

**TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
DEPOT
CORE ENGINE MODULE
AIRCRAFT ENGINE
USAF MODEL
F100-PW-229**

**PRATT & WHITNEY
LARGE MILITARY ENGINES
UNITED TECHNOLOGIES CORPORATION
F33657-84-C-2014
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THIS PUBLICATION IS ONE OF A SET OF TWELVE MANUALS. THE COMPLETE SET CONSISTING OF T.O. 2J-F100-53-1 THROUGH T.O. 2J-F100-53-11 AND T.O. 2J-F100-11-2 IS REQUIRED FOR DEPOT MAINTENANCE.

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RECORD OF CHANGES

Original	15 Aug 91	Change 16	15 Aug 95
Change 1	15 Nov 91	Change 17	15 Nov 95
Change 2	15 Feb 92	Change 18	15 Feb 96
Change 3	15 May 92	Change 19	15 May 96
Change 4	15 Aug 92	Change 20	15 Aug 96
Change 5	15 Nov 92	Change 21	15 Nov 96
Change 6	15 Feb 93	Change 22	15 Feb 97
Change 7	15 May 93	Change 23	15 May 97
Change 8	15 Aug 93	Change 24	15 Aug 97
Change 9	15 Nov 93	Change 25	15 Nov 97
Change 10	15 Feb 94	Change 26	15 Feb 98
Change 11	15 May 94	Change 27	15 Aug 98
Change 12	15 Aug 94	Change 28	15 Nov 98
Change 13	15 Nov 94	Change 29	15 Feb 99
Change 14	15 Feb 95	Change 30	15 May 99
Change 15	15 May 95	Change 31	15 Aug 99

TOTAL NUMBER OF PAGES IN THIS MANUAL IS 3172

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NUMERICAL INDEX OF EFFECTIVE WORK PACKAGES**NOTE**

Only those work packages (WP) and subordinate work packages (SWP) assigned to this manual are listed in this index.

Insert Change No. 31 work packages and subordinate work packages, dated 15 August 1999. Dispose of superseded work packages and subordinate work packages. If changed pages are issued to a work package or subordinate work package, insert the changed pages in the applicable work package or subordinate work package. The portion of the text affected in a changed WP or SWP is indicated by change bars in the outer margin of each column of text. Changes to illustrations are indicated by pointing hands or change bars, as applicable. Changes to wiring diagrams are indicated by shaded areas.

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023 00	0	319 00	0
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438 00 New	29	499 00 through 599 00	Open
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* Zero in this Column Indicates an Original WP/SWP

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

This is a list of TCTOs applicable to this manual. TCTOs will also be listed in the work packages to which they apply.

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229-560	30 Apr 95	O/I	Reoperation of PWA 57742, No. 4 Bearing Front Seal Assembly Leak Check Fixture, F100-PW-229 Engine, F-15/F-16 Aircraft. (ECP 93QC001AR1)
2J-F100229(II)-502	30 Oct 91	O/I	Retrofit of Fuel Manifold Brackets and Clamps, Core Module, F100-PW-229 Engines, F-15/F16 Aircraft. (ECP 89QA694)
2J-F100229(II)-509	15 Apr 92	O/I	Retrofit of 4th Through 9th Stage Compressor Stator Assembly Featuring Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engines, F15/F16 Aircraft. (ECP 90QA096)
2J-F100229(II)-510	30 Aug 93	O/I	Reoperation of Hardware for Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engines, F15/F16 Aircraft. (ECP 90QA096)
2J-F100229(II)-514	15 Jun 98	D	Retrofit of PN 4077913 Rear Compressor Exit Stator Assembly Featuring PN 4077422 Compressor Damper, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 89QA728)
2J-F100229(II)-519	31 Dec 93	O/I	Retrofit of Improved 4th and 5th Stage Bushings to Eliminate Back-out, F100-PW-229 Engine, F15/F16 Aircraft. (ECP 92QA105)
2J-F100229(II)-521	8 Jul 93	O/I	Retorque of Left and Right Fuel Supply Tubes and Replacement of Lockwire, F100-PW-229 Engine, F16 Aircraft.
2J-F100229(II)-522	15 Aug 93	O/I	Retorque of Left and Right Fuel Supply Tubes and Replace Safety Wire, F100-PW-229 Engines, F15 Aircraft.
2J-F100229(II)-523	30 Nov 93	O/I	Remove and Replace No. 4 Bearing Air Seal Assembly PN 4074849 With New Assembly Featuring Increased Forward Snap Diameter, F100-PW-229 Engines, F15/F16 Aircraft (ECP 90QA181)

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS (continued)

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-532	30 Nov 95	O/I	Remove and Replace No. 4 Bearing Oil Pressure Transfer Tube, B-Nut, and Install Conical Seal, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 91QA245C2)
2J-F100229(II)-536	30 Jul 95	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)
2J-F100229(II)-538	15 Mar 96	O/I	Retrofit of No. 2/3 Bearing Crossover Housing Aft Flange Bolts PN ST5001-12 Featuring Increased Strength and Torque, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 92QA295C1)
2J-F100229(II)-548	30 May 97	D	Reoperation of Diffuser Case Assembly OD Rear Flange to Incorporate a New Short Skirt Configuration, F100-PW-229, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-550	15 May 98	D	Final Assembly of Core Module Featuring '97 Enhancement Package, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-552	31 Oct 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-559	15 Oct 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-15 Aircraft (ECP 96QA179)
2J-F100229(II)-560	01 May 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-16 Aircraft (ECP 96QA179)
2J-F100(II)-603	28 Feb 92	O/I	Retrofit of Combustion Chamber No. 2 ID Liner Segments to Improve Combustion Exit Temperature Profile, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 90QA280)
2J-F100(II)-606	15 Oct 91	O/I	Remove and Replace No. 4 Bearing Air Supply Tube Adapter Bolts PN ST2151-012, F100-PW-229 Engines, F15/F16 Aircraft (ECP 90QB134)

SAFETY SUMMARY

INTRODUCTION

This Technical Order (T.O.) describes physical and chemical processes which may require the use of chemicals, solvents, paints, or other commercially available hazardous material. This T.O. also describes maintenance actions which may require handling or use of potentially dangerous parts or equipment.

Personnel performing maintenance procedures and practices included in this T.O. shall be familiar with safety precautions and procedures associated with chemicals and other hazardous materials, parts and equipment. The user of this T.O. shall consult their local safety and health staff and Material Safety Data Sheet (MSDS) concerning any questions on hazardous chemicals, personal protective equipment requirements, and appropriate handling and emergency procedures. The user shall become completely familiar with the manufacturer/supplier information and adhere to the procedures, recommendations, warnings, and cautions of the manufacturer/supplier for the safe use, handling, storage, and disposal of these materials. Disregarding safety precautions and procedures or performing unauthorized maintenance can cause engine or equipment damage, serious injury, illness, or death.

BACKUP WRENCH

When torquing or breaking torque on any tube coupling nut, use a suitable wrench to apply torque to the fitting to which the part is attached. Failure to properly use a backup wrench can result in failure of tubes and accessories due to stress loading during torquing procedures.

BEARING HANDLING

The most common cause of bearing damage is attributed to improper preservation and mishandling. Do not handle bearings with bare hands. Wear approved gloves when handling bearings. Coat bearings with engine oil and store in labeled containers as matched sets. Ensure all bearing components have matching serial numbers before installation to prevent bearing failure due to mismatched contact surfaces.

BRAZING, SOLDERING AND WELDING

Brazing, soldering and welding operations may produce fumes that can be harmful to breathe. Arc welding emits ultraviolet light, which can burn the skin and eyes. Provide adequate ventilation. Wear protective clothing/equipment. Ensure gas bottles are properly secured.

CABLES, ELECTRICAL

Small radius bends or severe flexing of electrical cables can result in damage to conductors and/or outer braid.

SAFETY SUMMARY (continued)

CARBON SEALS AND SEAL SEATS

Carbon seals and carbon seal seats are easily damaged and shall be handled with care. Do not allow carbon seals to come in contact with petroleum based solvents. These solvents will reduce the lubricity of the carbons and result in rapid seal wear. Do not handle carbon seals or seal seats with bare hands. Wear approved, lint free gloves.

CHEMICAL COMPOUNDS AND SOLUTIONS

Many of the chemical compounds and solutions used in cleaning, inspection, and repair may cause irritation to the skin, eyes, and respiratory system. Many of the chemicals, including their vapors, may be poisonous, easily ignited, corrosive, and react violently with incompatible materials. Improper mixing and combining of these chemicals may produce violent reactions, rapid heat generation, and explosive/toxic gases. Heating certain chemicals may cause toxic gases to be produced. Observe manufacturer's warning labels and Material Safety Data Sheet (MSDS) instructions for proper handling, storage, and disposal. Consult the local Safety Office for additional information.

COMPRESSED AIR

Compressed air can generate flying debris and can cause severe injury if air blast penetrates the skin or eyes. Reduce compressed air pressure for cleaning or drying to less than 30 psig. Use with effective chip guarding and personal protective equipment. Do not direct air blast toward other personnel.

COMPRESSED GASES

Many compressed gases are highly flammable/explosive and can cause suffocation at varied levels of concentration or exposure time. Some of the gases can freeze body tissue. Keep ignition sources away. Provide adequate ventilation. Wear protective clothing/equipment. Store in properly marked/labeled containers at approved locations. Do not use in confined areas which may create an explosive atmosphere. Refer to specific Material Safety Data Sheet (MSDS) for additional information.

DANGEROUS PRESSURE

Pressure system precautions apply to all equipment using gases and fluids at all ranges of pressure. To avoid injury, stand clear of tooling and parts being pressure tested when pressure is being applied. Proper tool installation, shielding and hose connections shall be ensured before applying pressure. Ensure all system components are compatible with pressures applied and pressure medium used. Pressure shall be applied slowly.

SAFETY SUMMARY (continued)**ELECTROSTATIC DISCHARGE (ESD)**

Circuit card assemblies and their related components may be damaged by undetectable electrostatic discharge. Care shall be used during handling or repair of these items. Use electrostatic discharge precautionary standard operating procedures.

ENGINE AND ACCESSORIES - TEMPERATURE

Aircraft engines and accessories are extremely hot following operation. Allow sufficient time to cool or wear protective clothing/equipment when maintenance or inspection tasks are required following engine operation. Failure to comply may result in injury to personnel.

ENGINE AND CONTROLS PRESERVATION

Engines and engine controls shall be drained of all fuel and preserved before shipping. Failure to drain fuel can result in a fire hazard. Engine preservation replaces any fuel with oil, which acts as a corrosion preventing agent.

FOREIGN OBJECT DAMAGE (FOD)

Foreign objects can enter engine compartments and accessories during maintenance. Always be aware of the potential for foreign object damage (FOD) entering any uncovered opening of an engine or accessory. Always thoroughly clean parts and compartments to remove all foreign material. Make a final detail inspection of the work area when the job is finished. Follow standard operating procedures for tool and equipment accountability.

FOOD AND TOBACCO

Wash hands and face thoroughly prior to smoking tobacco products or eating food. Residue of the materials used in engine and equipment maintenance can cause serious health problems if ingested or inhaled in the smoke.

HEARING PROTECTION

The frequency and intensity of noise generated during some operations may cause an acute or chronic hearing impairment. Wear approved hearing protection equipment. Contact the local safety office or bioenvironmental engineering for further guidance.

SAFETY SUMMARY (continued)

HYDRAULIC TOOLING

Application of hydraulic pressure to tooling or engine parts can cause them to jump with enough force to cause personal injury. Excessive pressure applied to tooling by a hydraulic pump can cause a structural failure to the engine part and/or the tooling which could result in personal injury. Using a ram with a nonapproved part number or exceeding hydraulic pump pressure can result in excessive pressure being applied to tooling. Do not exceed ram capacity for a given tool. Stand clear of tooling and engine parts during hydraulic tool operations.

JEWELRY

Remove rings, watches, necklaces, and other metallic objects that may be snagged or cause shock or burn hazards.

LEAD SEALS

Lead seals shall only be removed when specifically called for in the procedure. Lead seals identify areas of critical adjustment that can only be attained at the Depot or Vendor level.

LIFTING, ROTATING, AND SUPPORTING

Personnel shall stay clear of objects being lifted during hoist operations or when objects are supported by temporary transition supports. To prevent personal injury, use adequate number of personnel and appropriately rated lifting/handling devices to lift or move objects. Unless specified in the procedures, personnel shall not work on objects suspended by a hoist or supported by temporary transition supports. Personnel shall be prepared for potential unbalanced conditions during hoist operations.

LIVE ELECTRICAL CIRCUITS

Do not work on electrical systems, replace components, or make adjustments to equipment with the electrical supply turned on. Under certain conditions, danger may exist even when the power control is in the ''off'' position due to charges retained by capacitors. To avoid injuries, always remove power from, discharge, and ground a circuit prior to servicing. Adhere to all lock-out/tag-out requirements.

MAINTENANCE STANDS AND FIXTURES

Ensure modules or assemblies are firmly secured to work stands or fixtures before performing maintenance procedures. Personal injury or damage to modules or assemblies may occur if a work stand or fixture slips.

SAFETY SUMMARY (continued)**METAL MACHINING PROCESSES**

Metal machining processes may generate dust, fumes, filings, and/or shavings which may cause acute/chronic irritation to the skin, eyes, digestive tract, and respiratory system. Metallic dust vapors may form a fire hazard when exposed to heat, flame, or when in contact with oxidizing agents. Prior to performing any metal machining process, personnel shall consult their local safety and health staff and the Material Safety Data Sheet (MSDS) to become familiar with the hazards and protective measures for a specific metal.

MOVING ENGINE

Do not move an engine on work stand rails or transportation trailer without having installed proper supports, tie-rods, and flange adapters. Engine may shift or fall off rails and cause injury to personnel. When moving engine, do not push on engine. Use the engine support mount assemblies as a push point.

PACKING LUBRICATION (OIL AND FUEL SYSTEMS)

Use only the lubricant specified in the technical order to lubricate fuel and oil system packings. Use of an incompatible lubricant can cause oil foaming, clogging of critical fuel system filters, and packing deterioration leading to leakage, possible fire and engine shutdown.

PROTECTIVE CLOSURES AND COVERS

Install protective closures on all plumbing and components immediately upon removal. Install protective covers on engine modules, assemblies, parts, and compartments when not being worked.

QUICK RELEASE PINS

Do not force quick release pins into place as this may damage the self-locking feature of the pins. The compatibility of quick release pins is determined by the part number. Intermixing of pin part numbers during installation can result in loss of or failure of the quick release pins.

SHARP EDGED BLADES

Many blades have sharp edges. Wear protective gloves when handling bladed rotors and when installing or removing blades from rotors. Blades should only be used in their designed holder or rotor.

SAFETY SUMMARY (continued)

SUPER-CHILLED/HEATED PARTS AND EQUIPMENT

Super-chilled or heated parts and the equipment or agents used to heat or chill can cause burns, frostbite, or both. Wear temperature resistant gloves and other related protective clothing/equipment when handling chilled or heated parts or equipment. Super-chilled parts are fragile due to a lower resistance to impact. Heating parts beyond specified temperature limits can degrade heat treat qualities and result in part failure.

TEMPERATURE NORMALIZING

Allow heated or chilled parts to reach room temperature before applying final torque to fasteners. Failure to comply may result in improperly seated parts and/or mistorqued fasteners.

WORK BOLTS AND WORK NUTS

Work bolts and work nuts shall be permanently marked to distinguish them from engine bolts and nuts. Do not apply lubricants to work bolts and work nuts that will be replaced by engine bolts and nuts which require a thread sealant. Sealants will not adhere to threads contaminated with lubricants.

WORK PACKAGE**CORE ENGINE MODULE****ALPHABETICAL INDEX****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

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ALPHABETICAL INDEX

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Inspection - - - - -	339 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	439 00
Bearing, No. 4, Outer Race	
Cleaning - - - - -	201 00
Disassembly - - - - -	031 00
Inspection - - - - -	339 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	439 00
Bearing and Coupling Assy, No. 2	
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Cleaning - - - - -	201 00
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Installation - - - - -	605 00
Removal - - - - -	022 00
Bearing, Ball, Annular	
Assembly - - - - -	701 00
Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	339 00
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Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
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Inspection - - - - -	374 00
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Installation - - - - -	701 00
Removal - - - - -	014 00
Replacement - - - - -	628 00
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Blade, Compressor Rotor, 6th and 7th Stage	
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Inspection - - - - -	374 00
Inspection After Volcanic Ash Ingestion - - - - -	374 01
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Inspection After Volcanic Ash Ingestion - - - - -	374 01
Installation - - - - -	701 00
Removal - - - - -	014 00
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Replacement - - - - -	630 00
Bleed Valve Strap, Assy of	
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Installation - - - - -	701 00
Removal - - - - -	014 00
Bolt, Internally Relieved	
Assembly - - - - -	604 00
Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	343 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Borescope Plug, Compressor Intermediate Case	
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Bracket - Compressor Stator Linkage Arm, Assembly of	
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C	
Case Assy, Compressor Intermediate	
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Cleaning - - - - -	201 00
Disassembly - - - - -	028 00
Inspection - - - - -	369 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	469 00
Case, Compressor 4th Stage, Assy of	
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Inspection - - - - -	364 00
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Cleaning - - - - -	201 00
Disassembly - - - - -	029 00
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Repair - - - - -	434 00
Case, Turbine, Front	
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Cleaning - - - - -	201 00
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Chamber, Combustion, Assy of	
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	619 01
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	033 01
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Inspection - - - - -	372 00
Installation - - - - -	706 00
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Coupling, Gearbox Driveshaft Assembly	
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Inspection - - - - -	344 00
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Coupling, Turbine Shaft	
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D	
Diffuser Case, Assy of	
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Cleaning - - - - -	201 00
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Inspection - - - - -	370 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	434 00
Discharge Manifold, Compressor, Assy of	
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Disk and Hub, Compressor, 6th Stage, Assy of	
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Disassembly - - - - -	035 00
Inspection - - - - -	305 00
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Disk, Drum Rotor, Rear Compressor Front, Assy of (4th through 5th Stages)	
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Disassembly - - - - -	035 00
Inspection - - - - -	302 00
Installation - - - - -	701 00
Removal - - - - -	014 00
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Subject	WP/SWP No.
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Inspection - - - - -	361 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	461 00
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Fan Exit Stator	
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Inspection - - - - -	348 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Flange, No. 4 Bearing Air Sealing Ring	
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Cleaning Assembly - - - - -	201 00
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Inspection - - - - -	333 01
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Repair - - - - -	433 01
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Cleaning - - - - -	201 00
Inspection - - - - -	377 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Fuel Supply Manifold, Connector Tube, Assy of	
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Installation - - - - -	706 00
Removal - - - - -	011 00
Fuel Supply Manifold, Left, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	340 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Fuel Supply Manifold, Right, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	340 00
Installation - - - - -	706 00
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G	
Gear, Bevel, Gearbox Drive (73 Teeth)	
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Cleaning - - - - -	201 00
Disassembly - - - - -	026 00
Inspection - - - - -	311 00
Installation - - - - -	701 00
Removal - - - - -	014 00

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Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	311 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	411 00
Gearbox Drive Bearing Housing	
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Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	310 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	410 00
Gearbox Driveshaft Coupling	
Assembly - - - - -	604 00
Cleaning - - - - -	201 00
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Inspection - - - - -	344 00
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Removal - - - - -	022 00
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Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	345 00
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Removal - - - - -	022 00
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Housing Assembly, No. 2 Bearing	
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Inspection - - - - -	315 00
Installation - - - - -	701 00
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Disassembly - - - - -	031 00
Inspection - - - - -	327 00
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Disassembly -----	025 00
Inspection -----	310 00
Installation -----	605 00
Removal -----	022 00
Repair -----	410 00
I	
Insert, Screw Thread (Igniter Plug Boss Insert)	
Inspection -----	378 00
Installation -----	706 00
Removal -----	029 00
Repair -----	478 00
Intermediate Case, Compressor, Assy of	
Assembly -----	609 00
Cleaning -----	201 00
Disassembly -----	028 00
Inspection -----	369 00
Installation -----	701 00
Removal -----	014 00
Repair -----	469 00
Internally Relieved Bolt	
Assembly -----	604 00
Cleaning -----	201 00
Disassembly -----	025 00
Inspection -----	343 00
Installation -----	605 00
Removal -----	022 00
L	
Lock, No. 3 Bearing	
Cleaning -----	201 00
Inspection -----	322 00
Installation -----	701 00
Removal -----	014 00
Lock, Rear Compressor Driveshaft Nut	
Repair -----	404 00
M	
Manifold Assy, Compressor Discharge, Left	
Installation -----	706 00
Removal -----	011 00
Manifold Assy, Compressor Discharge, Right	
Installation -----	706 00
Removal -----	011 00
Manifold, Fuel Supply, Left, Assy of	
Cleaning -----	201 00
Inspection -----	340 00
Installation -----	706 00
Removal -----	011 00
Repair -----	440 00

ALPHABETICAL INDEX (continued)

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Inspection - - - - -	340 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	440 00
Manifold, Pressure, No. 4 Bearing, Internal, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	372 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	472 00
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N	
Nozzle, No. 2 and No. 3 Bearing, Assy of	
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Installation - - - - -	701 00
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Cleaning - - - - -	201 00
Installation - - - - -	706 00
Removal - - - - -	011 00
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Cleaning - - - - -	201 00
Disassembly - - - - -	024 00
Inspection - - - - -	307 00
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Nut, No. 3 Bearing Retaining, Internally Threaded	
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Inspection - - - - -	303 00
Repair - - - - -	403 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Nut, No. 4 Bearing Retaining, Internally Threaded	
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Inspection - - - - -	307 00
Installation - - - - -	706 00
Removal - - - - -	011 00

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Subject	WP/SWP No.
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Inspection - - - - -	303 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	403 00
Nut, Gearshaft Bearing Retaining, Internally Threaded	
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Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	307 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Nut, Inverted Spanner	
Assembly - - - - -	604 00
Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	307 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Nut, Plain Round	
Assembly - - - - -	604 00
Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	307 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Nut, Rear Compressor Drive Shaft	
Cleaning - - - - -	201 00
Inspection - - - - -	350 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	450 00
Nut, Retaining, Gearbox Drive Bevel Gearshaft Outer Race	
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Cleaning - - - - -	201 00
Disassembly - - - - -	022 00
Inspection - - - - -	307 00
Installation - - - - -	701 00
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O	
Oil Check Valve Assembly, No. 3 Bearing	
Installation - - - - -	701 00
Removal - - - - -	014 00
Outer Gearbox Drive Bevel Gearshaft Race	
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Installation - - - - -	701 00
Removal - - - - -	014 00

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Manifolds, Left and Right Fuel Supply - - - - -	707 00
R	
Race, Outer Gearbox Drive Bevel Gearshaft	
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Cleaning - - - - -	201 00
Disassembly - - - - -	022 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Rail, Compressor Stator, 7th, 8th, and 9th Stage	
Assembly - - - - -	621 00
Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Ring, Air Sealing and Seal, No. 4 Bearing, Front	
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Disassembly - - - - -	030 00
Installation - - - - -	614 00
Removal - - - - -	029 00
Ring, Air Sealing, No. 4 Bearing, Front, Assy of (Multiply Lands)	
Assembly - - - - -	614 00
Cleaning - - - - -	201 00
Disassembly - - - - -	029 00
Inspection - - - - -	373 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Ring, Air Sealing, No. 4 Bearing, Front, Assy of (Single Land)	
Assembly - - - - -	612 00
Cleaning - - - - -	201 00
Disassembly - - - - -	030 00
Inspection - - - - -	333 00
Installation - - - - -	614 00
Removal - - - - -	029 00
Repair - - - - -	433 00

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Subject	WP/SWP No.
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Inspection - - - - -	325 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	425 00
Ring, Air Sealing, Turbine, 1st Stage, Assy of	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	359 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	459 00
Ring, Air Sealing, Turbine, Inner, 1st Stage, Assy of	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	359 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	459 00
Ring, Air Sealing, Turbine, Outer, 1st Stage, Assy of	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	359 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	459 00
Ring, Compressor Blade Lock, 4th, 5th, 6th, and 7th Stage	
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Disassembly - - - - -	035 00
Inspection - - - - -	374 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Ring, Retaining	
Assembly - - - - -	603 00
Cleaning - - - - -	201 00
Disassembly - - - - -	024 00
Inspection - - - - -	346 00
Installation - - - - -	605 00
Removal - - - - -	022 00

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Disassembly - - - - -	034 00
Inspection - - - - -	335 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Ring Half, Synchronizing, Rear Compressor Stator, Inlet, Assy of	
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Inspection - - - - -	335 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Ring Segment, Compressor Stator Lock, 4th, 5th, and 6th Stage, Assy of	
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Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Inspection - - - - -	366 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Ring Segment, Compressor Stator Support, 10th through 12th Stage	
Inspection - - - - -	397 00
Rotor and Stator Assy, Turbine, Rear Compressor Drive (Refer to T.O. 2J-F100-53-8)	
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Removal - - - - -	011 00

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Subject	WP/SWP No.
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Scoop, No. 2 Bearing, Front	
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Disassembly - - - - -	024 00
Inspection - - - - -	313 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	413 00
Scoop, No. 2 Bearing, Rear	
Assembly - - - - -	603 00
Cleaning - - - - -	201 00
Disassembly - - - - -	024 00
Inspection - - - - -	314 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	414 00
Scoop, No. 4 Bearing	
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Inspection - - - - -	328 00
Inspection After Volcanic Ash Ingestion - - - - -	328 01
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	428 00
Seal, Air, No. 3 Bearing	
Cleaning - - - - -	201 00
Inspection - - - - -	336 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	436 00
Seal, Air, No. 4 Bearing, Front	
Cleaning - - - - -	201 00
Inspection - - - - -	334 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	438 00

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Disassembly - - - - -	023 00
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Seal Assy, No. 3 Bearing, Rear	
Assembly - - - - -	609 00
Disassembly - - - - -	027 00
Installation - - - - -	610 00
Removal - - - - -	028 00
Seal, Face, No. 2 Bearing, Assy of, Front	
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Cleaning - - - - -	201 00
Disassembly - - - - -	021 00
Inspection - - - - -	317 00
Inspection After Volcanic Ash Ingestion - - - - -	317 01
Installation - - - - -	701 00
Removal - - - - -	013 00
Repair - - - - -	417 00
Seal, Face, No. 2 Bearing, Assy of, Rear	
Assembly - - - - -	606 00
Cleaning - - - - -	201 00
Disassembly - - - - -	023 00
Inspection - - - - -	317 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	417 00
Seal, Face, No. 3 Bearing, Assy of, Front	
Assembly - - - - -	606 00
Cleaning - - - - -	201 00
Disassembly - - - - -	023 00
Inspection - - - - -	318 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Repair - - - - -	418 00
Seal, Face, No. 3 Bearing, Assy of, Rear	
Assembly - - - - -	601 00
Cleaning - - - - -	201 00
Disassembly - - - - -	028 00
Inspection - - - - -	319 00
Installation - - - - -	609 00
Removal - - - - -	027 00
Repair - - - - -	419 00
Seal, Face, No. 4 Bearing, Assy of	
Assembly - - - - -	612 00
Cleaning - - - - -	201 00
Disassembly - - - - -	030 00
Inspection - - - - -	320 00
Inspection After Volcanic Ash Ingestion - - - - -	320 01
Installation - - - - -	614 00
Removal - - - - -	029 00
Repair - - - - -	420 00

ALPHABETICAL INDEX (continued)

Subject f	WP/No.
Seal Ring, No. 2 Bearing	
Assembly -----	601 00
Cleaning -----	201 00
Disassembly -----	021 00
Inspection -----	342 00
Inspection After Volcanic Ash Ingestion -----	342 01
Installation -----	701 00
Removal -----	014 00
Seal Ring, No. 3 Bearing, Front	
Assembly -----	606 00
Cleaning -----	201 00
Disassembly -----	023 00
Inspection -----	342 00
Inspection After Volcanic Ash Ingestion -----	342 01
Installation -----	605 00
Removal -----	022 00
Seal Ring, No. 3 Bearing, Rear	
Assembly -----	610 00
Cleaning -----	201 00
Disassembly -----	027 00
Inspection -----	342 00
Inspection After Volcanic Ash Ingestion -----	342 01
Installation -----	609 00
Removal -----	028 00
Seal Ring, No. 4 Bearing, Front	
Assembly -----	612 00
Disassembly -----	030 00
Inspection -----	342 00
Inspection After Volcanic Ash Ingestion -----	342 01
Installation -----	614 00
Removal -----	029 00
Seal Ring, No. 4 Bearing, Rear	
Assembly -----	617 00
Cleaning -----	201 00
Disassembly -----	032 00
Inspection -----	342 00
Inspection After Volcanic Ash Ingestion -----	342 01
Installation -----	706 00
Removal -----	011 00
Seat, No. 2 Bearing Seal, Front	
Assembly -----	603 00
Cleaning -----	201 00
Disassembly -----	024 00
Inspection -----	306 00
Inspection After Volcanic Ash Ingestion -----	306 01
Installation -----	605 00
Removal -----	022 00
Repair -----	406 00
Seat, No. 2 Bearing Seal, Rear	
Assembly -----	603 00
Cleaning -----	201 00
Disassembly -----	024 00
Inspection -----	306 00
Inspection After Volcanic Ash Ingestion -----	306 01
Installation -----	605 00
Removal -----	022 00
Repair -----	406 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Seat, No. 3 Bearing Seal, Front	
Cleaning - - - - -	201 00
Inspection - - - - -	306 00
Inspection After Volcanic Ash Ingestion - - - - -	306 01
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	406 00
Seat, No. 3 Bearing Seal, Rear	
Cleaning - - - - -	201 00
Inspection - - - - -	306 00
Inspection After Volcanic Ash Ingestion - - - - -	306 01
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	406 00
Seat, No. 4 Bearing Seal, Front	
Cleaning - - - - -	201 00
Inspection - - - - -	306 00
Inspection After Volcanic Ash Ingestion - - - - -	306 01
Installation - - - - -	701 00
Removal - - - - -	011 00
Repair - - - - -	406 00
Seat, No. 4 Bearing Seal, Rear	
Cleaning - - - - -	201 00
Inspection - - - - -	306 00
Inspection After Volcanic Ash Ingestion - - - - -	306 01
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	406 00
Shield, Heat, Compressor, Stator, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	363 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Shroud, Compressor Stator, 3rd Stage	
Cleaning - - - - -	201 00
Inspection - - - - -	330 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	430 00
Shroud, Compressor Stator, 7th Stage, Assy of	
Inspection - - - - -	354 00
Installation - - - - -	621 00
Removal - - - - -	034 00
Repair - - - - -	454 00
Shroud, Compressor Stator, 8th Stage, Assy of	
Inspection - - - - -	354 00
Installation - - - - -	621 00
Removal - - - - -	034 00
Repair - - - - -	454 00
Shroud, Compressor Stator, 9th Stage, Assy of	
Inspection - - - - -	354 00
Installation - - - - -	621 00
Removal - - - - -	034 00
Repair - - - - -	454 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Shroud Set, Rear Compressor Stator, Inlet	
Cleaning - - - - -	201 00
Inspection - - - - -	331 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Repair - - - - -	431 00
Shroud Segment Sets, Compressor Stator, 4th, 5th, and 6th Stage	
Assembly - - - - -	621 00
Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Inspection - - - - -	365 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	465 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Sleeve, Gearbox Drive Gearshaft	
Assembly - - - - -	604 00
Cleaning - - - - -	201 00
Disassembly - - - - -	025 00
Inspection - - - - -	345 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Static Pressure Probe Connector Tube	
Cleaning - - - - -	201 00
Inspection - - - - -	372 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	472 00
Stator, Fan Exit	
Cleaning - - - - -	201 00
Inspection - - - - -	348 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Repair - - - - -	448 00
Stator Compressor Exit	
Assembly - - - - -	614 00
Cleaning - - - - -	201 00
Disassembly - - - - -	029 00
Inspection - - - - -	367 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	467 00
Stator, Compressor, 3rd Stage	
Cleaning - - - - -	201 00
Inspection - - - - -	321 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Repair - - - - -	421 00
Stator Segment, Compressor, 7th, 8th, and 9th Stages	
Assembly - - - - -	621 00
Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Inspection - - - - -	354 00
	355 00
Inspection After Volcanic Ash Ingestion - - - - -	355 01
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	455 00
Stator Segment, Compressor, 10th through 12th Stages	
Cleaning - - - - -	201 00
Inspection - - - - -	352 00 353
	00 354 00
Inspection After Volcanic Ash Ingestion - - - - -	352 01
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	452 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Support Bracket, Strap and Actuating Linkage, Bumper and Carriage, Bleed Valve	
Cleaning - - - - -	201 00
Inspection - - - - -	349 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	449 00
Support, Compressor Stator, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	337 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	437 00
Support, No. 2 Bearing	
Assembly - - - - -	601 00
Cleaning - - - - -	201 00
Disassembly - - - - -	021 00
Inspection - - - - -	309 00
Inspection After Volcanic Ash Ingestion - - - - -	309 01
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	409 00
Support, No. 2 and No. 3 Bearing Seal, Assy of	
Assembly - - - - -	606 00
Cleaning - - - - -	201 00
Disassembly - - - - -	023 00
Inspection - - - - -	316 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Support, No. 3 Bearing, Assy of	
Assembly - - - - -	608 00
Cleaning - - - - -	201 00
Disassembly - - - - -	026 00
Inspection - - - - -	323 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	423 00
Support, No. 3 Bearing Seal, Assy of	
Assembly - - - - -	610 00
Cleaning - - - - -	201 00
Disassembly - - - - -	027 00
Inspection - - - - -	307 00
Installation - - - - -	324 00
Removal - - - - -	362 00
Repair - - - - -	609 00
Support, No. 4 Bearing Seal, Assy of, Front	
Assembly - - - - -	028 00
Cleaning - - - - -	407 00
Disassembly - - - - -	612 00
Inspection - - - - -	201 00
Installation - - - - -	030 00
Removal - - - - -	332 00
Repair - - - - -	614 00
Installation - - - - -	029 00
Removal - - - - -	432 00
Repair - - - - -	

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Support, No. 4 Bearing Seal, Assy of, Rear	
Assembly - - - - -	617 00
Cleaning - - - - -	201 00
Disassembly - - - - -	032 00
Inspection - - - - -	326 00
Inspection After Volcanic Ash Ingestion - - - - -	326 01
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	426 00
Support, Turbine Stator, 1st Stage, Assy of (TOBI)	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	359 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	459 00
Synchronizing Arm, Rear Compressor Stator, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	335 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	435 00
Synchronizing Ring Half, Compressor Stator, 4th, 5th, and 6th Stage, Assy of	
Assembly - - - - -	621 00
Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Inspection - - - - -	335 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	435 00
Synchronizing Ring Half, Rear Compressor Stator, Inlet, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	335 00
Installation - - - - -	609 00
Removal - - - - -	028 00
T	
Tip Shrouds, Compressor Blade, Fourth Through Thirteenth Stage	
Inspection Using PWA 57832 Inspection Gage - - - - -	353 00
Tube, Air Supply, No. 4 Bearing Seal, Assy of	
Assembly - - - - -	614 00
Cleaning - - - - -	201 00
Disassembly - - - - -	029 00
Inspection - - - - -	372 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	472 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Tube, Air Vent, No. 4 Bearing Internal, Assy of	
Assembly - - - - -	614 00
Cleaning - - - - -	201 00
Disassembly - - - - -	029 00
Inspection - - - - -	372 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Repair - - - - -	472 00
Tube Assy, Compressor Bleed	
Inspection - - - - -	382 00
Installation - - - - -	621 00
Removal - - - - -	014 00
Repair - - - - -	482 00
Tube Assy, Pressure, No. 2 and No. 3 Bearing Outer Internal	
Cleaning - - - - -	201 00
Inspection - - - - -	308 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	408 00
Tube Assy, Pressure, No. 3 Bearing Outer Internal	
Cleaning - - - - -	201 00
Inspection - - - - -	308 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Tube Pressure, No. 3 Bearing Seal Support Damper, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	301 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	401 00
Tube Pressure, No. 4 Bearing, Internal, Assy of	
Cleaning - - - - -	201 00
Inspection - - - - -	372 00
Installation - - - - -	614 00
Removal - - - - -	029 00
Repair - - - - -	472 00
Turbine, Rear Compressor Drive, Rotor and Stator, Assy of	
(Refer to T.O. 2J-F100-53-8)	
Installation - - - - -	706 00
Removal - - - - -	011 00
Turbine Shaft Coupling	
Assembly - - - - -	603 00
Cleaning - - - - -	201 00
Disassembly - - - - -	024 00
Inspection - - - - -	310 00
Installation - - - - -	605 00
Removal - - - - -	022 00
Turbine Stator, 1st Stage, Support, Assy of (TOBI)	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	359 00
Installation - - - - -	706 00
Removal - - - - -	011 00

ALPHABETICAL INDEX (continued)

Subject	WP/SWP No.
Turbine Stator Vane, 1st Stage, Assy of	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	360 00
Installation - - - - -	706 00
Removal - - - - -	011 00
V	
Vacuum Check	
Compartment, No. 2 and No. 3 Bearing - - - - -	704 00
Compartment, No. 4 Bearing - - - - -	708 00
Valve Assy, Oil Check No. 3 Bearing	
Installation - - - - -	701 00
Removal - - - - -	014 00
Vane, Compressor, 4th, 5th, and 6th Stage	
Assembly - - - - -	621 00
Cleaning - - - - -	201 00
Disassembly - - - - -	034 00
Inspection - - - - -	375 00
Installation - - - - -	701 00
Removal - - - - -	014 00
Repair - - - - -	475 00
Vane, Rear, Compressor Stator Variable Inlet	
Cleaning - - - - -	201 00
Inspection - - - - -	357 00
Installation - - - - -	609 00
Removal - - - - -	028 00
Repair - - - - -	457 00
Vane, Turbine Stator, 1st Stage, Assy of	
Assembly - - - - -	619 00
	619 01
Cleaning - - - - -	201 00
Disassembly - - - - -	033 00
	033 01
Inspection - - - - -	360 00
Installation - - - - -	706 00
Removal - - - - -	011 00
Volcanic Ash Removal - - - - -	202 00
W	
Washer, Spring Tension	
Assembly - - - - -	610 00
Cleaning - - - - -	201 00
Disassembly - - - - -	027 00
Inspection - - - - -	347 00
Installation - - - - -	609 00
Removal - - - - -	028 00

WORK PACKAGE**CORE ENGINE MODULE****INTRODUCTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 24

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	9 - 10	29	17	1
2	24	11	23	18 Blank	0
3	9	12	29	19	29
4	27	13	0	20 Blank	0
5	0	14 Blank	0	21	0
6	29	15	0	22 Blank	0
7	28	16 Blank	0	23	23
8	25			24 Blank	0

1. INTRODUCTION.

- a. This technical order contains depot maintenance instructions for core engine module.

2. CONTENTS, ARRANGEMENT, AND NUMBERING OF WORK PACKAGES.

- a. This technical order contains work packages arranged in separate groups for disassembly, cleaning, inspection, repair, and assembly functions.
- b. A block of five-digit numbers has been reserved for each group. For example, the block of numbers reserved for the inspection group is 300 00 through 399 00. Similarly, the block of numbers for the repair group is 400 00 through 599 00. Each block contains enough numbers to allow for expansion.
- c. The numbers within each block identify a work package.

- d. The first work package in a group is the introductory work package. This work package provides a listing of all the work packages within the group by title and number. The work package groups in this manual are as follows:

WP Block Numbers	Functional Group
001 00	Alphabetical Index
002 00	Introduction
003 00	Module Removal and
through	Installation in Shipping
009 00	Container
010 00	Module Dismantling
through	
019 00	
020 00	Disassembly of
through	Subassemblies
199 00	
200 00	Cleaning
through	
299 00	
300 00	Inspection
through	
399 00	
400 00	Repair
through	
599 00	
600 00	Assembly of Subassemblies
through	
699 00	
700 00	Final Assembly
through	
799 00	
800 00	Table of Limits and
through	Clearance Charts
801 00	

2A. CHANGE REQUEST

- a. Recommendations for specific changes to this technical order shall be submitted on an AFTO Form 22 to SA-ALC/LPCQ (TOMA), Kelly AFB, TX 78241-6421 in accordance with T.O. 00-5-1.

3. MODULE PICTORIAL INDEX.

(See FO-1 and Table 1.)

- a. A pictorial index is presented as an overall guide to identify each work package and associated assemblies and parts requiring depot maintenance.

4. LEADING PARTICULARS ON CORE ENGINE MODULE.

- a. The following is a list of leading particulars for the core engine.

CORE ENGINE MODULE

Length: 59.40 inches
Diameter: 33.60 inches
Weight: 1570 pounds (dry weight)

5. TYPICAL PART NUMBER.

- a. When the word typical precedes a part number, it indicates this part number is one of several that may be used in this location.
- b. By referring to this "typical" part number in the Illustrated Parts Breakdown (IPB) manual T.O. 2J-F100-54, all part numbers applicable to this location can be found.

- c. When a part number is used without the word typical, it indicates the procedure applies only to that part number.

6. LOCALLY MANUFACTURED SUPPORT EQUIPMENT.

- a. Locally manufactured support equipment may be manufactured by using activity or by a supplier.
- b. Locally manufactured support equipment is listed in the Master Numerical List of Support Equipment in T.O. 2J-F100-53-3 and the Applicable Support and Illustrated Support Equipment sections of maintenance WPs/SWPs.
- c. Locally manufactured support equipment is identified in these WPs/SWPs by the prefix LM and a four digit number (LM 0123), or by the prefix LM followed by the PWA number (LM PWA 51203).
- d. When an LM tool is identified in a maintenance WPs/SWPs, all data required to make the tool will be found in T.O. 2J-F100-53-3, WP 050 00.

Table 1. Core Engine Module - Pictorial Index

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
	CORE ENGINE MODULE	T.O. 2J-F100- 53-5, WP 134 00	011 00 (REAR) 014 00 (FRONT)				701 00 (FRONT) 706 00 (REAR)	T.O. 2J- F100- 53-5 WP 703 00	
1	SHROUD, COMPRESSOR STATOR, 3RD STAGE	014 00		201 00	330 00	430 00		701 00	
2	SEAL AND SUPPORT ASSEMBLY, NO. 2 BEARING	014 00						701 00	
3	SUPPORT, NO. 2 BEARING	014 00	021 00	201 00	309 00	409 00	601 00	701 00	
4	SEAL RING, NO. 2 BEARING	014 00	021 00	201 00	342 00		601 00	701 00	
5	SEAL, FACE NO. 2 BEARING, ASSY OF, FRONT	014 00	021 00	201 00	317 00	417 00	601 00	701 00	
6	TUBE PRESSURE, NO. 3 BEARING SEAL SUPPORT DAMPER, ASSY OF	014 00		201 00	301 00			701 00	
7	VALVE ASSY, OIL CHECK NO. 3 BEARING	014 00						701 00	
8	HOUSING, NO. 2 BEARING, ASSY OF	014 00	022 00	201 00	315 00	415 00	605 00	701 00	
9	NOZZLE, NO. 2 AND 3 BEARING, ASSY OF	014 00		201 00				701 00	
10	BEARING AND COUPLING ASSY, NO. 2	022 00	024 00	201 00			603 00	605 00	
11	COUPLING, TURBINE SHAFT	022 00	024 00	201 00	312 00	412 00	603 00	605 00	
12	SEAT, NO. 2 BEARING SEAL, FRONT	022 00	024 00	201 00	306 00	406 00	603 00	605 00	
13	SCOOP ASSEMBLY, NO. 2 BEARING, FRONT	022 00	024 00	201 00	313 00	413 00	603 00	605 00	
14	SCOOP, NO. 2 BEARING, REAR	022 00	024 00	201 00	314 00	414 00	603 00	605 00	
15	BEARING, NO. 2	022 00	024 00	201 00	339 00		603 00	605 00	
16	SEAT, NO. 2 BEARING SEAL, REAR	022 00	024 00	201 00	306 00	406 00	603 00	605 00	
17	NUT, BEARING RETAINING, INTERNALLY THREADED	022 00	024 00	201 00	303 00		603 00	605 00	
18	RING, RETAINING	022 00	024 00	201 00	346 00		603 00	605 00	
19	HOUSING ASSEMBLY, NO. 2 BEARING	014 00	022 00	201 00	315 00	415 00	605 00	701 00	
20	RACE, OUTER GEARBOX DRIVE BEVEL GEARSHAFT	014 00	022 00				605 00	701 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
21	NUT, RETAINING, GEARBOX DRIVE BEVEL GEARSHAFT OUTER RACE	014 00	022 00	201 00			605 00	701 00	
22	GEARSHAFT ASSEMBLY, GEARBOX DRIVE BEVEL	022 00	025 00	201 00	311 00	411 00	604 00	605 00	
23	HOUSING, GEARBOX DRIVE BEARING	022 00	025 00	201 00	310 00	410 00	604 00	605 00	
24	BEARING, BALL, ANNULAR	022 00	025 00	201 00	339 00		604 00	605 00	
25	SLEEVE, GEARBOX DRIVE GEARSHAFT	022 00	025 00	201 00	345 00		604 00	605 00	
26	NUT, BEARING RETAINING, INTERNALLY THREADED	022 00	025 00	201 00	303 00		604 00	605 00	
27	INVERTED NUT, SPANNER	022 00	025 00	201 00	303 00		604 00	605 00	
28	COUPLING, GEARBOX DRIVESHAFT	022 00	025 00	201 00	344 00		604 00	605 00	
29	BOLT, INTERNALLY RELIEVED	022 00	025 00	201 00	343 00		604 00	605 00	
30	BEARING, ROLLER CYLINDRICAL	022 00	025 00	201 00	339 00		604 00	605 00	
31	GEARSHAFT, BEVEL, GEARBOX DRIVE (38 TEETH)	022 00	025 00	201 00	311 00	411 00	604 00	605 00	
32	NUT, PLAIN ROUND	022 00	025 00	201 00	303 00		604 00	605 00	
33	SEAL ASSY, NO. 2 AND NO. 3 BEARING	022 00	023 00				606 00	605 00	
34	SEAL, FACE, NO. 2 BEARING, ASSY OF, REAR	022 00	023 00	201 00	317 00	417 00	606 00	605 00	
35	SUPPORT, NO. 2 AND NO. 3 BEARING SEAL, ASSY OF	022 00	023 00	201 00	316 00		606 00	605 00	
36	SEAL RING, NO. 3 BEARING, FRONT	022 00	023 00	201 00	342 00		606 00	605 00	
37	SEAL, FACE, NO. 3 BEARING, ASSY OF, FRONT	022 00	023 00	201 00	318 00	418 00	606 00	605 00	
38	NUT, BEARING RETAINING, INTERNALLY THREADED	014 00	201 00	201 00	303 00			701 00	
39	SEAT ASSY, NO. 3 BEARING SEAL, FRONT	014 00	201 00	201 00	306 00	406 00		701 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
40	NUT, BEARING RETAINING INTERNALLY THREADED	014 00		201 00	303 00			701 00	
41	LOCK, NO. 3 BEARING	014 00		201 00	322 00			701 00	
42	NO. 3 BEARING, NO. 3 BEARING SUPPORT AND GEARBOX DRIVE BEVEL GEAR	014 00						701 00	
43	GEARSHAFT, BEVEL, GEARBOX DRIVE (73 TEETH)	014 00	026 00	201 00	311 00		608 00	701 00	
44	BEARING, NO. 3	014 00	026 00	201 00	339 00		608 00	701 00	
45	SUPPORT, NO. 3 BEARING, ASSY OF	014 00	026 00	201 00	323 00	423 00	608 00	701 00	
46	SEAT ASSY, NO. 3 BEARING SEAL, REAR	014 00		201 00	306 00	406 00		701 00	
47	TUBE ASSY, PRESSURE, NO. 2 AND 3 BEARING INTERNAL PRESSURE	014 00		201 00	308 00	408 00		701 00	
48	TUBE ASSY, PRESSURE, NO. 3 BEARING OUTER INTERNAL	028 00		201 00	308 00			609 00	
49	CASE ASSY, COMPRESSOR INTERMEDIATE	014 00	028 00	201 00	369 00		609 00	701 00	
49A	BAFFLE, GEARBOX	028 00			379 00	479 00		609 00	
50	PLUG, BORESCOPE, COMPRESSOR INTERMEDIATE CASE	028 00						609 00	
51	SEAL ASSY, NO. 3 BEARING, REAR	028 00	027 00				610 00	609 00	
52	SEAL, FACE NO. 3 BEARING, ASSY OF, REAR	028 00	027 00	201 00	319 00	419 00	610 00	609 00	
53	SEAL RING, NO. 3 BEARING, REAR	028 00	027 00	201 00	342 00		610 00	609 00	
54	WASHER, SPRING TENSION	028 00	027 00	201 00	347 00		610 00	609 00	
55	SUPPORT, NO. 3 BEARING SEAL, ASSY OF	028 00	027 00	201 00	307 00 324 00 362 00	407 00	610 00	609 00	
56	SHROUD, COMPRESSOR STATOR INLET, ASSY OF	028 00		201 00	331 00 356 00	431 00		609 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
57	VANE, REAR, COMPRESSOR STATOR VARIABLE INLET	028 00		201 00	357 00	457 00		609 00	
58	SHROUD, REAR COMPRESSOR, STATOR INLET	028 00		201 00	331 00 356 00	431 00		609 00	
59	STATOR, FAN EXIT	028 00		201 00	348 00	448 00		609 00	
60	CASE, COMPRESSOR 4TH STAGE, ASSY OF	028 00		201 00	364 00			609 00	
61	DUCT SEGMENTS, COMPRESSOR, 4TH STAGE	014 00			388 00 388 01 388 02	488 00		701 00	
62	RING HALF, SYNCHRONIZING, REAR COMPRESSOR STATOR, INLET, ASSY OF	028 00		201 00	335 00			609 00	
63	SEAL, AIR NO. 3 BEARING	014 00		201 00	336 00	436 00		701 00	
64	ARM, REAR COMPRESSOR STATOR SYNCHRONIZING, ASSY OF	014 00		201 00	335 00	435 00		701 00	
65	STRAP, BLEED VALVE, ASSY OF	014 00		201 00	349 00	449 00		701 00	
66	GUIDE ASSY, BLEED VALVE STRAP CARRIAGE	014 00		201 00	349 00	449 00		701 00	
67	COMPRESSOR STATOR, 3RD STAGE	028 00		201 00	321 00	421 00		609 00	
68	BLADE, COMPRESSOR ROTOR, 4TH STAGE	014 00	035 00	201 00	374 00 374 01	474 00 474 01	622 00	701 00	628 00
69	BLADE, COMPRESSOR ROTOR, 5TH STAGE	014 00	035 00	201 00	374 00 374 01	474 00 474 01	622 00	701 00	628 00
70	DISK, DRUM ROTOR, REAR COMPRESSOR FRONT, ASSY OF	014 00	035 00	201 00	302 00	402 00	622 00	701 00	
71	RING, COMPRESSOR BLADE LOCK, 4TH STAGE	014 00	035 00				622 00	701 00	
72	RING, COMPRESSOR BLADE LOCK, 5TH STAGE	014 00	035 00				622 00	701 00	
73	RING, COMPRESSOR BLADE LOCK, 6TH AND 7TH STAGE	014 00	035 00				622 00	701 00	
74	BLADE, COMPRESSOR ROTOR, 6TH STAGE	014 00	035 00	201 00	374 00 374 01	474 00 474 01	622 00	701 00	629 00
75	DISK AND HUB, COMPRESSOR, 6TH STAGE, ASSY OF	014 00	035 00	201 00	305 00	405 00	622 00	701 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
76	CASE AND STATOR ASSY, COMPRESSOR, 4TH THROUGH 9TH STAGE	014 00	034 00	201 00			621 00	701 00	
77	VANE, COMPRESSOR STATOR, 4TH STAGE	014 00	034 00	201 00	375 00	475 00	621 00	701 00	
78	VANE, COMPRESSOR STATOR, 5TH STAGE	014 00	034 00	201 00	375 00	475 00	621 00	701 00	
79	VANE, COMPRESSOR STATOR, 6TH STAGE	014 00	034 00	201 00	375 00	475 00	621 00	701 00	
80	SHROUD SEGMENT SET, COMPRESSOR STATOR, 6TH STAGE	014 00	034 00	201 00	365 00	465 00	621 00	701 00	
81	RING SEGMENT, COMPRESSOR STATOR LOCK, 6TH STAGE, ASSY OF	014 00	034 00	201 00	366 00		621 00	701 00	
82	SHROUD SEGMENT SET, COMPRESSOR STATOR, 5TH STAGE	014 00	034 00	201 00	365 00	465 00	621 00	701 00	
83	RING SEGMENT, COMPRESSOR STATOR LOCK, 5TH STAGE, ASSY OF	014 00	034 00	201 00	366 00		621 00	701 00	
84	SHROUD SEGMENT SET, COMPRESSOR STATOR, 4TH STAGE	014 00	034 00	201 00	365 00	465 00	621 00	701 00	
85	RING SEGMENT, COMPRESSOR STATOR LOCK, 4TH STAGE, ASSY OF	014 00	034 00	201 00	366 00		621 00	701 00	
86	DUCT SEGMENT SET, COMPRESSOR, 5TH STAGE	014 00	034 00	201 00	388 00 388 01 388 02	488 00	621 00	701 00	
87	DUCT SEGMENT SET, COMPRESSOR, 6TH STAGE	014 00	034 00	201 00	388 00 388 01 388 02	488 00	621 00	701 00	
88	RING HALF, SYNCHRONIZING, COMPRESSOR STATOR, 4TH STAGE, ASSY OF	014 00	034 00	201 00	335 00	435 00	621 00	701 00	
89	RING HALF, SYNCHRONIZING, COMPRESSOR STATOR, 5TH STAGE, ASSY OF	014 00	034 00	201 00	335 00	435 00	621 00	701 00	
90	RING HALF, SYNCHRONIZING, COMPRESSOR STATOR, 6TH STAGE, ASSY OF (VARIABLE 6TH STAGE VANES ONLY)	014 00	034 00	201 00	335 00	435 00	621 00	701 00	
90A	ARM, COMPRESSOR STATOR, ASSY OF	014 00	034 00		335 00		621 00	701 00	
90B	LOCK, 6TH STAGE COMPRESSOR STATOR VANE (FIXED 6TH STAGE VANES, AFTER TCTO 2J-F100229(II)-509)	014 00	034 00		335 00		621 00	701 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
91	CASE SET, COMPRESSOR, 4TH THROUGH 9TH STAGE	014 00	034 00	201 00	351 00	451 00	621 00	701 00	
92	DUCT SEGMENT SET, COMPRESSOR, 7TH STAGE	014 00	034 00	201 00	388 00 388 01 388 02	488 00	621 00	701 00	
93	RAIL, COMPRESSOR STATOR, 7TH STAGE	014 00	034 00		390 00		621 00	701 00	
94	COMPRESSOR STATOR SEGMENT, 7TH STAGE	014 00	034 00	201 00	354 00 355 00	455 00	621 00	701 00	
94A	SHROUD, COMPRESSOR STATOR, 7TH STAGE		034 00		354 00	454 00		621 00	
95	COMPRESSOR STATOR SEGMENT, 8TH STAGE	014 00	034 00	201 00	354 00 355 00	455 00	621 00	701 00	
95A	SHROUD, COMPRESSOR STATOR, 8TH STAGE		034 00		354 00	454 00		621 00	
96	RAIL, COMPRESSOR STATOR, 8TH THROUGH 9TH STAGE	014 00	034 00		390 00		621 00	701 00	
97	COMPRESSOR STATOR SEGMENT, 9TH STAGE	014 00	034 00	201 00	354 00 355 00	455 00	621 00	701 00	
97A	SHROUD, COMPRESSOR STATOR, 9TH STAGE		034 00		354 00	454 00		621 00	
98	BLADE, COMPRESSOR ROTOR, 7TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	629 00
99	BLADE, COMPRESSOR ROTOR, 8TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
100	BLADE, COMPRESSOR ROTOR, 9TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
101	BLADE, COMPRESSOR ROTOR, 10TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
102	BLADE, COMPRESSOR ROTOR, 11TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
103	BLADE, COMPRESSOR ROTOR, 12TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
104	BLADE, COMPRESSOR ROTOR, 13TH STAGE	014 00	035 00	201 00	374 00	474 00 474 01	622 00	701 00	630 00
105	DISK, DRUM ROTOR, REAR COMPRESSOR, ASSEMBLY OF	014 00	035 00	201 00	361 00	461 00	622 00	701 00	
106	SEAL ASSY, AIR, NO. 4 BEARING	011 00		201 00	334 00	438 00		623 00	
107	SHIELD, HEAT, COMPRESSOR, STATOR, ASSEMBLY OF	011 00		201 00	363 00			706 00	
108	CASE, COMPRESSOR, 10TH THROUGH 12TH STAGE	014 00		201 00	368 00	468 00		701 00	
109	COMPRESSOR STATOR SEGMENT, 10TH THROUGH 12TH STAGE	014 00		201 00	352 00 354 00	452 00		701 00	
110	SUPPORT, COMPRESSOR STATOR, ASSY OF	014 00		201 00	337 00	437 00		701 00	
111	TUBE, AIR VENT, NO. 4 BEARING INTERNAL, ASSY OF	011 00	029 00	201 00	372 00	472 00	614 00	706 00	
112	TUBE, AIR VENT, NO. 4 BEARING INTERNAL, ASSY OF	011 00	029 00	201 00	372 00	472 00	614 00	706 00	
113	CONNECTOR, TUBE, STATIC PRESSURE PROBE	011 00		201 00	372 00	472 00		706 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
114	COMPRESSOR STATOR, EXIT	011 00	029 00	201 00	367 00	467 00	614 00	706 00	
115	RING, AIR SEALING, NO. 4 BEARING, FRONT, ASSY OF	011 00	029 00	201 00	373 00		614 00	706 00	
116	TUBE, AIR SUPPLY, NO. 4 BEARING SEAL, ASSY OF	011 00	029 00	201 00	372 00	472 00	614 00	706 00	
117	CASE, DIFFUSER, ASSY OF	011 00	029 00	201 00	370 00	434 00	614 00	706 00	
118	FLANGE, NO. 4 BEARING AIR SEALING RING	011 00	029 00	201 00	333 01	433 01	614 00	706 00	
119	MANIFOLD, PRESSURE, NO. 4 BEARING, INTERNAL, ASSY OF	011 00		201 00	372 00	472 00		706 00	
120	NOZZLE, FUEL	011 00		201 00				706 00	
120A	INSERT, SCREW THREAD (IGNITER PLUG BOSS INSERT)	029 00			378 00	478 00		706 00	
121	MANIFOLD ASSY, COMPRESSOR DISCHARGE, LEFT	011 00		201 00	396 00			706 00	
122	MANIFOLD ASSY, COMPRESSOR DISCHARGE, RIGHT	011 00		201 00	396 00			706 00	
123	TUBE, PRESSURE, NO. 4 BEARING, INTERNAL, ASSY OF	029 00		201 00	372 00	472 00		614 00	
124	RING, AIR SEALING AND SEAL, NO. 4 BEARING, FRONT	029 00	030 00				612 00	614 00	
125	RING, AIR SEALING, NO. 4 BEARING, FRONT, ASSY OF	029 00	030 00	201 00	333 00	433 00	612 00	614 00	
126	SUPPORT, NO. 4 BEARING SEAL, ASSEMBLY OF, FRONT	029 00	030 00	201 00	332 00	432 00	612 00	614 00	
127	SEAL RING, NO. 4 BEARING, FRONT	029 00	030 00		342 00		612 00	614 00	
128	SEAL, FACE, NO. 4 BEARING, ASSY OF	029 00	030 00	201 00	320 00	420 00	612 00	614 00	
129	SEAT ASSY, NO. 4 BEARING SEAL, FRONT	011 00		201 00	306 00	406 00		706 00	
130	SCOOP, NO. 4 BEARING	011 00		201 00	328 00	428 00		706 00	
131	BEARING, NO. 4	011 00		201 00	339 00	439 00		706 00	
132	HOUSING, NO. 4 BEARING, NUT RETAINING, OUTER RACE	011 00	031 00				616 00	706 00	

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
133	HOUSING, NO. 4 BEARING	011 00	031 00	201 00	327 00	427 00	616 00	706 00	
134	OUTER RACE, NO. 4 BEARING	011 00	031 00	201 00	339 00	439 00	616 00	706 00	
135	NUT, BEARING RETAINING, EXTERNALLY THREADED	011 00	031 00	201 00	303 00		616 00	706 00	
136	SEAT ASSY, NO. 4 BEARING SEAL, REAR	011 00		201 00	306 00	406 00		706 00	
137	NUT, BEARING RETAINING, INTERNALLY THREADED	011 00		201 00	303 00			706 00	
138	SUPPORT, NO. 4 BEARING SEAL, ASSEMBLY OF, REAR	011 00	032 00	201 00	326 00		617 00	706 00	
139	SEAL, FACE, NO. 4 BEARING, ASSY OF	011 00	032 00	201 00	320 00	420 00	617 00	706 00	
140	SEAL RING, NO. 4 BEARING, REAR	011 00	032 00	201 00	342 00		617 00	706 00	
141	SUPPORT, NO. 4 BEARING SEAL, REAR, ASSY OF	011 00	032 00	201 00	326 00	426 00	617 00	706 00	
142	RING, AIR SEALING, NO. 4 BEARING, REAR, ASSY OF	011 00		201 00	325 00	425 00		706 00	
143	CHAMBER, COMBUSTION, ASSY OF	011 00	033 00	201 00	358 00	458 00	619 00	706 00	
143A	CHAMBER, COMBUSTION, ASSY OF (INCORPORATING FRONT TURBINE CASE)	011 00	033 01*	201 00			619 01*	706 00	
143B	CASE, TURBINE, FRONT	011 00	033 01*	201 00			619 01*	706 00	
144	CONNECTOR, TUBE, FUEL SUPPLY MANIFOLD, ASSY OF	011 00						706 00	
145	MANIFOLD, FUEL SUPPLY, LEFT, ASSY OF	011 00		201 00	340 00	440 00		706 00	
146	MANIFOLD, FUEL SUPPLY, RIGHT, ASSY OF	011 00		201 00	340 00	440 00		706 00	
147	SUPPORT, FIRST STAGE TURBINE (TOBI), FIRST STAGE TURBINE STATOR VANES, ASSY OF	011 00	033 00 033 01*				619 00 619 01*	706 00	
148	VANE, TURBINE STATOR, 1ST STAGE, ASSY OF	011 00	033 00 033 01*	201 00 202 00	360 00		619 00 619 01*	706 00	
149	SUPPORT, TURBINE STATOR, 1ST STAGE, ASSY OF (TOBI)	011 00	033 00 033 01*	201 00	359 00	459 00	619 00 619 01*	706 00	

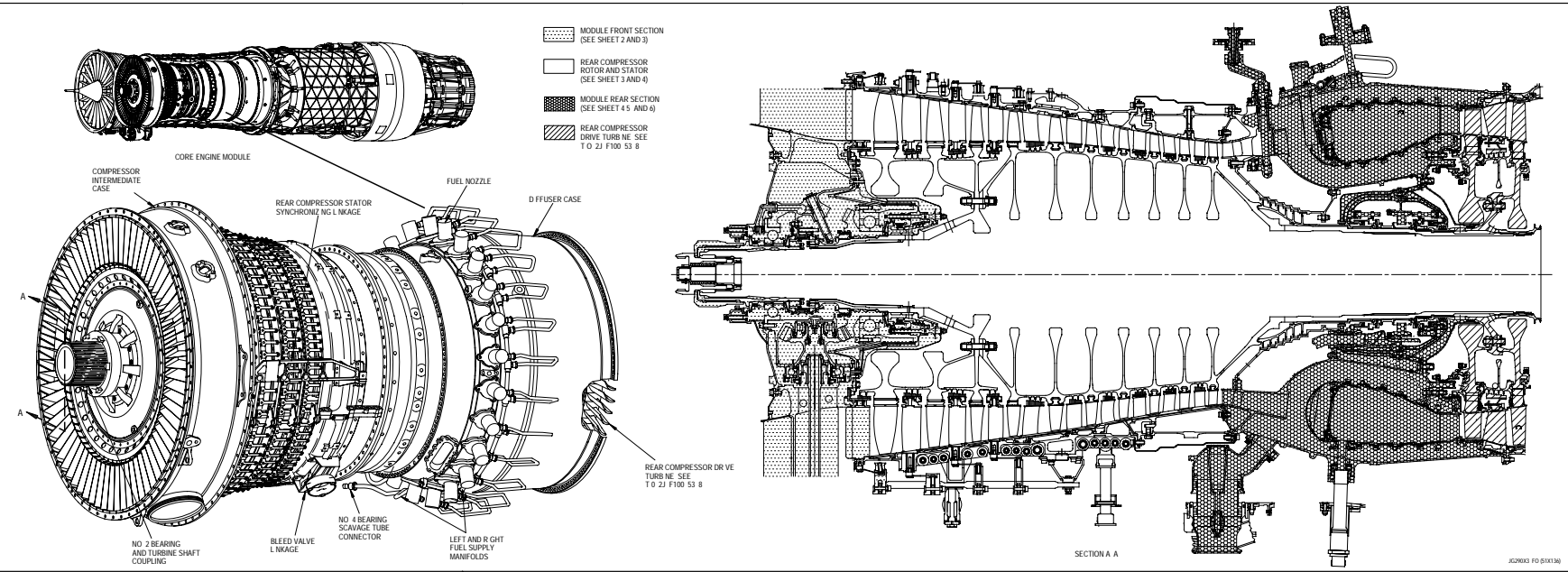
* These SWPs specifically address configuration incorporating front turbine case.

Table 1. Core Engine Module - Pictorial Index (continued)

(See FO-1.)

INDEX NO.	NAME	REM	DISASSY	CLEAN	INSP	REPAIR	ASSY	INSTL	OTHER
150	RING, AIR SEALING, TURBINE, INNER, 1ST STAGE, ASSY OF	011 00	033 00 033 01*	201 00	359 00	459 00	619 00 619 01*	706 00	
151	RING, AIR SEALING, TURBINE, OUTER, 1ST STAGE, ASSY OF	011 00	033 00 033 01*	201 00	359 00	459 00	619 00 619 01*	706 00	
152	SUPPORT, AIR SEALING RING, 1ST STAGE	011 00	033 00 033 01*	201 00	359 00		619 00 619 01*	706 00	
153	RING, AIR SEALING, TURBINE, 1ST STAGE, ASSY OF	011 00	033 00 033 01*	201 00	359 00	459 00	619 00 619 01*	706 00	
154	ROTOR AND STATOR ASSY, TURBINE, REAR COMPRESSOR DRIVE	011 00	REFER TO T.O. 2J-F100-53-8					706 00	
155	NUT, REAR COMPRESSOR DRIVE SHAFT	011 00		201 00	350 00	450 00		706 00	

* These SWPs specifically address configuration incorporating front turbine case.

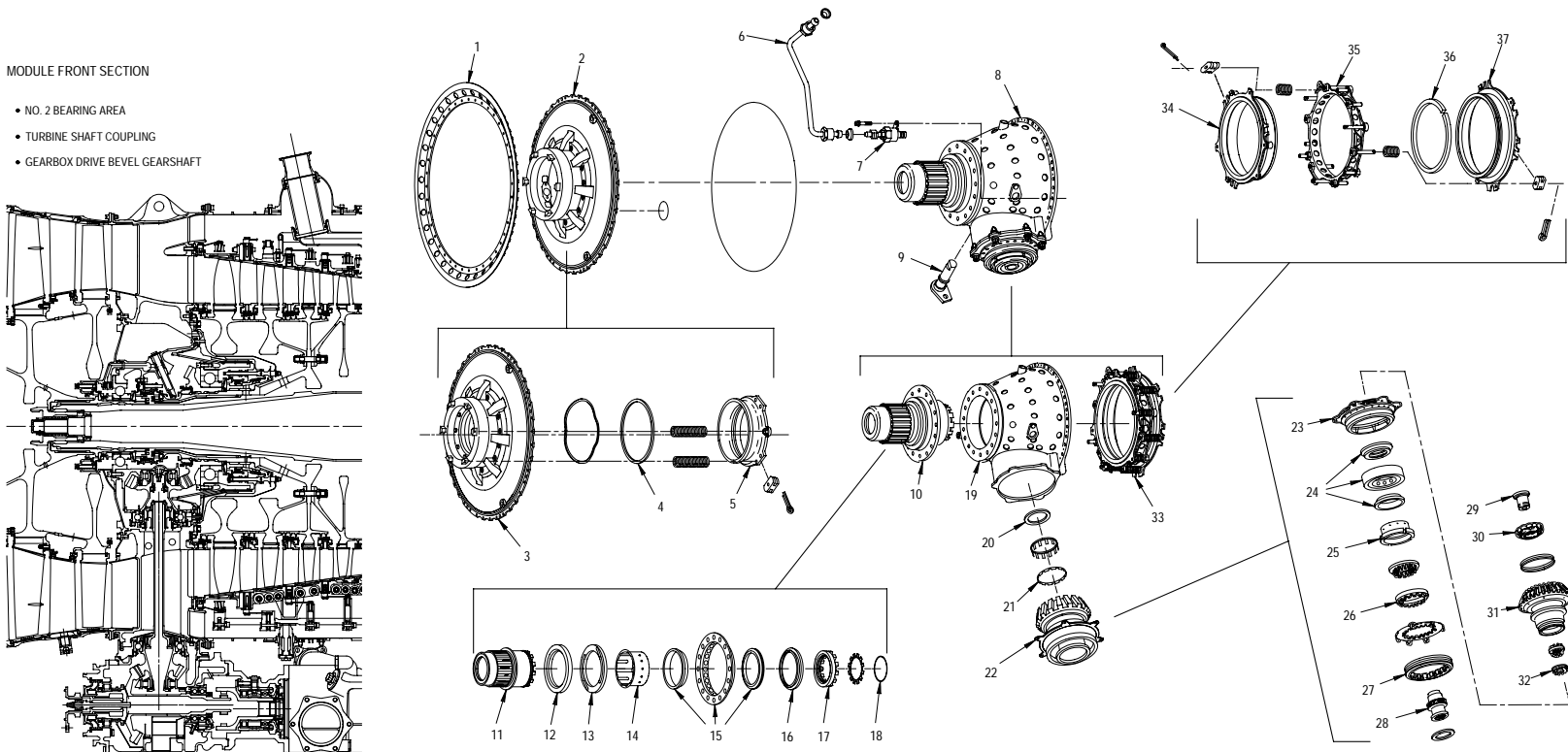


FO-1. Core Engine Module Pictorial Index (Sheet 1 of 6)

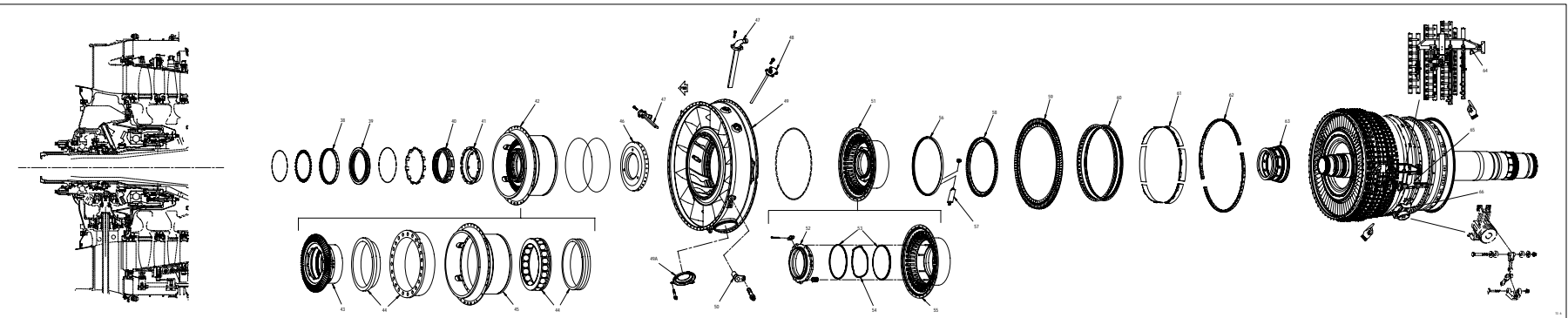
JG312X2 FO (51X100)

MODULE FRONT SECTION

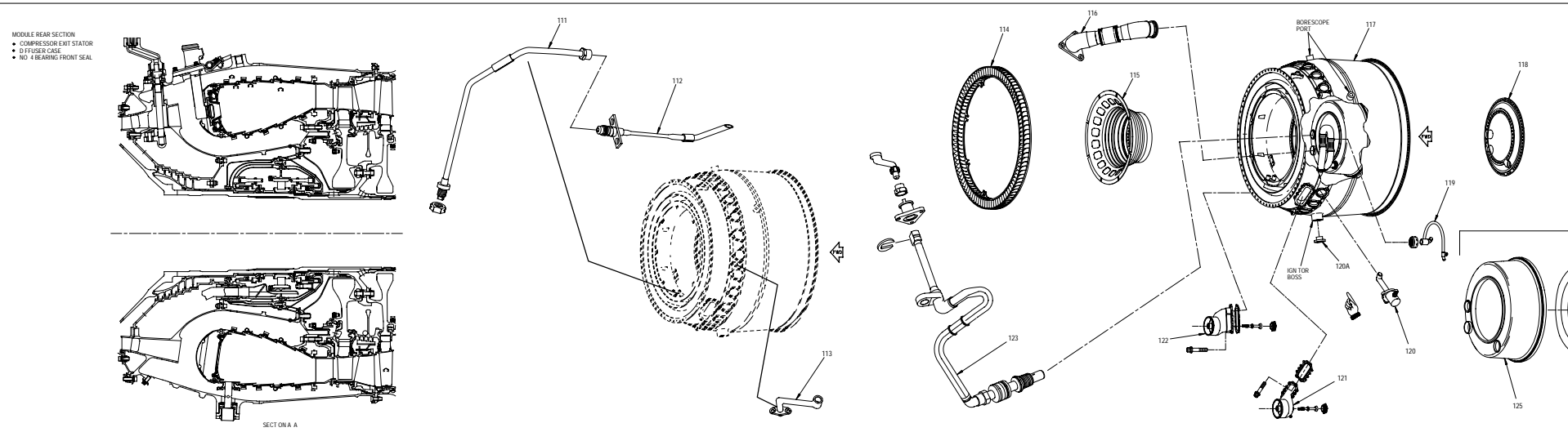
- NO. 2 BEARING AREA
- TURBINE SHAFT COUPLING
- GEARBOX DRIVE BEVEL GEARSHAFT



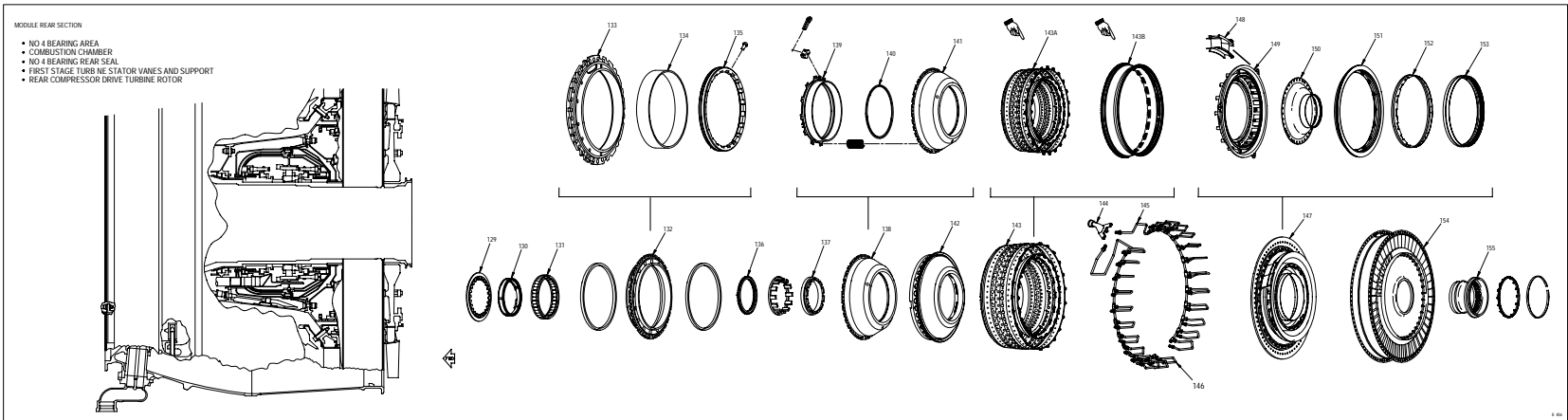
FO-1. Core Engine Module Pictorial Index (Sheet 2 of 6)



FO-1. Core Engine Module Pictorial Index (Sheet 3 of 6)



FO-1. Core Engine Module Pictorial Index (Sheet 5 of 6)



FO-1. Core Engine Module Pictorial Index (Sheet 6 of 6)

INTRODUCTION

REMOVAL/INSTALLATION IN SHIPPING CONTAINER

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2					

1. INTRODUCTION.

This work package introduces the 003 00 through 009 00 series of work packages for removal from and installation into shipping container. The following work packages are included in this series.

WP No.	Title
004 00	Core Engine Module - Removal From Shipping Container
005 00	Core Engine Module - Installation Into Shipping Container
006 00 through 009 00	Open

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****REMOVAL FROM SHIPPING CONTAINER****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 16

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	26	8	26	11 - 13	1
3	1	9	1	14	26
4 - 5	26	10	26	15	1
6 - 7	1			16 Blank	1

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

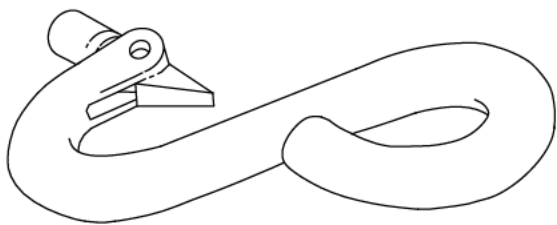
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

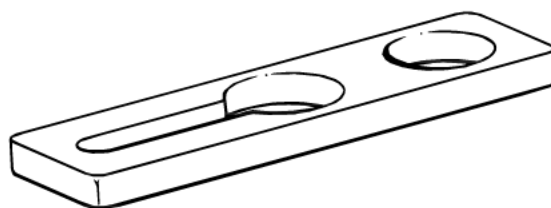
Paragraph	Function - Tool Nomenclature	Tool Number
2	CORE ENGINE MODULE - REMOVAL FROM SHIPPING CONTAINER	
	SLING, HANDLING - - - - -	PWA 56336
	HOOK, SAFETY (FOUR REQUIRED) - - - - -	PWA 2388
	RETAINER, FRONT, CORE ENGINE MODULE - - - - -	PWA 56731
	RETAINER, REAR, CORE ENGINE MODULE - - - - -	PWA 56732
	ADAPTER, LIFT AND TRUNNION (FOUR REQUIRED) - - - - -	PWA 26147
	ADAPTER, PLATE - - - - -	PWA 50992
	STAND, INLET FAN MODULE, STORAGE AND DISASSEMBLY - -	PWA 50775
		OR
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
	ADAPTER, TRUNNION, CORE ENGINE FRONT - - - - -	PWA 57623

ILLUSTRATED SUPPORT EQUIPMENT



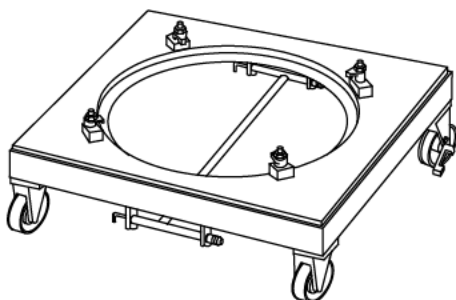
PWA 2388 -C

Figure T1. PWA 2388 Hook



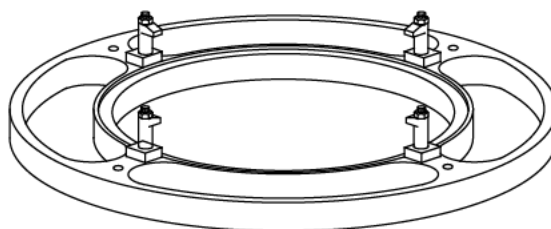
PWA 26147 -C

Figure T2. PWA 26147 Adapter



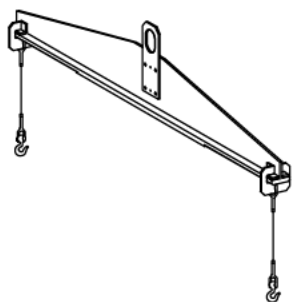
PWA 50775 -C

Figure T3. PWA 50775 Stand



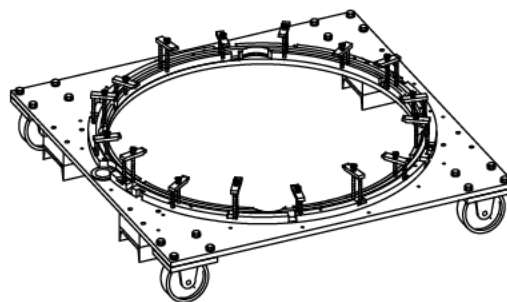
PWA 50992 -C

Figure T4. PWA 50992 Adapter



PWA 56336 -C

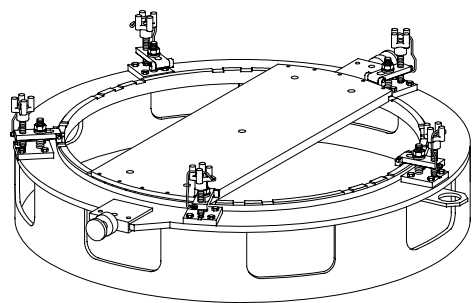
Figure T5. PWA 56336 Sling



PWA 56338 -C

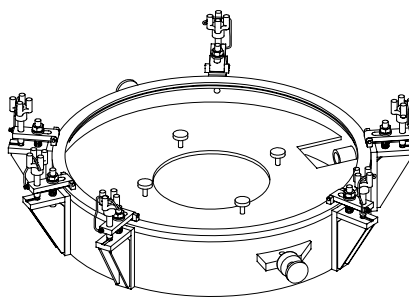
Figure T6. PWA 56338 Stand

ILLUSTRATED SUPPORT EQUIPMENT (continued)



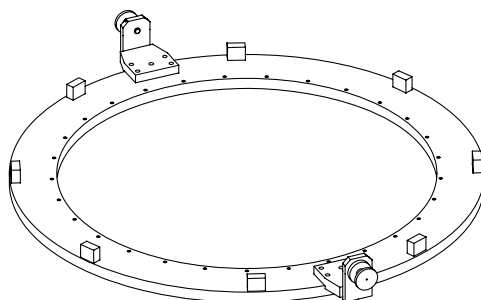
PWA 56731 -C

Figure T7. PWA 56731 RETAINER



PWA 56732 -C

Figure T8. PWA 56732 RETAINER



PWA 57623 -C

Figure T9. PWA 57623 ADAPTER

1. INTRODUCTION.

- a. This work package contains instructions for removing the core engine module from metal shipping container.
- b. Two shipping containers are available to transport F100-PW-229 core engine modules.

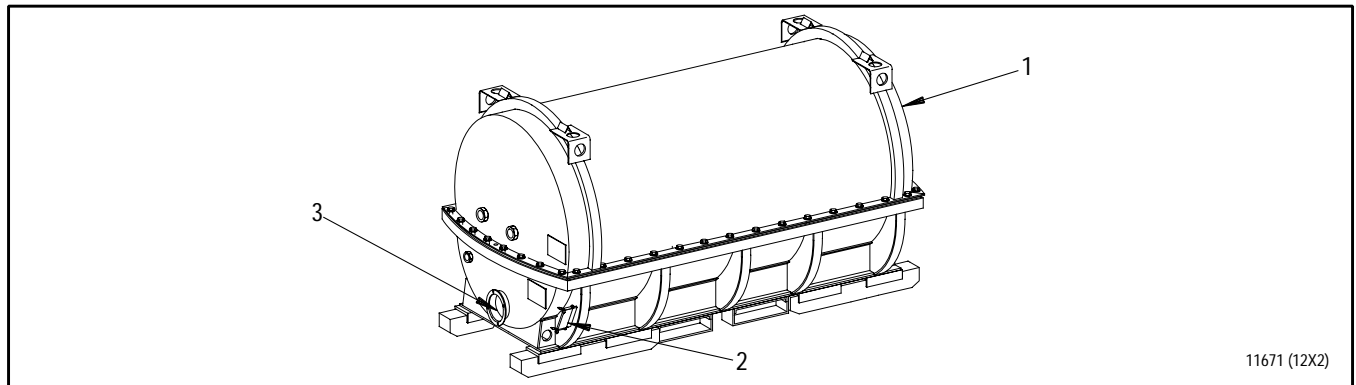
(1) PN 4078843 is a universal container for F100-PW-100/200/220/229 core engine modules. This container uses PWA 56731 and PWA 56732 retainers and two adapters, stored within the tools, to adapt to F100-PW-229 core engine modules.

(2) PN 4070529 container is for F100-PW-229 core engine modules only. This container uses front and rear lifting rings instead of PWA 56731 and PWA 56732 retainers and no adapters are required.

2. CORE ENGINE MODULE - REMOVAL FROM SHIPPING CONTAINER.

(See Figures 1 and 2.)

- a. Position shipping container under two hoists.
- b. Remove shipping papers from engine data box(2, figure 1, sheet 1.)



11671 (12X2)

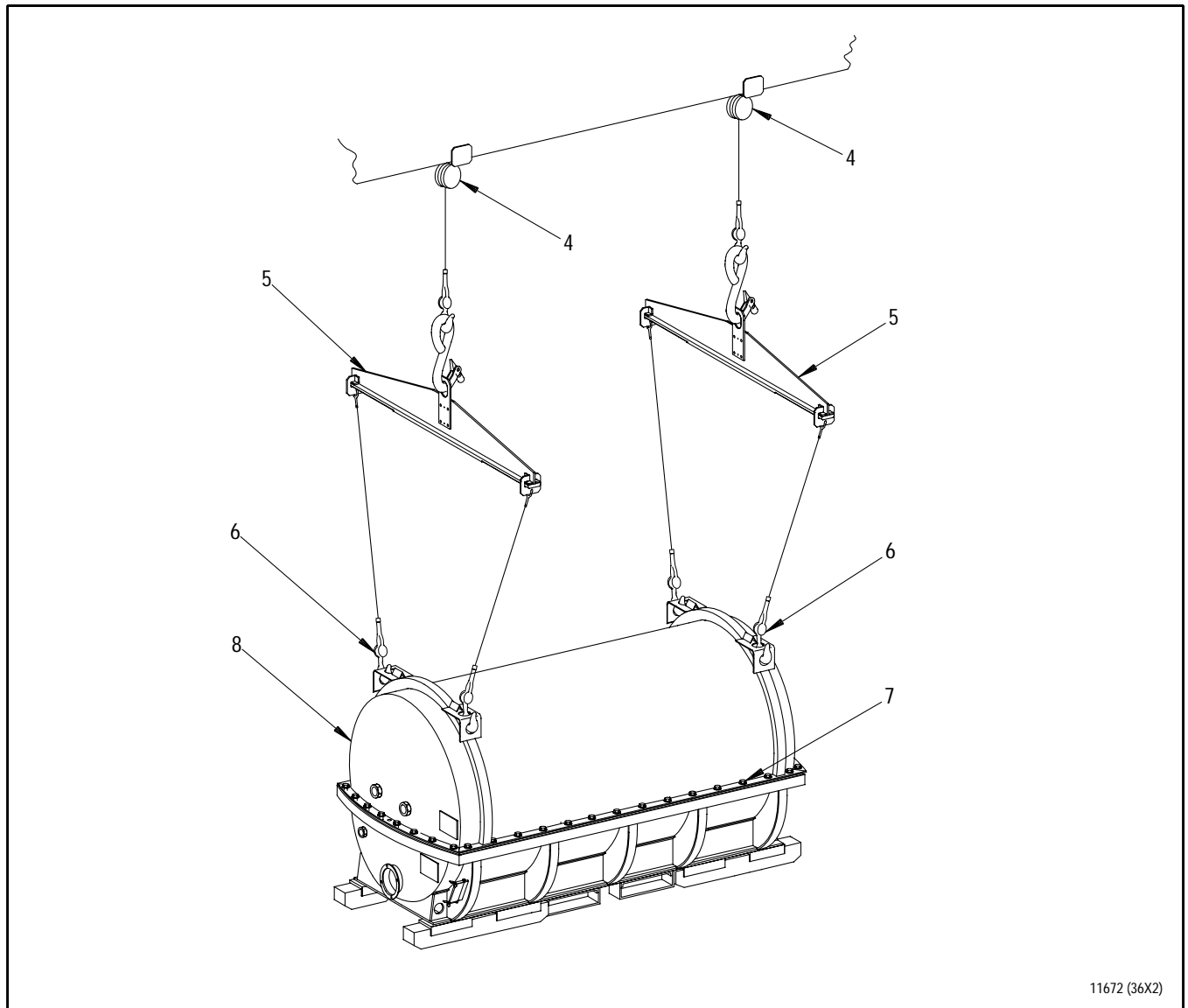
1. Core engine module shipping container
2. Engine data box
3. Air pressure relief valve

Figure 1. Core Engine Module - Removal From Shipping Container (Sheet 1 of 3)

WARNING

Shipping container may be sealed under pressure.

- c. Using air pressure relief valve(3), remove any air pressure from shipping container(1).
- d. Loosen adjusting screws in shank bottom of turnlock fasteners(7, figure 1, sheet 2). Release turnlock fasteners(7) by turning 1/4 turn counterclockwise.
- e. Attach two PWA 56336 slings(5) to two hoists(4).
- f. Install PWA 2388 hooks(6) to each corner of shipping container upper half(8).
- g. Connect slings(5) to hooks(6).
- h. Remove shipping container upper half(8) and place on wooden blocks as required, to prevent damaging turnlock fasteners and shipping container preformed packing.



11672 (36X2)

- | | |
|--------------------|----------------------------------|
| 4. Hoist | 7. Turnlock fasteners |
| 5. PWA 56336 sling | 8. Shipping container upper half |
| 6. PWA 2388 hook | |

Figure 1. Core Engine Module - Removal From Shipping Container (Sheet 2 of 3)

- i. Release front lifting ring or PWA 56731 retainer(9, figure 1, sheet 3) as follows:
 - (1) Release knob retainer(13) securing swing bolt(11) in retaining carriage(15).
 - (2) Loosen bar knob(12) and remove swing bolt(11) away from retaining bar(14).
 - (3) Move retaining bar(14) so front lifting ring or PWA 56731 retainer(9) can be removed.
- j. Release engine rear lifting ring or PWA 56732 retainer(10) as follows:
 - (1) Remove pin(17) locking latch clamp(16).
 - (2) Lift up on handle of latch clamp(16) releasing drawbar clamp(18).
 - (3) Move drawbar clamp(18) so engine rear lifting ring or PWA 56732 retainer(10) can be removed.
- k. Install PWA 26147 adapters(3, figure 2, sheet 1) to trunnion spools on front and rear lifting rings or retainers(2 and 6).
- l. Attach two PWA 56336 slings(1) to two hoists.
- m. Connect PWA 56336 slings(1) to PWA 26147 adapters(3).
- n. Lift core engine module out of shipping container. Remove polyethylene covering and P53376 skirt from core engine module.

Legend for figure 1 (continued)

- 9. Front lifting ring or PWA 56731 retainer
- 10. Rear lifting ring or PWA 56732 retainer
- 11. Swing bolt
- 12. Bar knob
- 13. Knob retainer
- 14. Retaining bar
- 15. Retaining carriage
- 16. Latch clamp
- 17. Pin
- 18. Drawbar clamp

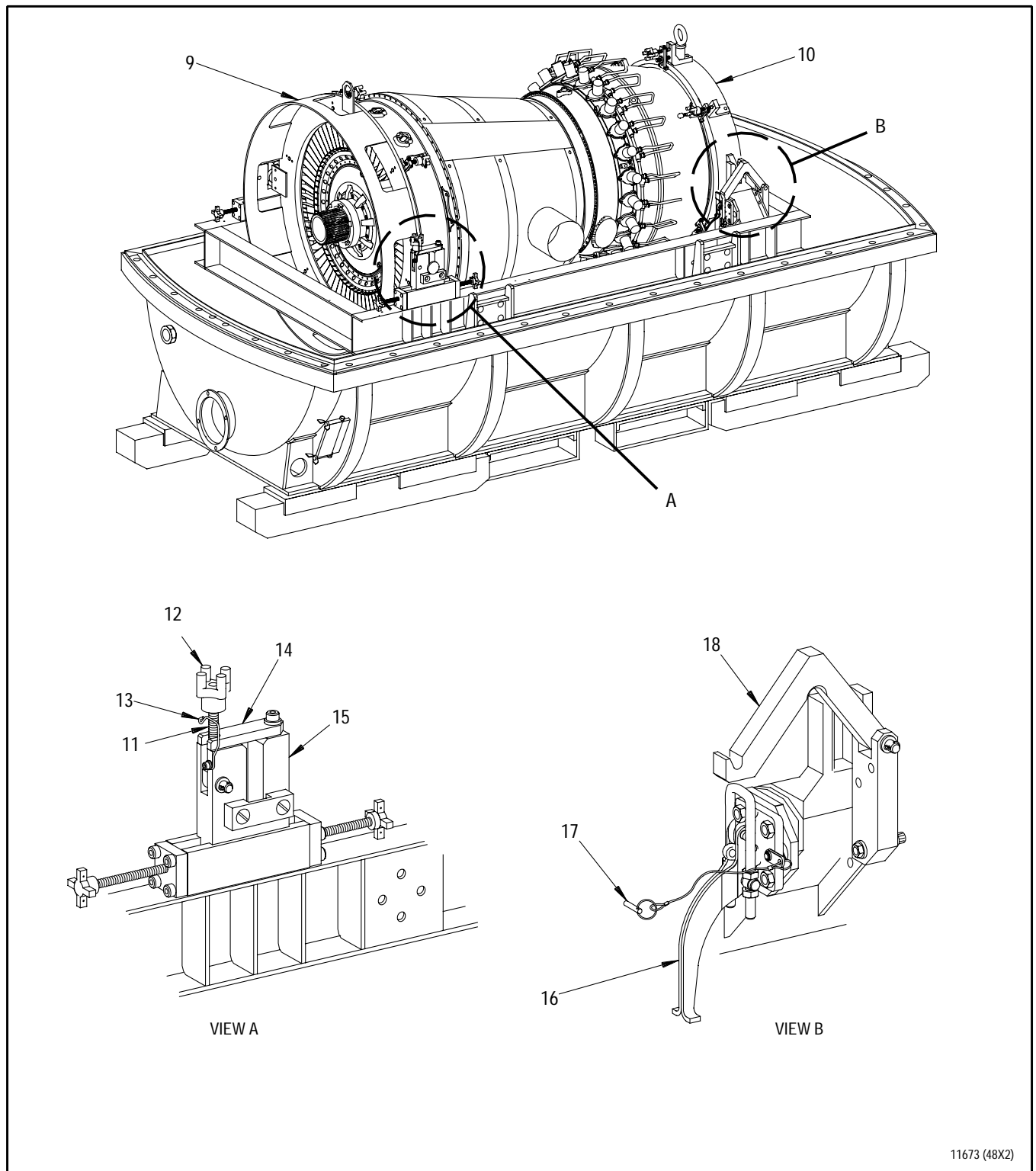


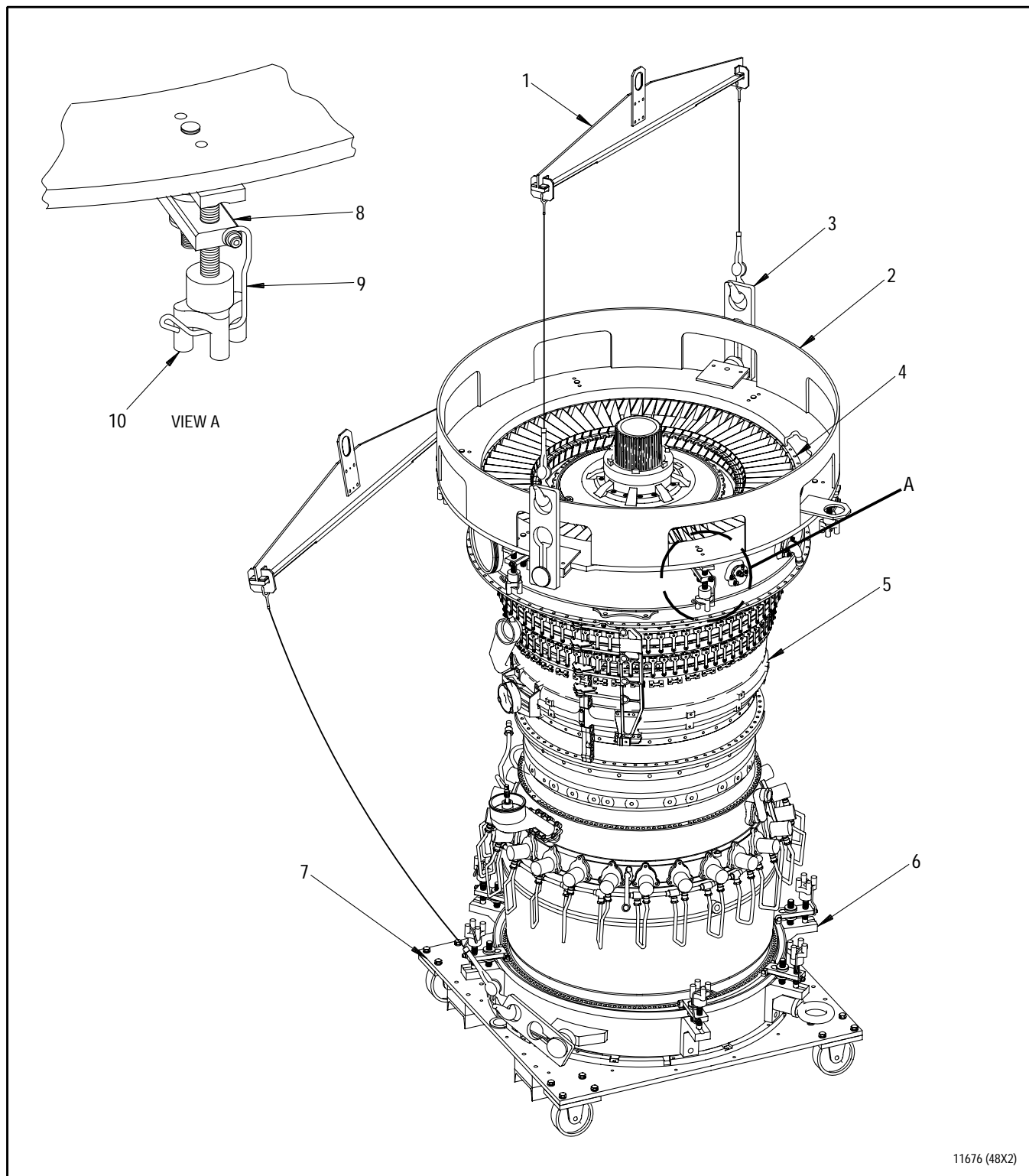
Figure 1. Core Engine Module - Removal From Shipping Container (Sheet 3 of 3)

11673 (48X2)

- nl. Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- o. Install PWA 50992 adapter plate onto PWA 50775 or PWA 56338 stand(7).
- p. Rotate core engine module(5) to rear end down position and lower onto PWA 50775 or PWA 56338 stand(7).
- q. Remove PWA 56336 sling(1) from rear lifting ring or PWA 56732 retainer(6).
- r. Remove front lifting ring or PWA 56731 retainer(2) as follows:
 - (1) Release knob retainer(9) securing bar knob(10) at six locations.
 - (2) Loosen bar knob(10) so clamping strap(8) can be moved away from intermediate case front flange(4).
 - (3) Remove front lifting ring or PWA 56731 retainer(2) from core engine module(5).

Legend for figure 2

- 1. PWA 56336 sling
- 2. Front lifting ring or PWA 56731 retainer
- 3. PWA 26147 adapter
- 4. Intermediate case front flange
- 5. Core engine module
- 6. Rear lifting ring or PWA 56732 retainer
- 7. PWA 50775 or PWA 56338 storage stand
- 8. Clamping strap
- 9. Knob retainer
- 10. Bar knob



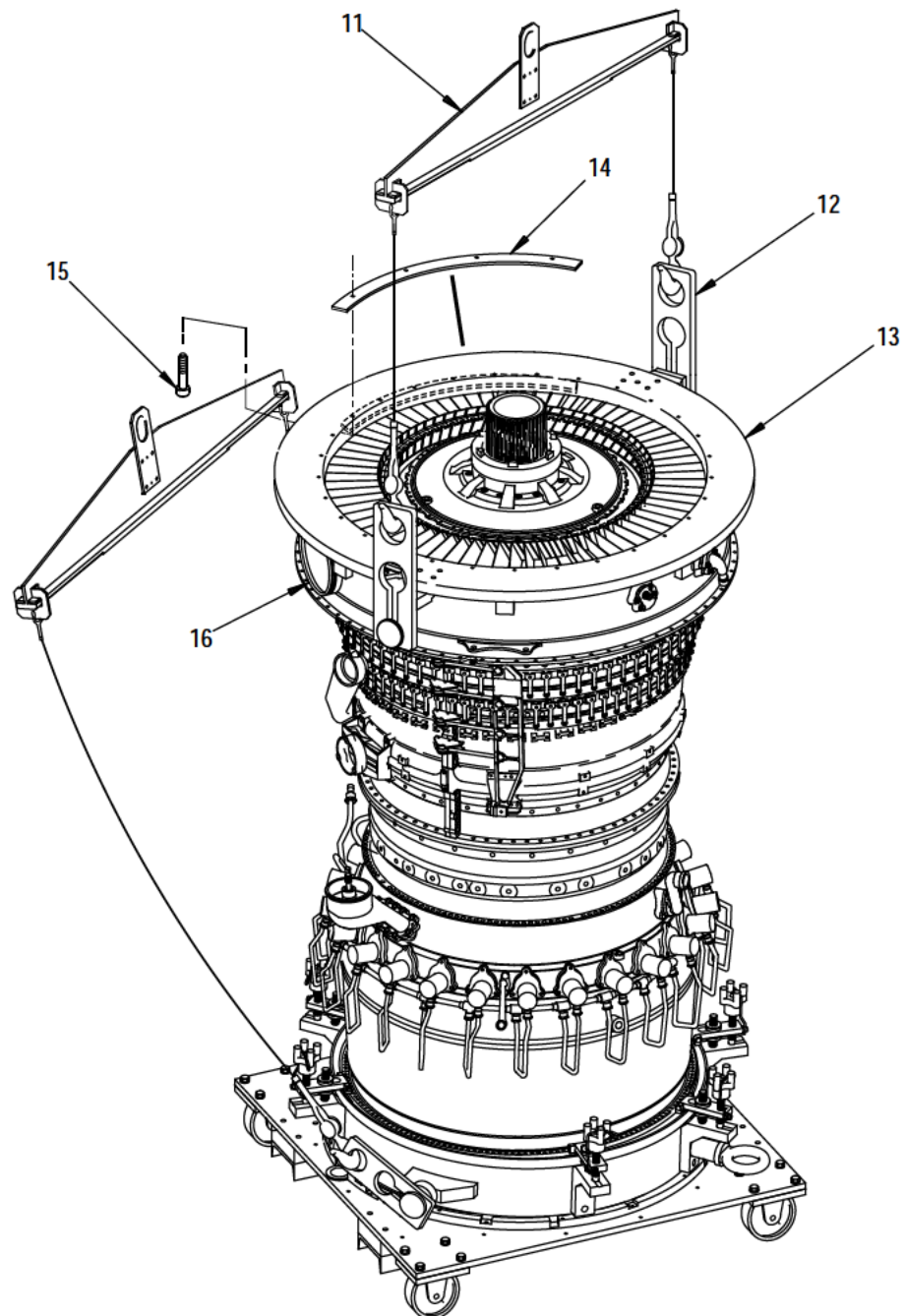
11676 (48X2)

Figure 2. Front and Rear Lifting Rings - Removal (Sheet 1 of 3)

- s. Install PWA 57623 adapter(13, figure 2, sheet 2) as follows:
 - (1) Install PWA 56336 sling(11) to hoist.
 - (2) Attach PWA 56336 sling(11) to trunnion spools on PWA 57623 adapter(13) using two PWA 26147 adapters(12).
 - (3) Install PWA 57623 adapter(13) onto front flange of intermediate case(16).
 - (4) Align dowel pin to position trunnion spools at 3 o'clock and 9 o'clock.
 - (5) Install four detail-11 ring segments(14) and secure with 16 detail screws(15).
 - (6) Torque screws(15) 110 to 135 pound-inches.
- t. Install PWA 56336 sling(17, figure 2 sheet 3) to PWA 26147 adapters (18) on rear lifting ring (23).
- u. Lift and rotate engine core module (22) to a front end down position.
- v. Remove PWA 50992 adapter plate from PWA 50775 or PWA 56338 storage stand(19).

Legend for figure 2 (continued)

- 11. PWA 56336 sling
- 12. PWA 26147 trunnion adapter
- 13. PWA 57623 trunnion adapter
- 14. Detail-11 ring segments
- 15. Detail screws
- 16. Intermediate case front flange



11677 (48X2)

Figure 2. Front and Rear Lifting Rings - Removal (Sheet 2 of 3)

- w. Lower core engine module(21) back onto PWA 50775 or PWA 56338 stand(19).
- x. Secure PWA 57623 adapter(20) to stand(19) using clamps(21).
- y. Remove PWA 56336 sling(17) and PWA 26147 adapters(18) from PWA 57623 adapter(20).
- z. Remove rear lifting ring or PWA 56732 retainer(23) as follows:
 - (1) Release knob retainer(25) at five locations securing bar knob(26).
 - (2) Loosen bar knob(26) so clamping strap(24) can be moved away from diffuser case rear flange.
 - (3) Remove rear lifting ring or PWA 56732 retainer(23) from core engine module(22).
- aa. Remove bleed strap retainer and store with shipping container.

Legend for figure 2 (continued)

- 17. PWA 56336 sling
- 18. PWA 26147 adapters
- 19. PWA 50775 or PWA 56338 stand
- 20. PWA 57623 adapter
- 21. Detail clamps
- 22. Core engine module
- 23. Rear lifting ring or PWA 56732 retainer
- 24. Clamping strap
- 25. Knob retainer
- 26. Bar knob

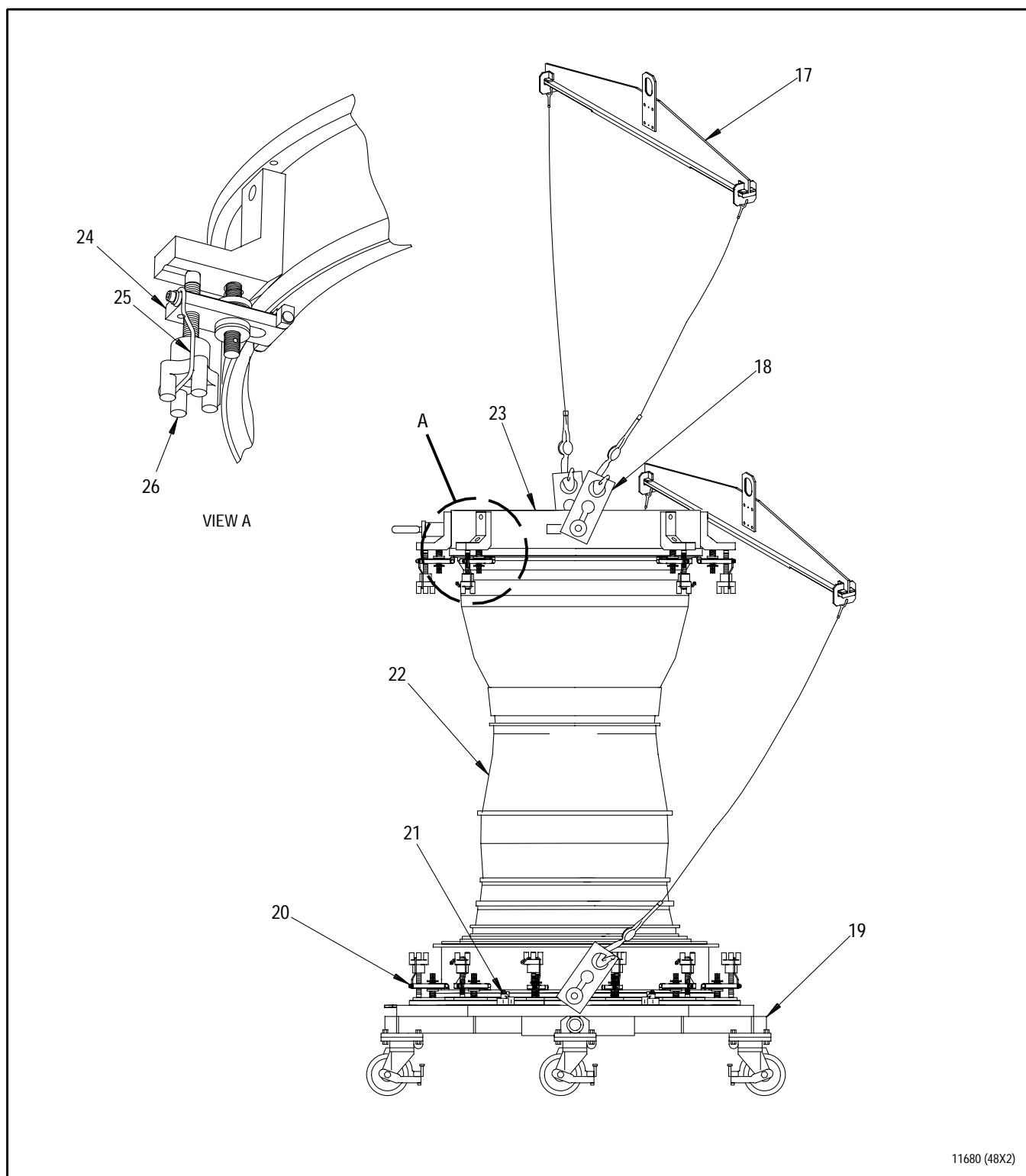


Figure 2. Front and Rear Lifting Rings - Removal (Sheet 3 of 3)

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****INSTALLATION INTO SHIPPING CONTAINER****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 26

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	26	8A Added	9	12 - 14	26
2	9	8B Blank Added	9	15	1
2A Added	26	9	2	16	26
2B Blank Added	26	10	26	17 - 20	2
3 - 5	26	11	2	21 Added	2
6 - 8	9			22 Blank Added	2

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Lint-free cloth	-
Lubricant, engine oil	MIL-L-7808
or	
Petrolatum	VV-P-236
Methyl ethyl ketone	TT-M-261
(MEK)	
Polyethylene sheet barrier	-
material (PMC 4205)	
Tape, masking (PMC 4001)	CC 150-01B Red or, CP 1315 or, 92T Red or, No. 222

EXPENDABLE ITEMS

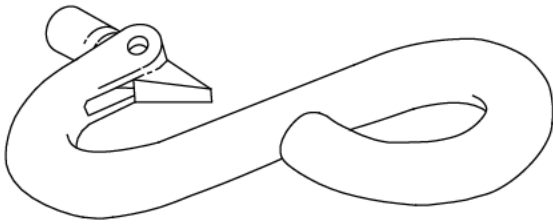
Nomenclature	Part Number	Quantity
Consumable packaging parts, core engine module	P4078918	1
Cap, protective	P4021568-01	1
Closure, shipping	*P12757	1
Closure, shipping	*P12758	2
Closure, shipping	*P12760	1
Closure, shipping	*P12763	2
Closure, shipping	*P12770	1
Closure, shipping	*P12784	1
Cover Assembly	P4070585	1
Cover, shipping	*P11040	3
Desiccant	*P8320	11
Lockwire	*MS205995-C41	As required
Plate, identification	P52715	As required
Plug, protective	*MS20913-1S	1
Plug, protective	*MS20913-6S	1
Plug, protective	*P-6614	2
Plug, protective	P4021572-02	1
Plug, protective	P4021572-04	2
Plug, protective	P4021572-06	2
Plug, protective	*P52506	1
Plug, humidity	TA346-50844	1
Seal, lead	*83280	3
Tape, transparent	P48076	As required

*Details of PN P4078918

APPLICABLE SUPPORT EQUIPMENT

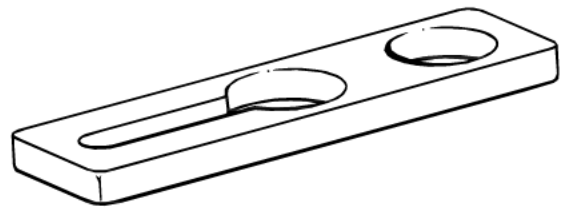
Paragraph	Function - Tool Nomenclature	Tool Number
3	INSTALLATION OF ENGINE CORE MODULE INTO SHIPPING CONTAINER	
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	RETAINER, REAR, CORE ENGINE MODULE - - - - -	PWA 56732
	ADAPTER, LIFT AND TRUNNION (FOUR REQUIRED) - - - - -	PWA 26147
	SLING, HANDLING (TWO REQUIRED) - - - - -	PWA 56336
	RETAINER, FRONT, CORE ENGINE MODULE - - - - -	PWA 56731

ILLUSTRATED SUPPORT EQUIPMENT



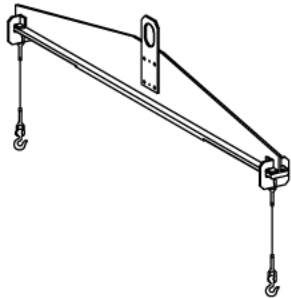
PWA 2388 -C

Figure T1. PWA 2388 HOOK



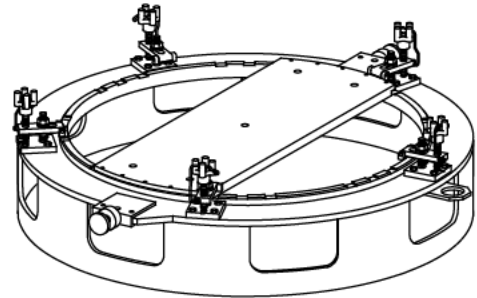
PWA 26147 -C

Figure T2. PWA 26147 ADAPTER



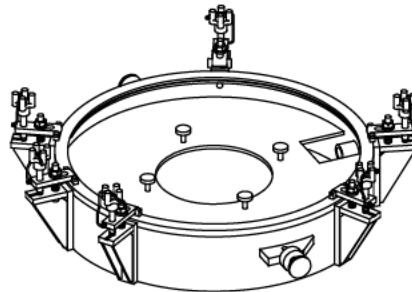
PWA 56336 -C

Figure T3. PWA 56336 SLING



PWA 56731 -C

Figure T4. PWA 56731 RETAINER



PWA 56732 -C

Figure T5. PWA 56732 RETAINER

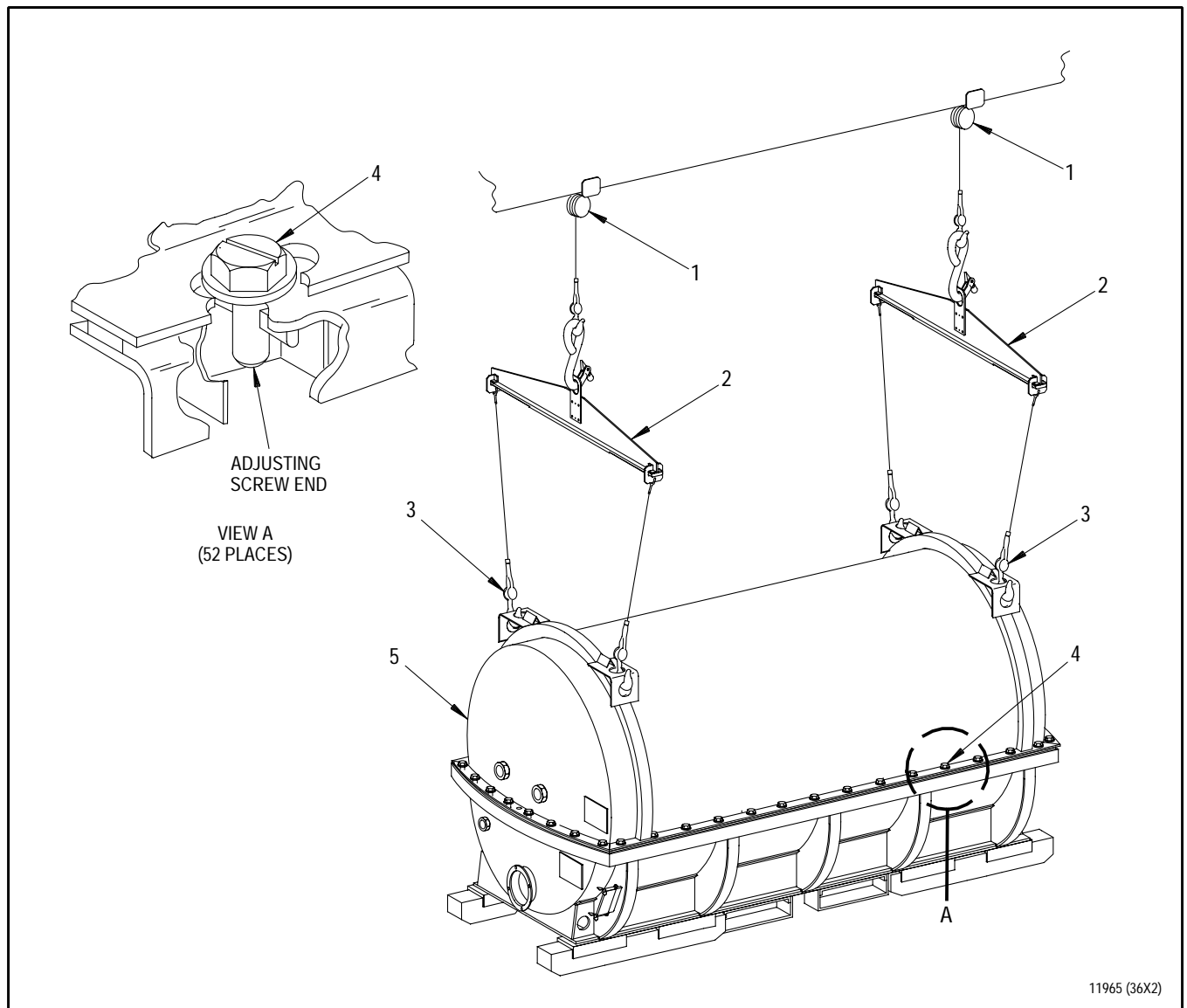
1. INTRODUCTION.

- a. This work package contains instructions for installing core engine module into metal shipping container.
- a. Two shipping containers are available to transport F100-PW-229 core engine modules.
 - (1) PN 4078843 is a universal container for F100-PW-100/200/220/229 core engine modules. This container uses PWA 56731 and PWA 56732 retainers and two adapters, stored within the tools, to adapt to F100-PW-229 core engine modules.
 - (2) PN 4070529 container is for F100-PW-229 core engine modules only. This container uses front and rear lifting rings instead of PWA 56731 and PWA 56732 retainers and no adapters are required.

2. PRELIMINARY INSTRUCTIONS.

(See Figure 1.)

- a. Position shipping container under two hoists(1, figure 1).
- b. If required, loosen adjusting screws in shank bottom of turnlock fasteners(4).
- c. Release turnlock fasteners(4) by turning 1/4 turn counterclockwise.
- d. Attach two PWA 56336 slings(2) to two hoists(1).
- e. Install PWA 2388 hooks(3) to each corner of shipping container upper half(5).
- f. Connect slings(2) to hooks(3).
- g. Remove shipping container upper half(5). Place on wooden blocks as required to prevent damaging turnlock fasteners.



1. Hoist
2. PWA 56336 sling
3. PWA 2388 hooks
4. Turnlock fasteners
5. Shipping container upper half

Figure 1. Shipping Container Upper Half - Removal

3. INSTALLATION OF ENGINE CORE MODULE INTO SHIPPING CONTAINER.

(See Figures 2 through 5.)

- a. Install the following on engine core module before placing into shipping container:

(See figure 2.)

(1) Compressor Case:

- (a) Cap(4) P4021568-01, No. 2 and 3 bearing tube.
- (b) Closure(2) P12770, 10th and 12th stage compressor case borescope port.
- (c) Closure(6) P12784, 7th stage air tube.
- (d) Closure(7) P12758, 7th stage borescope boss.

(d1) Closure(15) P12760, No. 4 bearing seal air supply manifold assembly(16).

(e) Cover(5) P11040, (3 places), air supply tube.

(f) Plug(3) P6614, (2 places) NO. 2 and 3 bearing tube. Secure rod protruding from each boss inward using polyethylene and masking tape CC 150-01B or equivalent.

(g) Secure cover assembly (14) P4070585 to bleed strap guide. Ensure bar knob is backed out to its stop. Align and secure cover with three bolts. Torque bolts 85 to 95 pound-inches.

Legend for figure 2

- 1. Deleted.
- 2. Closure, P12770, 10th through 12th stage compressor case borescope port.
- 3. Plug (2 places), P6614, No. 2 and 3 bearing tube, compressor case.
- 4. Cap, P4021568-01, No. 2 and 3 bearing tube, compressor case.
- 5. Cover, P11040, (3 places) air supply tube, diffuser case.
- 6. Closure, P12784, tube, compressor case.
- 7. Closure, P12758, boss, 7th stage borescope, compressor case.
- 8. Plug, P4021572-04, (2 places) fuel supply manifold, and No. 4 bearing oil scavenge connector, diffuser case.

NOTE

Used with cover(5).

- 9. Closure, P12757, compressor discharge, diffuser case.
- 10. Plug, P4021572-02, static pressure probe, diffuser case.
- 11. Closure, P12763, (2 places) boss, instrumentation, diffuser case.
- 12. Plug, P52506, diffuser case tube.
- 13. Plug, P4021572-06 ignitor plug bosses (2 places) diffuser case.
- 14. Cover assembly P4070585, bleed strap guide.
- 15. Closure, P12760, No. 4 bearing seal air supply manifold assembly
- 16. No. 4 bearing seal air supply manifold assembly

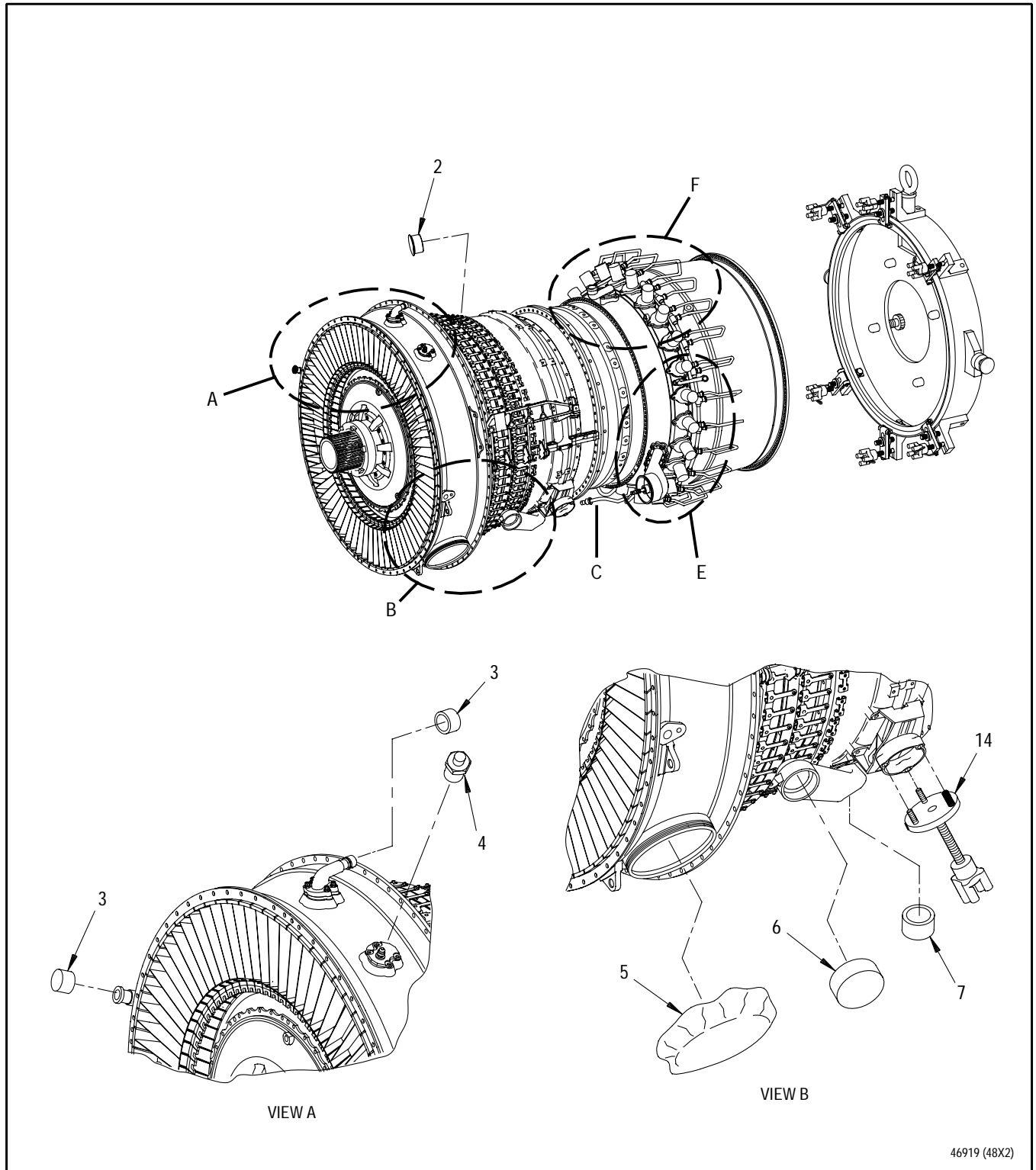


Figure 2. Engine Core Module - Shipping Preparation (Sheet 1 of 3)

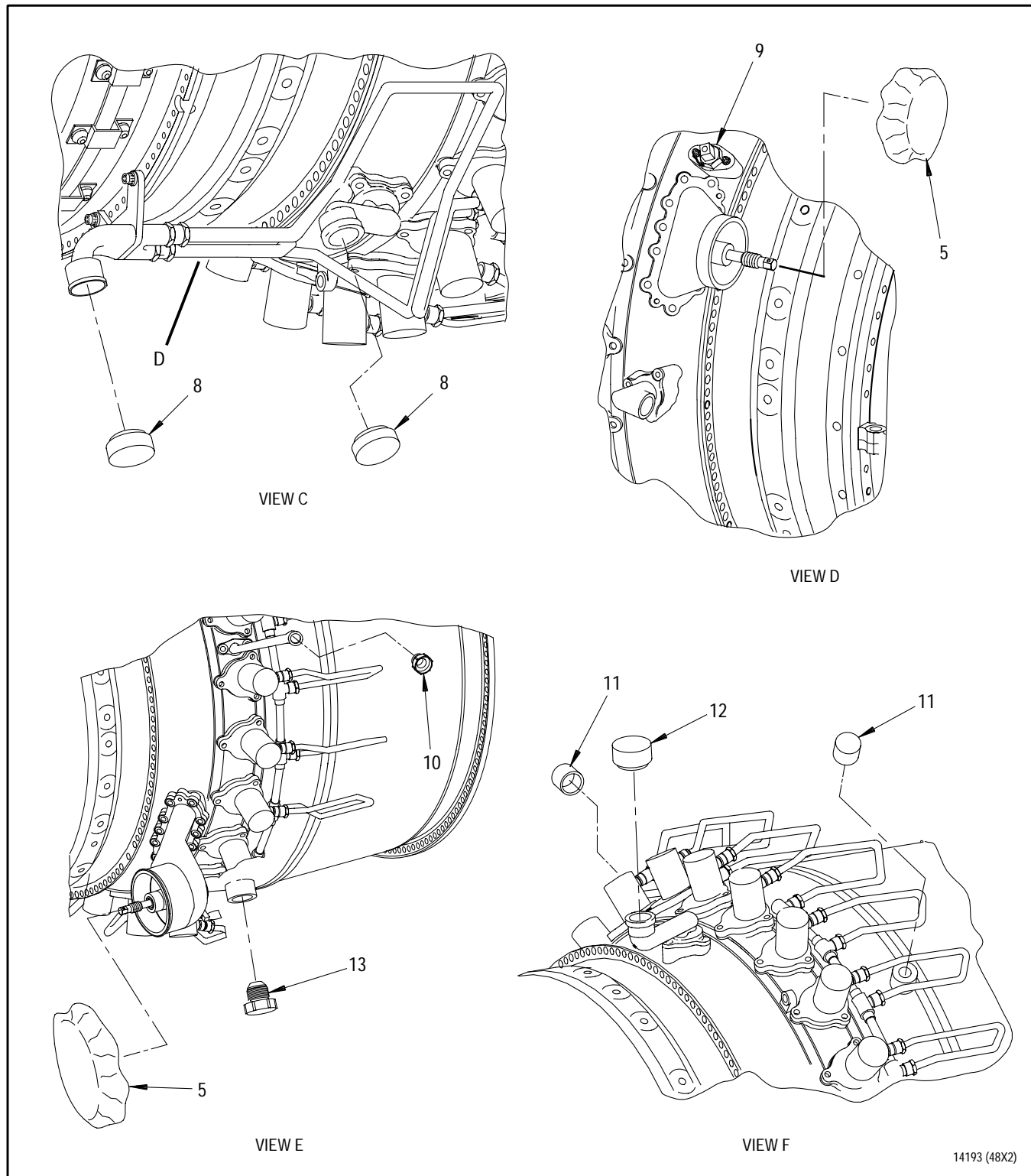


Figure 2. Engine Core Module - Shipping Preparation (Sheet 2 of 3)

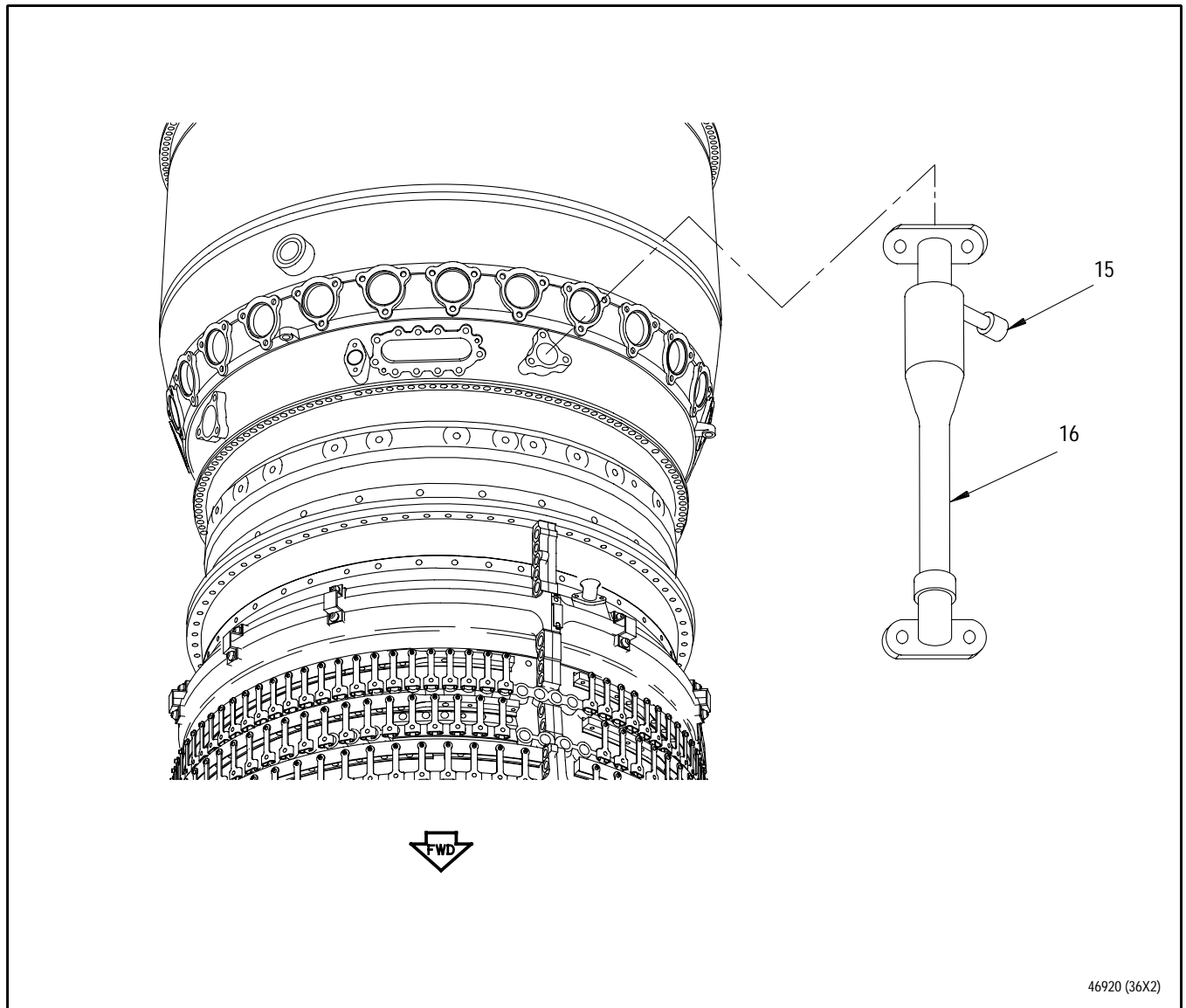


Figure 2. Engine Core Module - Shipping Preparation (Sheet 3 of 3)

(2) Diffuser case:

NOTE

Cover(5) shall be used under
closure(9) on compressor
discharge tube.

(a) Closure(9) P12757
compressor discharge tube
(two bolt pad with jam
nut).

(b) Closure(11) P12763,
(2 places)
instrumentation boss.

(c) Plug(8) P4021572-04,
(2 places) fuel manifold
and No. 4 bearing oil
scavenge connector
attached to diffuser case
OD.

(d) Plug(10) P4021572-02
static pressure probe
boss.

(e) Plug(12) PN P52506
diffuser case tube.

(f) Plug(13) P4021572-06,
(2 places)ignitor plug
bosses,diffuser case.

NOTE

Core engine module is in front end down position, secured on PWA 50775 or PWA 56338 stand.

- b. If installed, remove PWA 57635 adapter.
- c. Install rear lifting ring or PWA 56732 retainer(3, figure 3) as follows:
 - (1) Attach two PWA 26147 adapters(2) to trunnion spools on rear lifting ring or PWA 56732 retainer(3).
 - (2) Connect PWA 56336 sling(1) to hoist and adapters(2).
 - (3) Remove rear lifting ring or PWA 56732 retainer(3) from shipping container.
 - (4) Loosen bar knobs(8) and slide clamping straps(10) outward to their stops, at six locations.
 - (5) Ensure four thumbscrews near center of rear lifting ring or PWA 56732 retainer(3) are backed out to their stops.
 - (6) Visually inspect interior and exterior of turbine assembly for correct assembly, absence of damage, and foreign material.

- (6a) If using PN 4078843 container, ensure PN P4078846 rear adapter is removed from PWA 56732 retainer and installed between retainer and core engine module.
- (7) Position rear lifting ring or PWA 56732 retainer(3) onto rear of core engine module(5), aligning dowel pin in rear lifting ring or PWA 56732 retainer with dowel pin hole in diffuser case rear flange(4).
- (8) Engage clamping strap(10) to case rear flange(4) at six locations. Hold bar knob(8) firmly against grooved clamp base. Do not push clamping strap(10) into locking position without following groove in clamping base. Pushing clamping strap(10) beyond spherical stop in clamping base may damage tooling.
- (9) Hand tighten bar knob(8) until clamping strap(10) contacts diffuser case rear flange(4). Turn bar knob an additional 1/4 turn.
- (10) Lock bar knob(8) in position with knob retainer(9).

Legend for figure 3

- | | |
|---|---------------------------------|
| 1. PWA 56336 sling | 6. PWA 50775 or PWA 56338 stand |
| 2. PWA 26147 adapters | 7. PWA 57623 adapter |
| 3. Rear lifting ring P4078883 or PWA 56732 retainer | 8. Bar knob |
| 4. Diffuser case rear flange | 9. Knob retainer |
| 5. Core engine module | 10. Clamping strap |

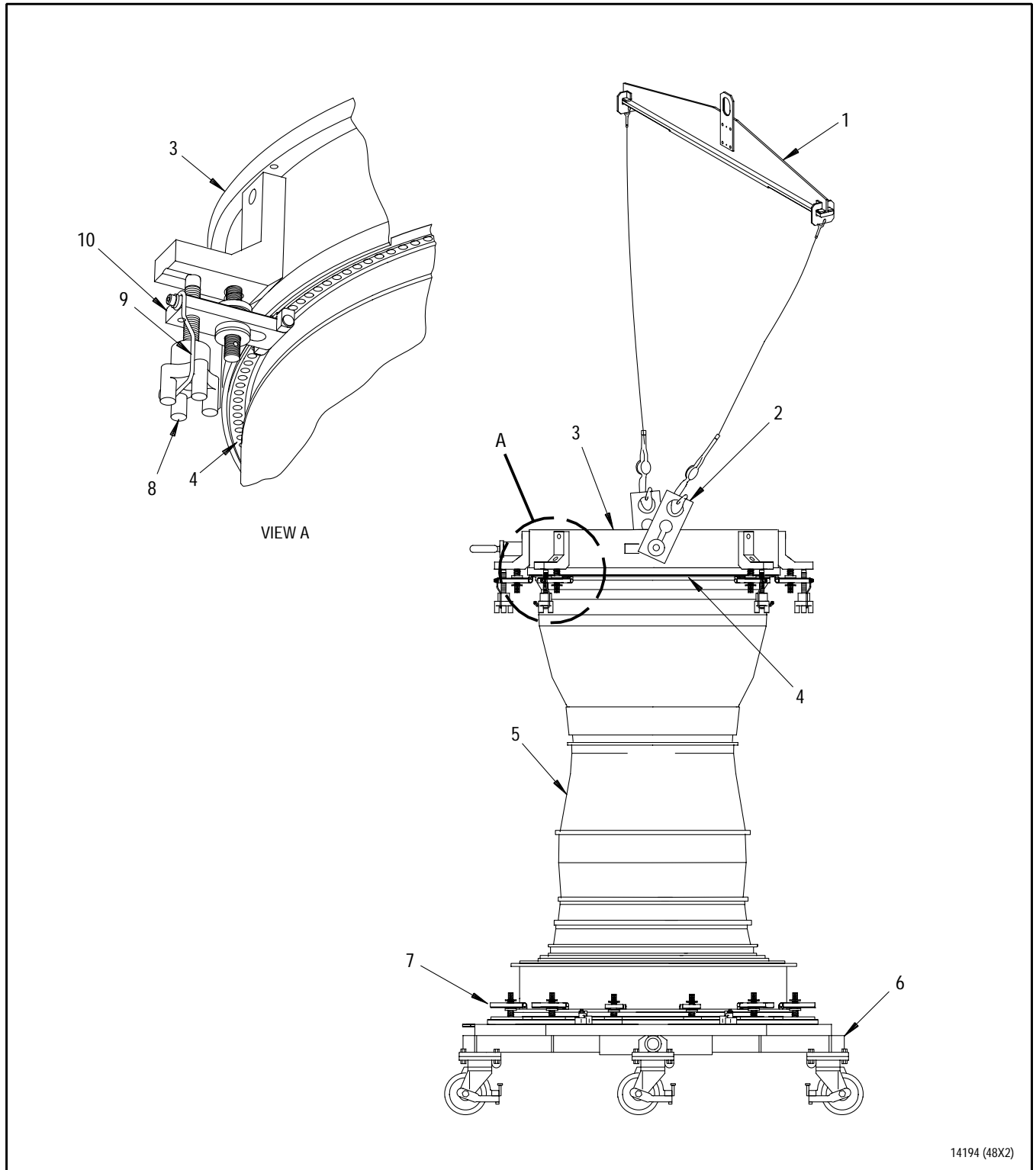
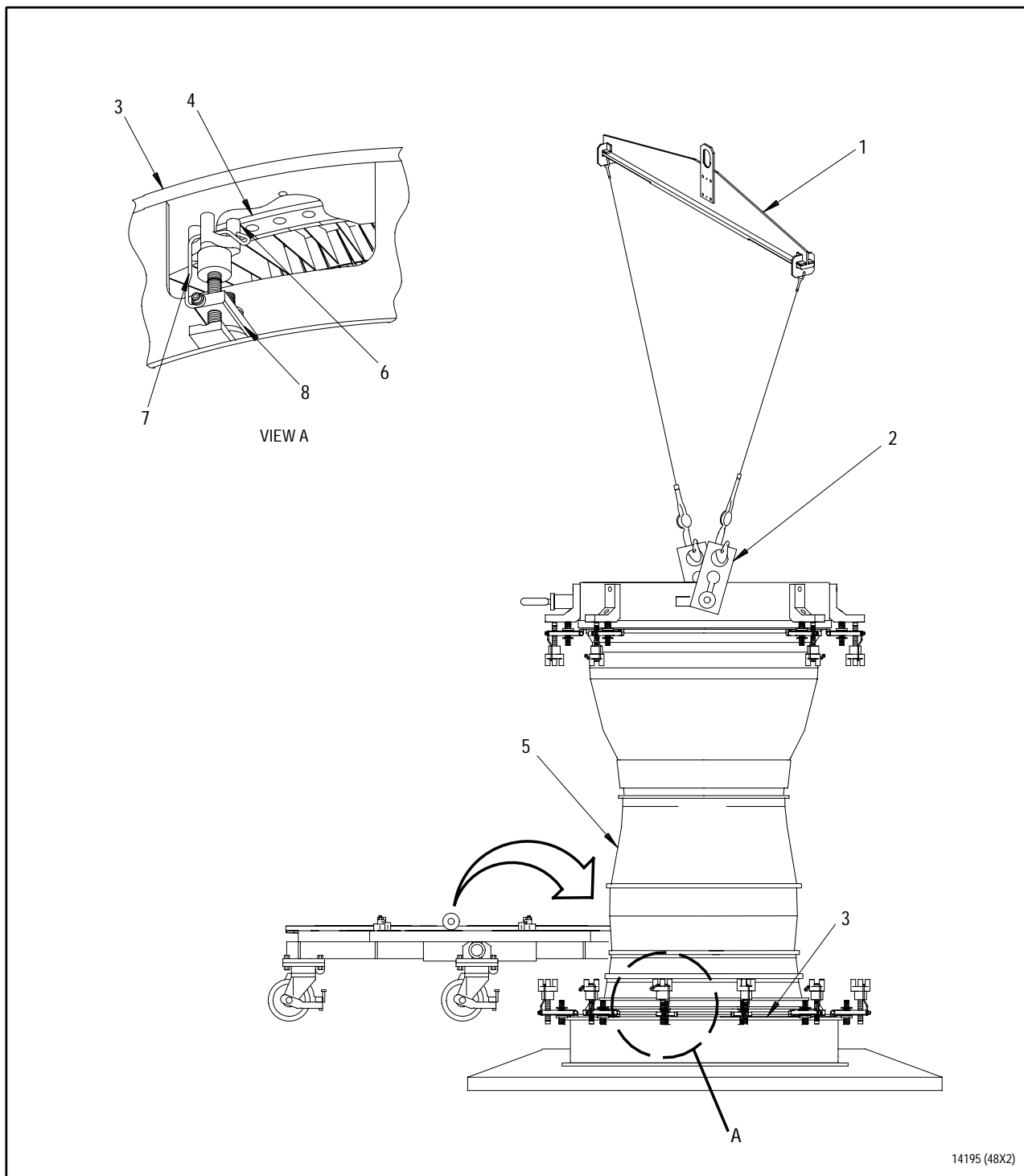


Figure 3. Rear Lifting Ring - Installation

- d. Remove PWA 56336 sling(1) and two PWA 26147 adapters(2) from rear lifting ring or PWA 56732 retainer(3).
- e. Cover rear of core engine module with polyethylene and secure with masking tape CC 150-01B or equivalent. Do not tape polyethylene to core engine module. Cut slits in polyethylene for trunnion spools to come through and tape polyethylene around trunnion spools to secure.
- f. Attach PWA 56336 sling(1) and two PWA 26147 adapters(2) to trunnion adapters on rear lifting ring or PWA 56732 retainer(3).
- g. Install front lifting ring or PWA 56731 retainer(3, figure 4) as follows:
 - (1) Attach PWA 56336 sling(1) and two PWA 26147 adapters(2) to trunnion adapters on front lifting ring or PWA 56731 retainer(3).
 - (2) Place protective material (polyethylene, cardboard, or plywood sheet etc.) on floor along side core engine module.
 - (3) Remove front lifting ring or PWA 56731 retainer(3) from shipping container and place on protective material on floor front side down.
 - (4) Loosen bar knobs(6) and slide clamping straps(8) outward to their stops at six locations.
 - (5) Remove detail bolts and detail ring segments securing PWA 57623 lift adapter to intermediate case front flange.
 - (6) Lift core engine module up and position over front lifting ring(3).
 - (7) Visually inspect front of core engine module interior and exterior for correct assembly, absence of damage, and foreign material.
 - (7a) If using PN 4078843 container, ensure PN P4078840 forward adapter is removed from PWA 56731 retainer and installed between retainer and core engine module.
 - (8) Lower core engine module onto front lifting ring or PWA 56731 retainer(3) aligning alignment pins in front lifting ring or PWA 56731 retainer with offset holes in intermediate case front flange.
 - (9) Engage clamping strap(8) to front flange of intermediate case(4) at six locations. Hold bar knob(6) firmly against grooved clamp base. Do not push clamping strap(8) into locking position without following groove in clamping base. Pushing clamping strap(8) beyond spherical stop in clamping base may damage tooling.
 - (10) Hand tighten bar knob(6) until clamping strap(8) contacts flange. Turn bar knob an additional 1/4 turn.
 - (11) Lock bar knob(6) in position with knob retainer(7).



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- | | |
|--|-----------------------|
| 1. PWA 56336 sling | 5. Core engine module |
| 2. PWA 26147 adapters | 6. Bar knob |
| 3. Front lifting ring P4078852-01
or PWA 56731 retainer | 7. Knob retainer |
| 4. Intermediate case front flange | 8. Clamping strap |

Figure 4. Front Lifting Ring - Installation

- h. Lift core engine module to provide clearance to install polyethylene.
- i. Cover front of core engine module with polyethylene and secure with masking tape CC 150-01B or equivalent. Do not tape polyethylene to core engine module. Cut slits in polyethylene for trunnion spools to come through and tape polyethylene around trunnion spools to secure.
- j. Attach PWA 56336 sling(1) and two PWA 26147 adapters(2) to trunnion adapters on front lifting ring or PWA 56731 retainer(3).
- k. Rotate core engine module(17, figure 5) to horizontal position so front of module is over rear of shipping container(13).
- l. Visually check interior of shipping container(13) for correct assembly, securing of details, absence of damage and foreign material.
- m. Ensure draw bar clamp(1), retaining bars(6) and swingbolts(10) are open on core engine module support assembly(14) in shipping container(13).
- n. Lower core engine module(17) into shipping container(13) aligning front and rear lifting ring trunnion adapter brackets(16 and 19) with retaining carriage(9) and support(2).
- o. If required, adjust retaining carriage(9) by turning bolt assemblies(7) and lockwire using PN MS20995-C41 wire.

Legend for figure 5

- 1. Drawbar clamp
- 2. Support
- 3. Eye bolt
- 4. Latch clamp handle
- 5. Pin
- 6. Retaining bar
- 7. Bolt assembly
- 8. Support carriage
- 9. Retaining carriage
- 10. Swingbolt
- 11. Bar knob
- 12. Knob retainer
- 13. Shipping container lower half P4070529-04
- 14. Core engine module support assembly
- 15. Rear lifting ring or PWA 56732 retainer
- 16. Rear lifting ring trunnion adapter bracket
- 17. Core engine module
- 18. Front lifting ring or PWA 56731 retainer
- 19. Front lifting ring trunnion adapter bracket

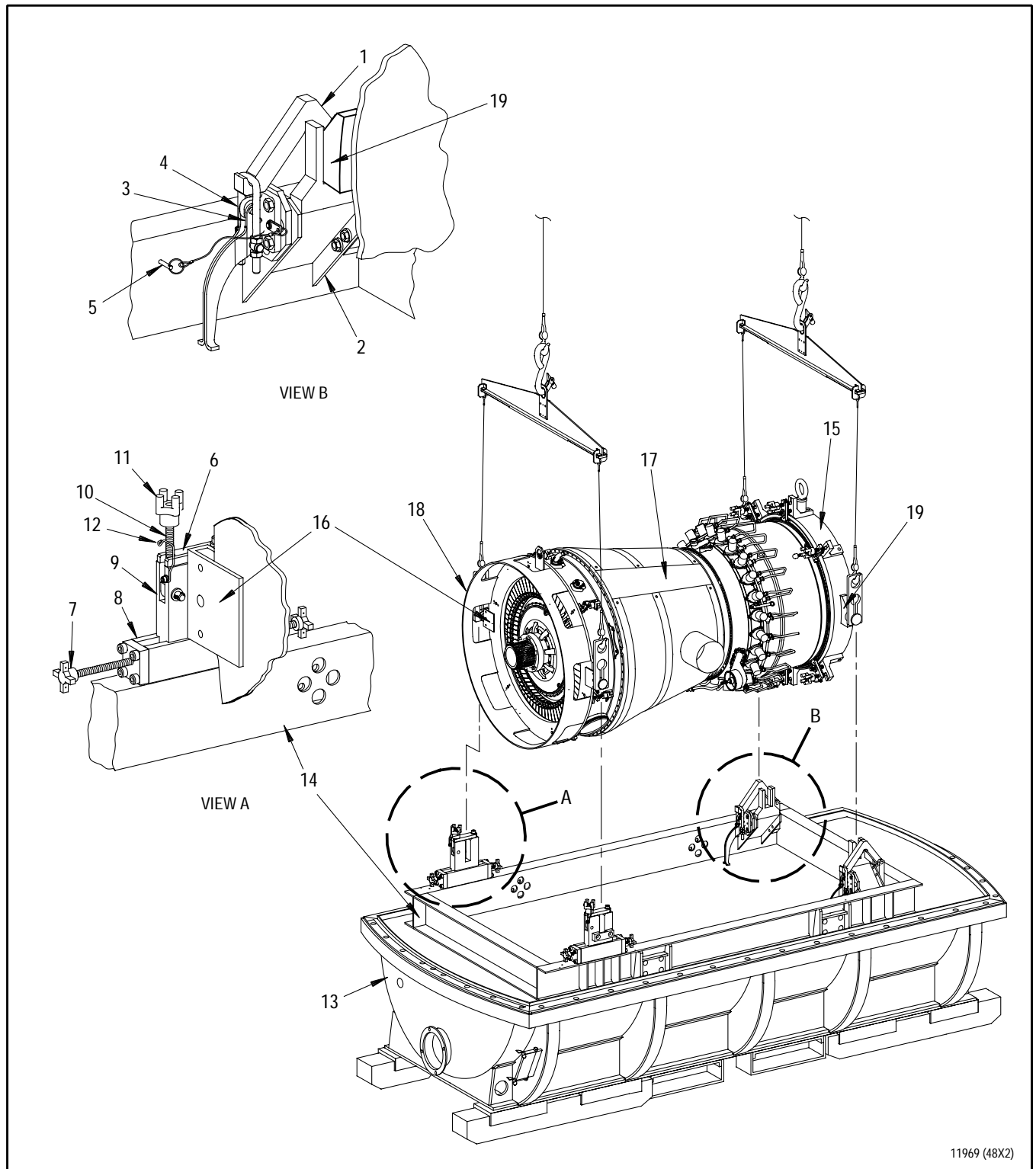


Figure 5. Engine Core Module - Installation Into Shipping Container

- p. Secure front lifting ring or PWA 56731 retainer(18) in retaining carriage(9) as follows:
- (1) Slide retaining bar(6) over trunnion adapter bracket(16).
 - (2) Install swing bolt(10) into groove in retaining bar(6).
 - (3) Hand tighten bar knob(11) until it contacts retaining bar(6). Turn bar knob(11) an additional 1/4 turn.
 - (4) Lock bar knob(11) in position with knob retainer(12).
- q. Secure rear lifting ring or PWA 56732 retainer(15) in supports(2) as follows:
- (1) Install drawbar clamps(1) over rear lifting ring trunnion adapter brackets(19).
 - (2) Lift up latch clamp handle(4) so latch fits into groove on end of drawbar clamp(1).
 - (3) Lower latch clamp handle(4) to secure drawbar clamp(1).
 - (4) Install pin(5) into eyebolt(3) to lock latch clamp(4) in place.

4. INSTALL DESICCANT AND SEAL CONTAINER.

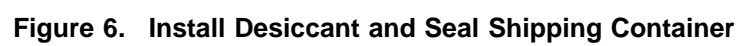
(See Figure 6.)

- a. Visually check interior of container assembly(1 and 3) for correct assembly, securing of details, absence of damage and foreign material.
- b. Ensure preformed packing(2) is installed correctly in lower container half(3) and in good condition.
- c. Clean preformed packing(2) with a lint-free cloth and isopropyl alcohol TT-I-735.
- d. Dry humidity indicator plug(13) using a hand held dryer, held at least 12 inches away from plug.
- e. If necessary, replace humidity indicator plug(13). Torque plug 10 to 20 pound-inches.
- f. Ensure insert holding glass in observation window(16) is torqued 10 to 20 pound-inches.
- g. Remove container cover(8) on end of lower container half(3).
- h. Remove 11 bags of P8320 desiccant of 16 units each from desiccant storage container. Check color of humidity card located in storage container, color shall be blue.
- i. Desiccant storage container shall not be open any longer than is necessary to remove exact quantity of desiccant. Seal storage container immediately after desiccant removal.
- j. Record time desiccant is removed from storage container. Desiccant shall not be exposed to room atmosphere for more than 1 hour.
- k. Place desiccant bags(14) into basket in lower container half(3) through access port(12).
- l. Lubricate packing(9) on container cover(8) with MIL-L-7808 oil or VV-P-236 petrolatum.
- m. Install cover(8) over access port(12).
- n. Lubricate bolts(7) with MIL-L-7808 oil.
- o. Install bolts(7) heads outward, washers(10) under nuts, nuts(11).
- p. Torque nuts 270 to 300 inch-pounds. Lockwire cover(8) using PN MS20995-C41 wire(5) and P83280 lead seal(4).
- q. Ensure plug(6) is installed and torqued 30 to 40 pound-inches.
- r. Align turnlock fasteners(15) in upper container half(1) with slots in lower container half(3).
- s. Ensure not more than 1 hour has elapsed from time desiccant bags were installed.

- t. Lower upper container half(1)
onto lower container half(3)
aligning dowel pin.
- u. Turn turnlock fasteners(15)
1/4 turn clockwise to lock.
- v. Torque adjusting screws in
shanks of turnlock fasteners as
follows:
 - (1) Torque two adjusting screws
180 degrees apart in center
of sides of container
75 to 100 pound-inches.
 - (2) Torque two adjusting screws
180 degrees apart on ends of
container 75 to 100
pound-inches.
 - (3) Torque remaining adjusting
screws 75 to 100
pound-inches. Continue
torquing until torque is
maintained.

Legend for figure 6

- 1. Shipping container upper half P4070529-03
- 2. Preformed packing P48931
- 3. Shipping container lower half P4070529-04
- 4. Lead seal PN 83280
- 5. Lockwire PN 20995-C41
- 6. Plug MS20913-1S
- 7. Bolt
- 8. Rotor and stator container cover
- 9. Packing PN MS29561-437
- 10. Washer
- 11. Nut
- 12. Access port
- 13. Humidity indicator plug
- 14. Desiccant P8320
- 15. Turnlock fasteners
- 16. Observation window



**5. ENGINE CORE MODULE-SHIPPING
CONTAINER IDENTIFICATION PLATE
REPLACEMENT.**

(See Figure 7.)

NOTE

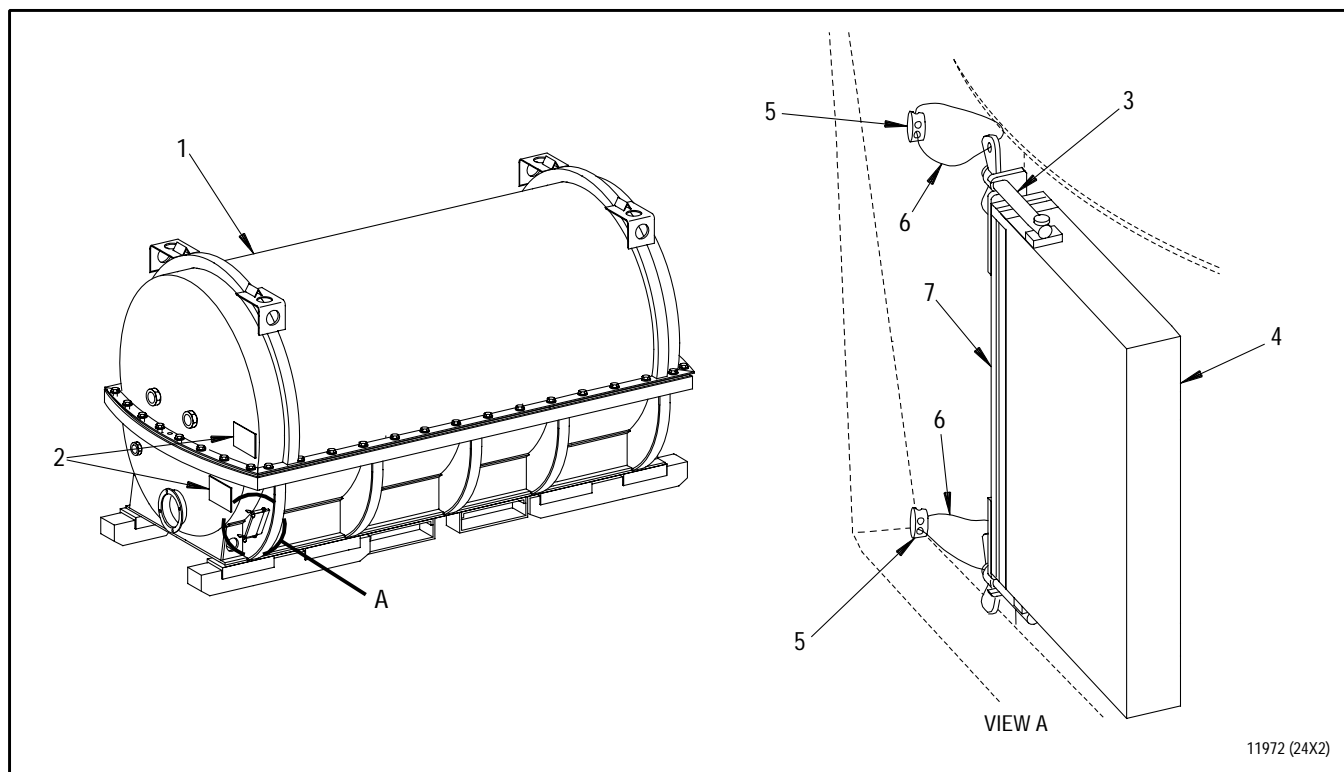
- Identification plates made of metal foil and secured with an adhesive may be bonded on top of one old plate, provided the old plate is securely bonded to the container.
 - Adhesive plates attached too high or not securely bonded shall be removed when revised plates are to be attached.
- a. Remove damaged identification plates(2, figure 7) as required from end of shipping container(1).
 - b. Clean identification plate area with methyl ethyl ketone (MEK) TT-M-261.

- c. Mark new identification plates(2) as follows:

CONTAINER: SHIPPING AND STORAGE,
METAL REUSABLE

FOR PACKING: ENGINE CORE MODULE
SPEC: MIL-C-5584, MFGRS. PART
No.P4070529, MODEL No.F100

- d. Remove protective backing sheet off identification plates(2) exposing adhesive surface. Do not handle adhesive surface.
- e. Position identification plates(2) so left edge of plate is 10 to 12 inches to right of container vertical centerline and 1/2 to 1 inch above or below upper and lower container halves mating flanges.
- f. Press firmly over complete plate area.
- g. Install engine documents into engine data box(4).
- h. Secure box cover(7) with swing bolts(3) and handtighten wing nuts.
- i. Lockwire wing nuts to container using wire(6) and lead seal(5).



1. Engine core module shipping container
2. Identification plates
3. Swingbolt
4. Engine data box
5. Lead seal PN 83280
6. Wire PN MS20995-C41
7. Engine data box cover

Figure 7. Engine Core Module - Shipping Container Identification Plate Replacement

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE - DISMANTLING

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2					0

1. INTRODUCTION.

- a. This work package introduces the 010 00 through 019 00 series of work packages for core engine module dismantling. The following work packages are included in this series:

WP No.	Title
011 00	Core Engine Module - Dismantling (Rear)
012 00	Core Engine Module - Rotating To Front End Up Position (Fully Assembled Module)
013 00	Core Engine Module - Rotating to Front End Up Position (Diffuser Case Removed)
014 00	Core Engine Module - Dismantling (Front)
015 00 through 019 00	Open

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****DISMANTLING (REAR)****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 72

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	12D Blank Added	23	23 - 26F Deleted	31
2	29	13	23	27 - 28	0
3	31	14 - 15	0	29	5
4	29	16	20	30	0
5	26	16A - 16H	31	31 - 33	26
6 - 8	29	16J - 16U Added	31	34 - 35	21
8A Added	29	16V Blank Added	31	36	5
8B Blank Added	29	17 - 20	12	37	21
9 - 10	23	20A Added	12	38	0
10A Added	26	20B Blank Added	12	39 - 40	5
10B Blank Added	26	21	0	41 - 43	0
11 - 12	26	22	31	44	14
12A - 12C Added	23			45 - 46	9

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Case Assembly, Diffuser - Inspection - - - - -	WP 370 00
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 52666 - - - - -	T.O. 32B14-5-3-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-548	30 MAY 97	D	Reoperation of Diffuser Case Assembly OD Rear Flange to Incorporate a New Short Skirt Configuration, F100-PW-229, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-550	15 MAY 98	D	Final Assembly of Core Module Featuring '97 Enhancement Package, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-552	31 OCT 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229 Engine, F-15/ F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-559	15 OCT 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-15 Aircraft (ECP 96QA179)
2J-F100229(II)-560	01 MAY 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-16 Aircraft (ECP 96QA179)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
OIL, LUBRICATING	MIL-L-7808
PENCIL (CRAYON), SILVER METAL MARKING (HARD) (PMC 4059-7)	COLORBRITE NO. 2101 OR ANADEL NO. 1936
PENCIL (CRAYON), SILVER METAL MARKING (HARD)	COLOR-TEX NO. 1843

EXPENDABLE ITEMS

None

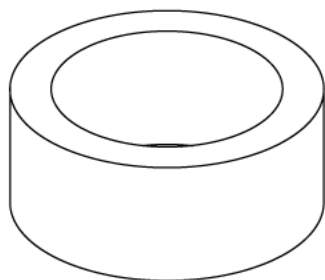
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	REAR COMPRESSOR DRIVE TURBINE ROTOR AND STATOR ASSEMBLY - REMOVAL	
	EQUIPMENT SET, NO. 4 BEARING AND R.C.D.T. RETAINER	
	NUT, ADAPTER AND IMMOBILIZER - - - - -	PWA 57664
	ADAPTER SET, HYDRAULIC WRENCH TO WRENCH - - - - -	PWA 57806
	SPACER - - - - -	LM 1022
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 52666
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	SPACER - - - - -	LM 1022
	FIXTURE, LIFT - - - - -	PWA 57920
		OR
	ADAPTER, REMOVE/INSTALL HIGH TURBINE ROTOR/STATOR ASSEMBLY - - - - -	PWA 57712
	PUSHER/PULLER, INSTALL/REMOVE HIGH TURBINE ROTOR AND STATOR ASSEMBLY - - - - -	PWA 57530
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
		OR
	SLING, FRONT AND REAR COMPRESSOR ROTOR ASSY - - - - -	PWA 6580
3C	FRONT TURBINE CASE, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER, AND FIRST STAGE TURBINE INNER AIR SEALING RING - REMOVAL	
	PULLER, DIFFUSER/HPT FLANGE - - - - -	PWA 57921
	FIXTURE, LIFT - - - - -	PWA 57919
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
4	FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER, AND FIRST STAGE TURBINE INNER AIR SEALING RING - REMOVAL	
	FIXTURE, GUIDE, TOBI COMBUSTOR AND 1ST VANE INSTALLATION AND REMOVAL - - - - -	PWA 57506
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
		OR
	SLING, FRONT AND REAR COMPRESSOR ROTOR ASSY - - - - -	PWA 6580
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388

APPLICABLE SUPPORT EQUIPMENT (continued)

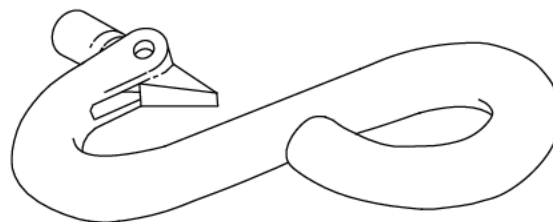
Paragraph	Function - Tool Nomenclature	Tool Number
7	NO. 4 BEARING REAR AIR SEALING RING AND NO. 4 BEARING REAR SEAL ASSEMBLY - REMOVAL	
	PULLER, NO. 4 BEARING REAR CARBON SEAL HEAT SHIELD -	PWA 51838
8	NO. 4 BEARING HOUSING - REMOVAL	
	ROTATOR, REAR COMPRESSOR ROTOR AND STATOR - - - - -	PWA 57538 OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852
9	NO. 4 BEARING RETAINING NUT, NO. 4 BEARING INNER RACE AND ROLLERS, NO. 4 BEARING INTERNAL PRESSURE MANIFOLD, FRONT AND REAR SEAL SEATS, AND SCOOP - REMOVAL	
	EQUIPMENT SET, NO. 4 BEARING AND R.C.D.T. RETAINER NUT, ADAPTER AND IMMOBILIZER - - - - -	PWA 57664
	ADAPTER SET, HYDRAULIC WRENCH TO WRENCH - - - - -	PWA 57806
	SPACER - - - - -	LM 1022
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	PUMP, HYDRAULIC - - - - -	PWA 55380
	PULLER, NO. 4 BEARING INNER RACE, FRONT AND REAR SEAL PLATE AND OIL SCOOP - - - - -	PWA 56309
	RETAINER, NO. 4 BEARING INNER RACE ROLLERS - - - - -	PWA 51790
10	DIFFUSER CASE ASSEMBLY AND COMPRESSOR STATOR HEAT SHIELD - REMOVAL	
	SLING, THREE CABLE - - - - -	PWA 14175
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
11	NO. 4 BEARING FRONT AIR SEAL - REMOVAL	
	PUSHER/PULLER, NO. 4 BEARING AIR SEAL - - - - -	PWA 57780
	PUMP, HYDRAULIC - - - - -	PWA 55380

ILLUSTRATED SUPPORT EQUIPMENT



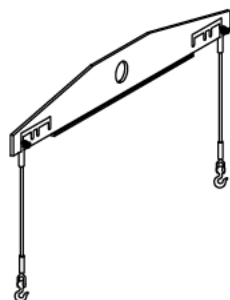
LM1022 (12X1)

Figure T1. LM 1022 SPACER



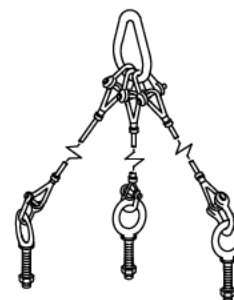
PWA 2388 -C

Figure T2. PWA 2388 HOOK



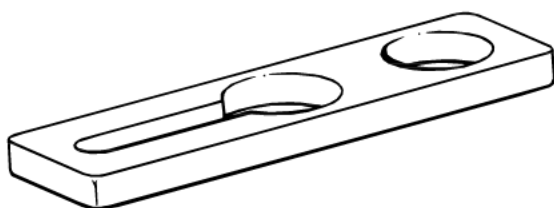
PWA 6580 -C

Figure T3. PWA 6580 SLING



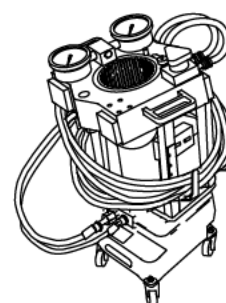
PWA14175-C

Figure T4. PWA 14175 SLING



PWA 26147 -C

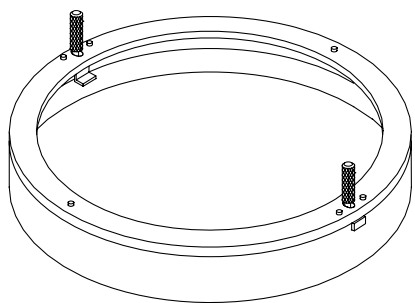
Figure T5. PWA 26147 ADAPTER



PWA 50308 -C

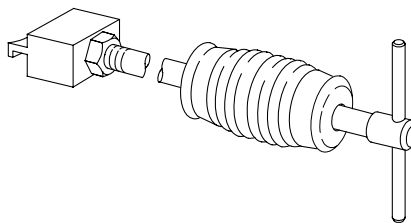
Figure T6. PWA 50308 WRENCH

ILLUSTRATED SUPPORT EQUIPMENT (continued)



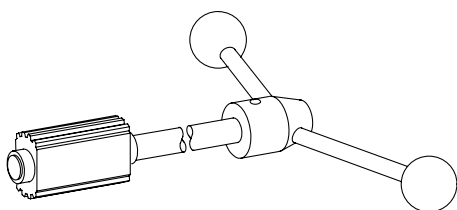
PWA 51790 -C

Figure T7. PWA 51790 RETAINER



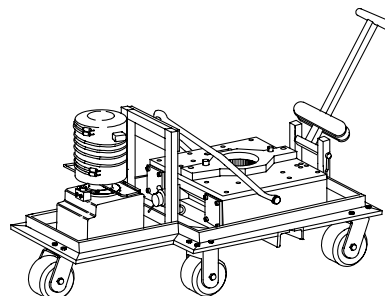
PWA 51838 -C

Figure T8. PWA 51838 PULLER



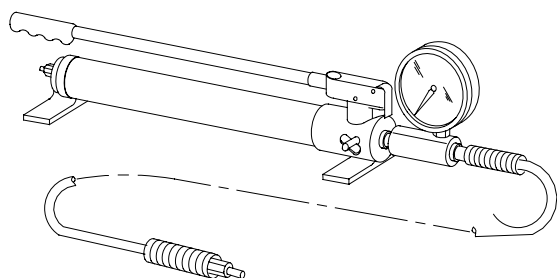
PWA 51852 -C

Figure T9. PWA 51852 ADAPTER



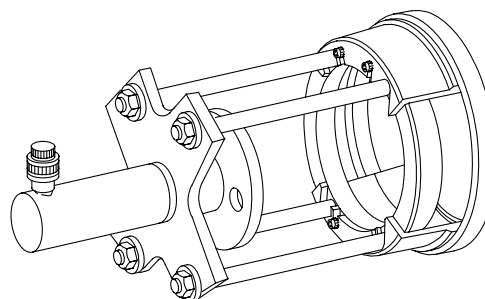
PWA 52666 -C

Figure T10. PWA 52666 WRENCH



PWA 55380 -C

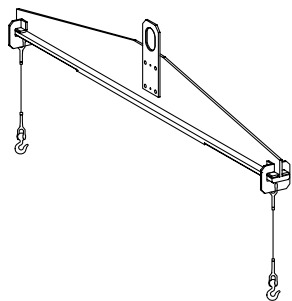
Figure T11. PWA 55380 PUMP



PWA 56309 -C

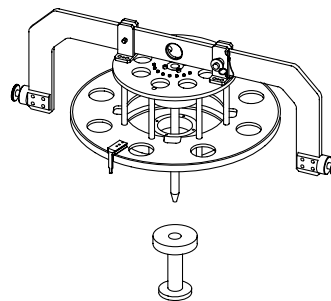
Figure T12. PWA 56309 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



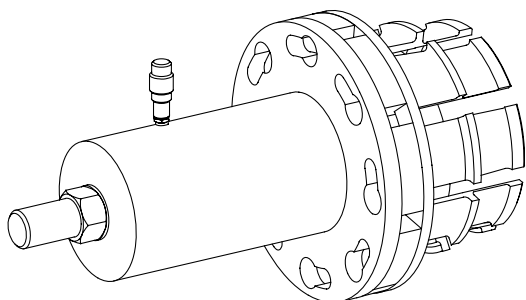
PWA 56336 -C

Figure T13. PWA 56336 SLING



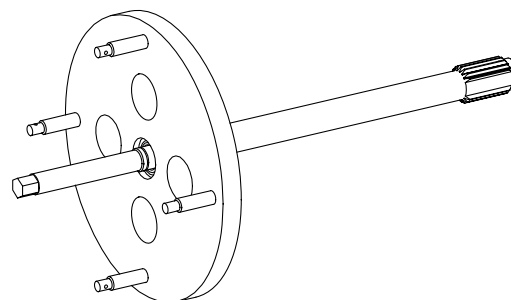
PWA 57506 -C

Figure T14. PWA 57506 FIXTURE



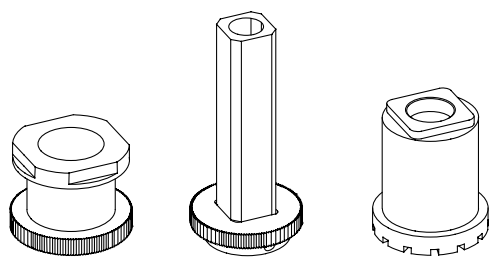
PWA 57530 -C

Figure T15. PWA 57530 PUSHER/PULLER



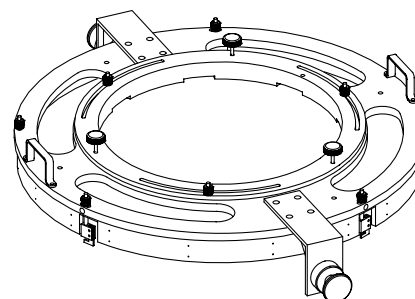
PWA 57538 -C

Figure T16. PWA 57538 ROTATOR



PWA 57664 -C

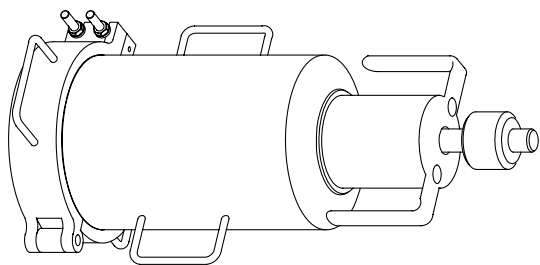
Figure T17. PWA 57664 EQUIPMENT SET



PWA 57712 -C

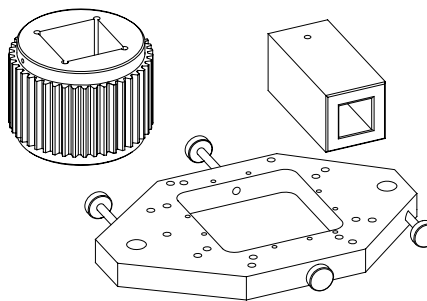
Figure T18. PWA 57712 ADAPTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



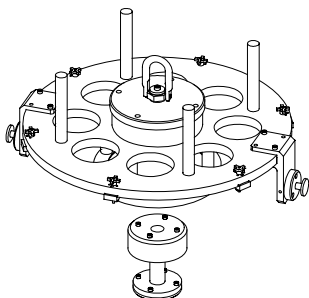
PWA 57780 -C

Figure T19. PWA 57780 PUSHER/PULLER



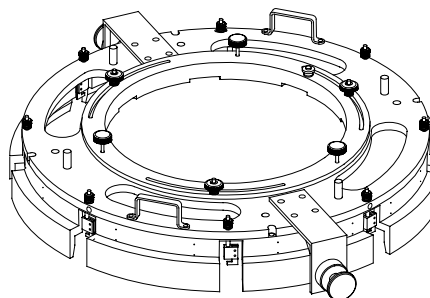
PWA 57806 -C

Figure T20. PWA 57806 ADAPTER SET



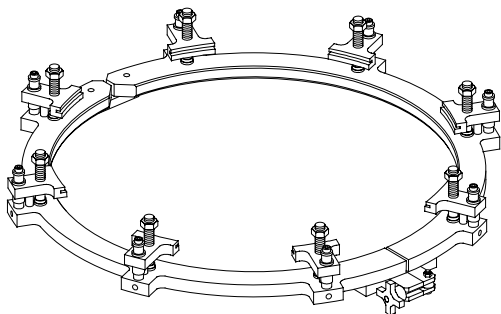
PWA 57919 -C

Figure T21. PWA 57919 FIXTURE



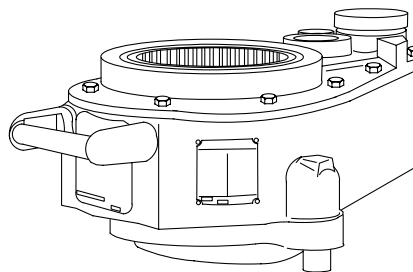
PWA 57920 -C

Figure T22. PWA 57920 FIXTURE



PWA 57921 -C

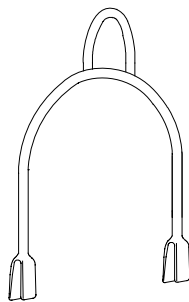
Figure T23. PWA 57921 PULLER



SWE 8200 -C

Figure T24. SWE 8100/8200 TORQUE MULTIPLIER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



SWE 81001 -C

Figure T25. SWE 81001/81002 SLING

1. INTRODUCTION.

- a. This work package contains instructions for vertical disassembly of rear of core engine module. Following major sections and components are removed:
 - Rear compressor drive turbine rotor and stator assembly
 - First stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring; and if applicable, front turbine case.
 - No. 4 bearing seal air supply manifold assembly and static pressure probe tube connector.
 - Fuel supply manifolds and fuel nozzles
 - No. 4 bearing rear air sealing ring and No. 4 bearing rear seal assembly
 - No. 4 bearing housing
 - No. 4 bearing retaining nut, No. 4 bearing inner race and rollers, No. 4 bearing internal pressure manifold, front and rear seal seats, and scoop
 - Diffuser case assembly and compressor stator heat shield.
 - Left and right compressor discharge manifold assemblies.
 - No. 4 bearing front air seal.

- b. There are two rear core engine module configurations described as follows:

- (1) One configuration incorporates short diffuser case with front turbine case separately installed with 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring.
- (2) Second configuration incorporates long diffuser case without separately installed front turbine case.

2. PRELIMINARY INSTRUCTIONS.

- a. If core engine module is in shipping container, remove per WP 004 00 and install front end down in PWA 50775 or PWA 56338 stand.

3. REAR COMPRESSOR DRIVE TURBINE ROTOR AND STATOR ASSEMBLY - REMOVAL.

(See Figures 1 through 4.)

- a. Remove rear compressor driveshaft nut as follows:
 - (1) Remove retaining ring(1, figure 1).
 - (2) Remove rear compressor driveshaft nut lock(2).

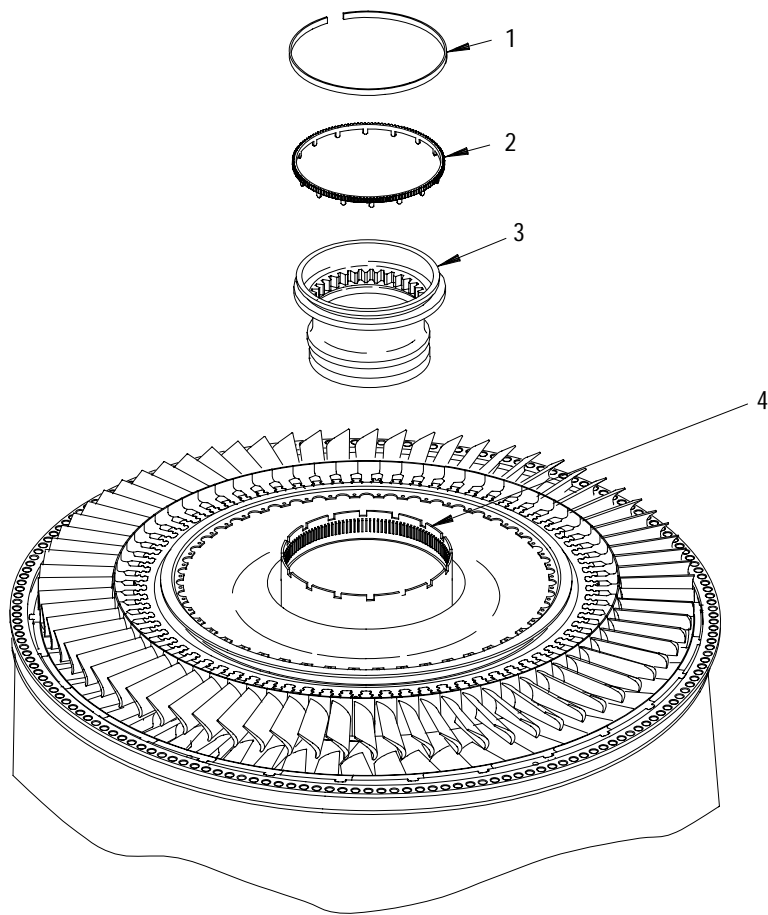
NOTE

PWA 57664 detail-2 immobilizer spline and detail-9 immobilizer shaft, are installed as an assembly and are referred to as PWA 57664 detail immobilizer.

- (3) Install PWA 57664 detail immobilizer(5, figure 2) to engage splines in rear compressor driveshaft.

(4) Install PWA 57664 detail-8 adapter(4) to engage in splines on rear compressor driveshaft nut(6).

(5) Install PWA 57806 detail-3 base assembly(3) onto PWA 57664 detail-8 adapter(4).



90205 (36X2)

1. Retaining ring
2. Rear compressor driveshaft nut lock
3. Rear compressor driveshaft nut
4. Rear compressor driveshaft

Figure 1. Retaining Ring and Rear Compressor Drive Turbine Shaft Nut Lock - Removal

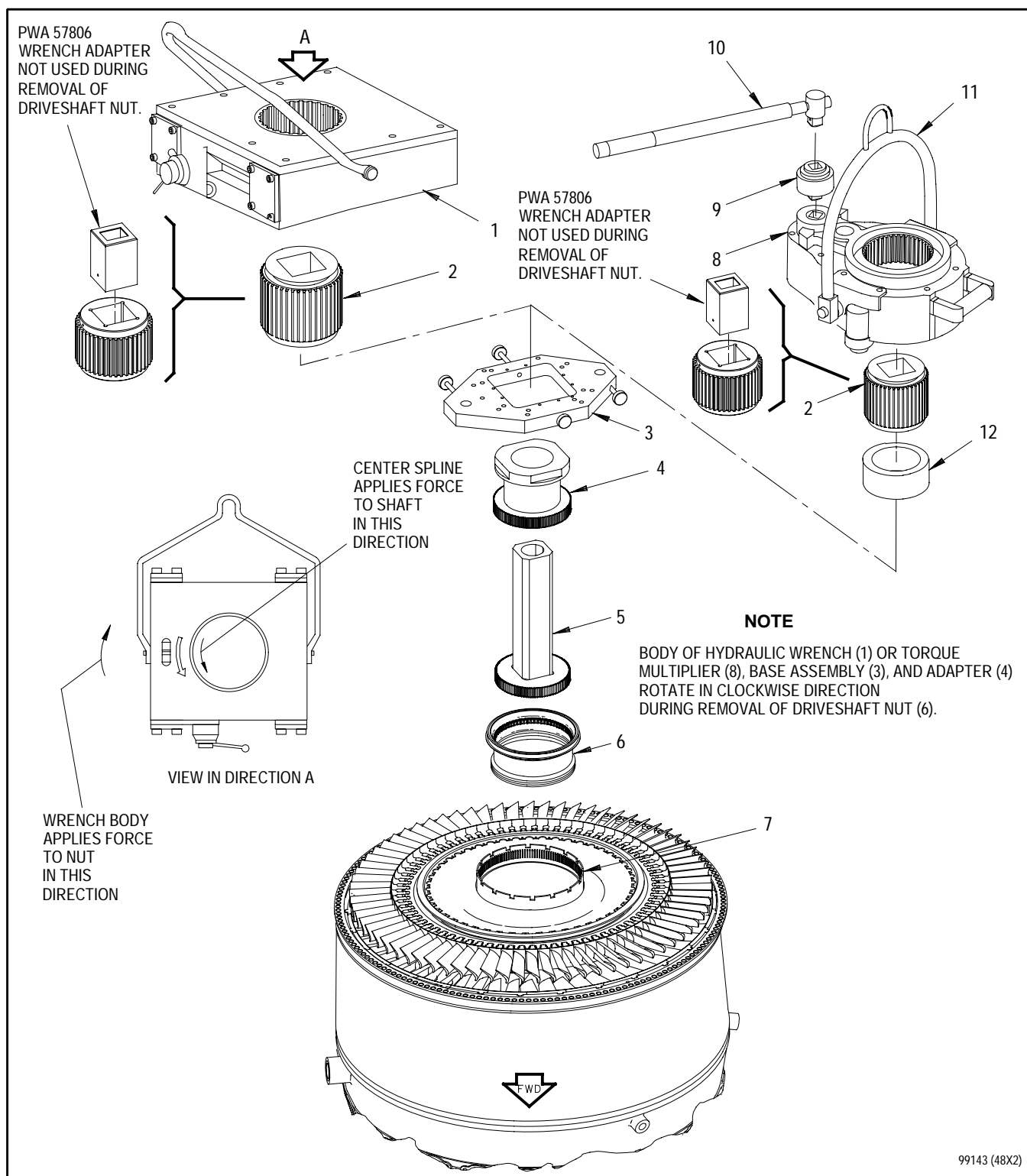


Figure 2. Rear Compressor Driveshaft Nut - Removal

Legend for figure 2

- | | |
|-----------------------------------|-------------------------------------|
| 1. PWA 52666 hydraulic wrench | 7. Rear compressor driveshaft |
| 2. PWA 57806 adapter assembly | 8. SWE 8100/8200 torque multiplier |
| 3. PWA 57806 base assembly | 9. 0.750 inch drive ratchet adapter |
| 4. PWA 57664 adapter | 10. 0.750 inch drive work handle |
| 5. PWA 57664 immobilizer | 11. SWE 81001/81002 sling |
| 6. Rear compressor driveshaft nut | 12. LM 1022 spacer |

NOTE

PWA 57806 wrench adapter is not used during this disassembly procedure. See figure 2.

- (6) Ensure PWA 57806 wrench adapter assembly is disengaged from inside of adapter assembly. See figure 2.
- (6a) Install PWA 57806 adapter assembly(2) onto PWA 57664 adapter(4). If SWE 8100/8200 torque multiplier(8) is used, install LM 1022 spacer(12) between adapter assembly(2) and adapter(4).



Use of SWE 8100/8200 torque multiplier instead of PWA 52666 hydraulic wrench when nut breakaway torque exceeds torque multiplier capacity will damage tool.

- (6b) If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling(11) onto torque multiplier.
- (7) Connect overhead hoist with PWA 2388 hook to PWA 52666 hydraulic wrench or connect PWA 2388 hook to SWE 81001/81002 sling(11).



Failure to install PWA 52666 hydraulic wrench as specified may cause damage to engine hardware.

- (8) Install PWA 52666 hydraulic wrench(1) or SWE 8100/8200 torque multiplier(8) onto PWA 57664 immobilizer(5), PWA 57664 adapter(4), PWA 57806 base assembly(3), and PWA 57806 adapter assembly(2). Use LM 1022 spacer(12) with SWE 8100/8200 torque multiplier. Ensure side of PWA 52666 wrench having counterclockwise arrow faces upward away from core engine. Secure with wrench or torque multiplier thumbscrews. Install hoses on PWA 52666 wrench. Attach ratchet adapter(9) and work handle(10) if SWE 8100/8200 torque multiplier is used.



- Failure to ensure hydraulic wrench torque does not exceed specified limit can result in damage to threads on rear compressor driveshaft.
- Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.
- Exceeding specified torque capacity of SWE 8100/8200 torque multiplier will damage tool.

NOTE

Nut has left-hand thread. Hydraulic wrench or torque multiplier splines will turn rear compressor in counterclockwise direction to loosen nut. Nut will not turn.

- (9) Actuate PWA 52666 wrench(1) or SWE 8100/8200 torque multiplier(8) and loosen left-hand threaded nut(6) as follows:

- (a) If using torque multiplier, do not exceed 120,000 pound-inches for SWE 8100 torque multiplier or 144,000 pound-inches for SWE 8200 torque multiplier. Refer to T.O. 32A5-2-2-1 for torque multiplier operating instructions. If torque multiplier will not loosen nut, use PWA 52666 wrench before going to step (10).

- (b) If using PWA 52666 wrench, do not exceed 300,000 pound-inches. Refer to T.O. 32B14-5-3-1 for wrench operating instructions.

- (10) If nut does not loosen, proceed as follows:

- (a) Pack dry ice inside rear compressor driveshaft.
- (b) Apply flameless heat not to exceed 700°F (370°C) to nut for 30 minutes.
- (c) Install PWA 52666 wrench(1) or SWE 8100/8200 torque multiplier(8) and repeat step (9).

- (11) Remove hydraulic wrench, or torque multiplier using hoist with nylon strap or sling respectively. Remove tooling and nut. Wrap nut in protective bubble paper.

- (12) Vacuum rear compressor rear hub cavity for debris, using vacuum cleaner.

NOTE

Two rear compressor drive turbine rotor and stator configurations exist. One is identifiable by long diffuser case and utilizes PWA 57712 adapter (see step b). Second configuration is identifiable by separate front turbine and diffuser cases and requires use of PWA 57920 fixture as follows:

- a1. Install PWA 57920 fixture on turbine rotor and stator assembly as follows:
- (1) Loosen knurled knobs(3 and 8, figure 2A) and knurled head screws(1).
 - (2) Remove ball lock pin(2).
 - (3) Rotate clamp ring(4) fully clockwise.

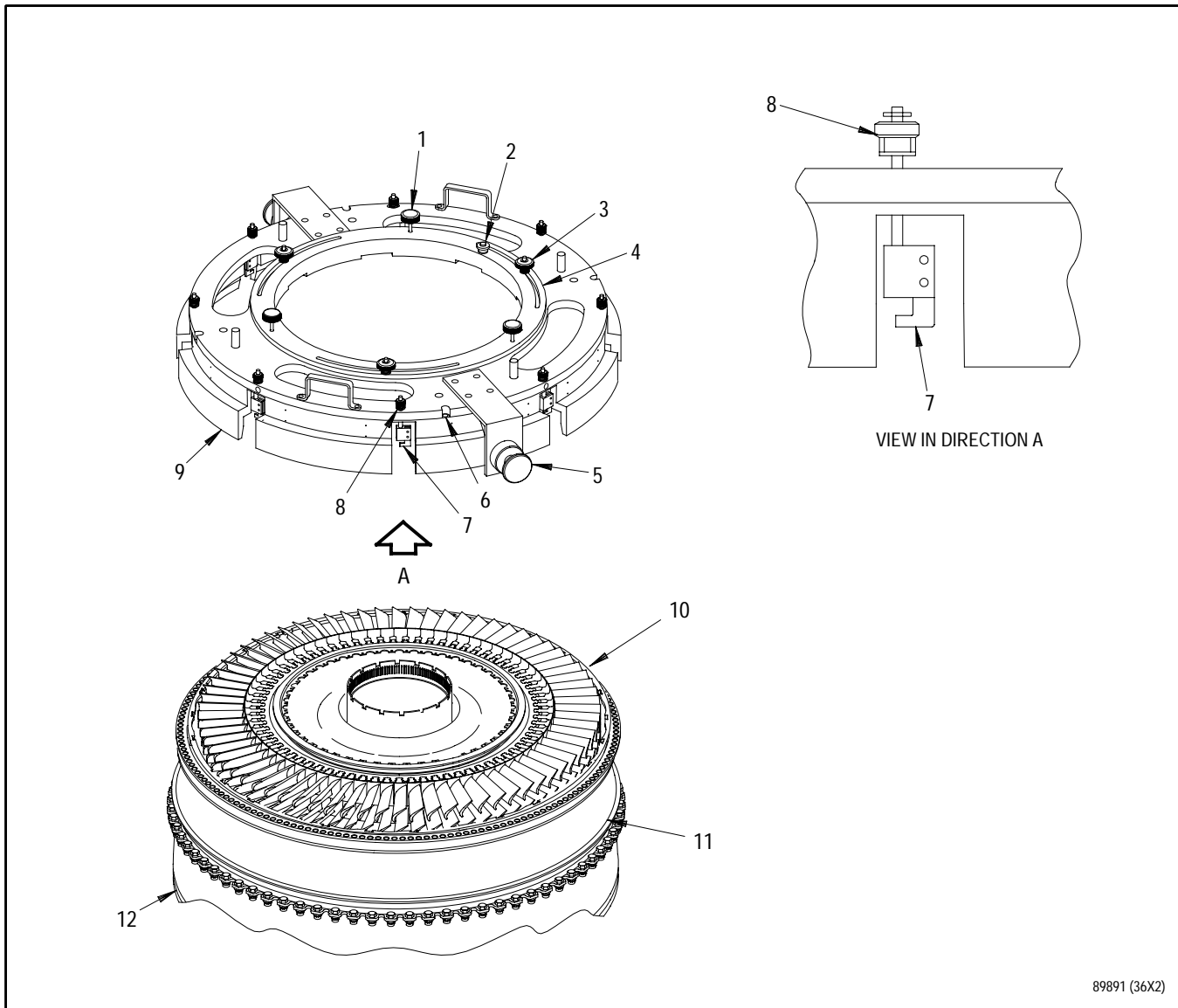
NOTE

- Twelve o'clock position is indicated by locating pin on flange between front turbine case(11) and diffuser case(12).
 - Clamp ring(4) may be rotated slightly counterclockwise to prevent interference between lugs on clamp ring(4) and lugs on 2nd stage rear turbine blade retaining plate(13).
- (4) Install PWA 57920 fixture on rotor and stator assembly(10) with word TOP on base assembly(9) aligned with 12 o'clock position of engine assembly. Rotate clamp ring(4) as necessary to prevent interference between lugs on clamp ring(4) and lugs on 2nd stage rear turbine blade retaining plate(13) during installation.

WARNING

Failure to engage clamps(7) in rectangular-shaped slots may result in disengagement of PWA 57920 fixture during lifting and cause serious injury to personnel.

- (5) Engage eight clamps(7) with rectangular-shaped slots in turbine duct and vane support(14).
- (6) Tighten knurled knobs(8) handtight.
- (7) Ensure all flush pins(6) are even with, or above, adjacent surface of base assembly(9). If flush pins(6) are below surface of base assembly(9) repeat steps (1) through (7).
- (8) Push clamp ring(4) down and turn counterclockwise until it stops.
- (9) Ensure lugs on clamp ring(4) engage behind lugs on 2nd stage rear turbine blade retaining plate(13).
- (10) Install ball lock pin(2) into clamp ring(4). Turn clamp ring clockwise until it stops. Ring should not rotate far enough to allow disengagement of lugs on clamp ring(4) and retaining plate(13). If disengagement of lugs occurs repeat steps (1) through (10).
- (11) Tighten knurled head screws(1) handtight to hold running position of rotor.
- (12) Tighten knurled knobs(3) securing clamp ring(4).



89891 (36X2)

- | | | |
|-------------------------------------|----------------------------------|---|
| 1. Knurled head screw
(3 places) | 6. Flush pin (4 places) | 11. Front turbine case |
| 2. Ball lock pin | 7. Clamp (8 places) | 12. Diffuser case |
| 3. Knurled knob (3 places) | 8. Knurled knob | 13. 2nd stage rear turbine
blade retaining plate |
| 4. Clamp ring | 9. Base assembly | 14. Turbine duct and vane
support |
| 5. Trunnion | 10. Rotor and stator
assembly | |

Figure 2A. PWA 57920 Fixture - Installation (Sheet 1 of 2)

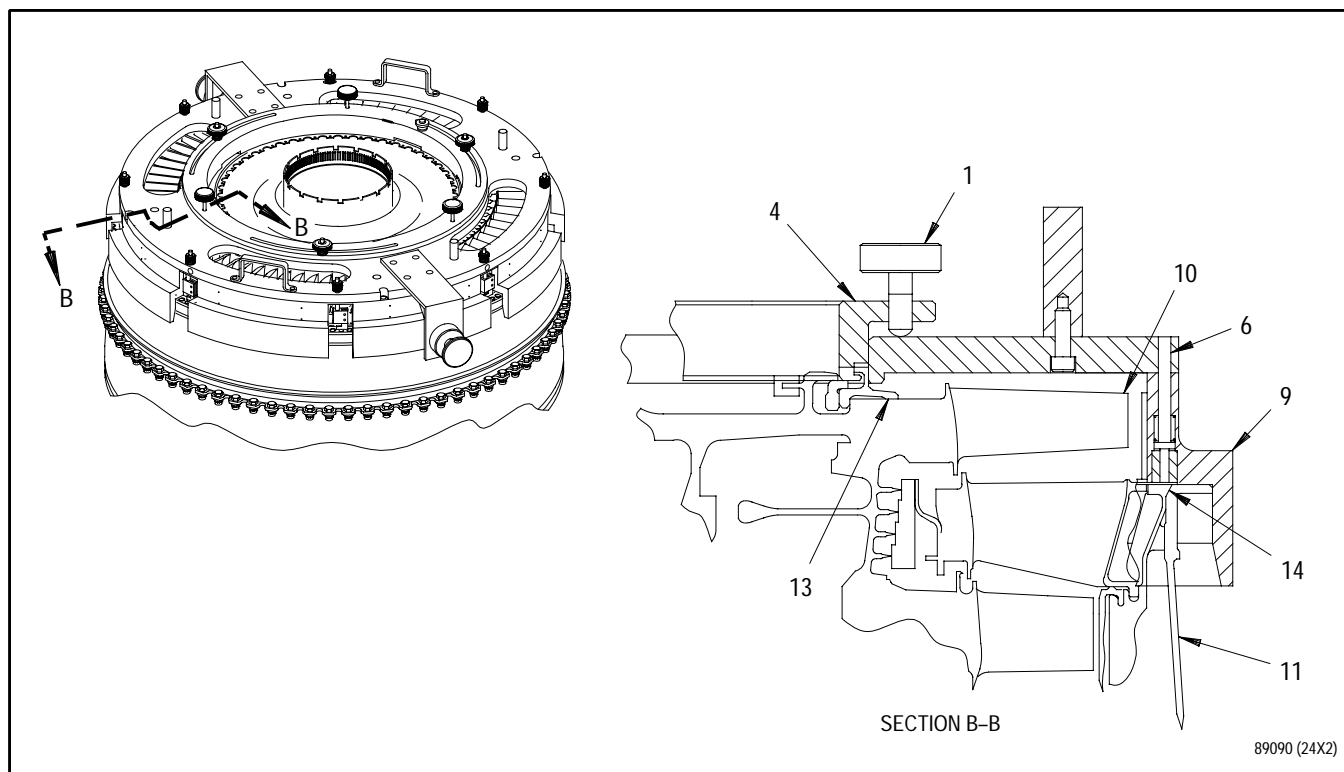


Figure 2A. PWA 57920 Fixture - Installation (Sheet 2 of 2)

NOTE

Two rear compressor drive turbine rotor and stator configurations exist. One is identifiable by separate front turbine and diffuser cases and requires use of PWA 57920 fixture (see step a1). Second configuration is identifiable by long diffuser case and requires use of PWA 57712 adapter as follows:

b. Install PWA 57712 adapter(2, figure 3) onto rear compressor drive turbine rotor and stator assembly(7) as follows:

- (1) Loosen all detail-14 and detail-15 knurled knobs(1, 4, and 10).
- (2) Remove detail-20 spring plunger(6).

NOTE

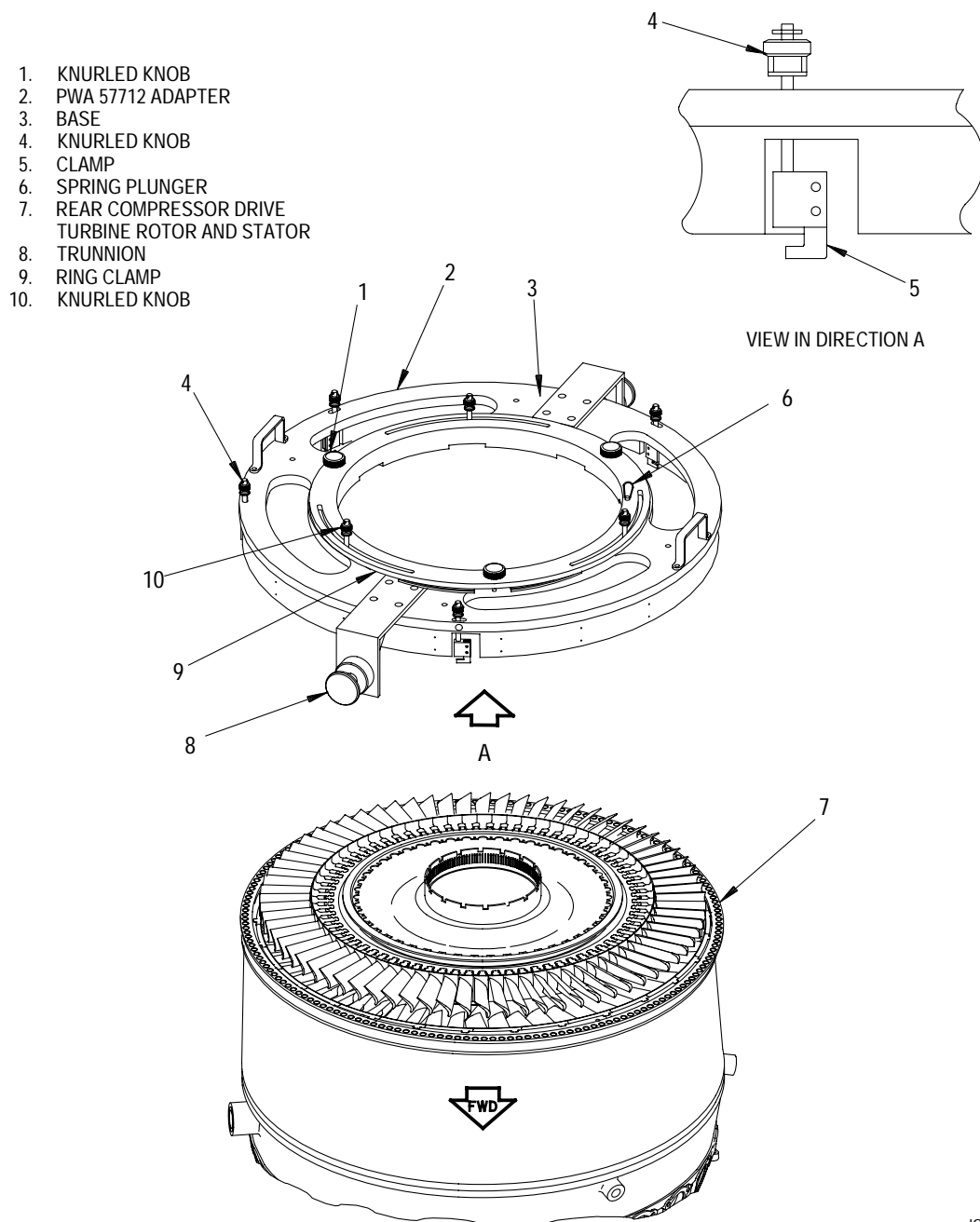
When installing PWA 57712 adapter(2) on rear compressor drive turbine rotor and stator assembly(7) it may be necessary to rotate detail-2 ring clamp(9) to ensure ring clamp lugs align with scallops in 2nd turbine blade rear retaining plate.

- (3) Install PWA 57712 adapter(2) on rotor and stator assembly(7) so word TOP marked on detail-1 base(3) is at 12 o'clock.
- (4) Engage four detail-6 clamps(5) into slots in rotor and stator assembly(7).
- (5) Tighten detail-14 knurled knobs(4) hand tight.

- (6) Push detail-2 ring clamp(9) in and turn counterclockwise until it stops.
- (7) Install detail-20 spring plunger(6) into ring clamp(9). Rotate 3 inches clockwise. If clamp continues to rotate, repeat steps (5) and (6).
- (8) Ensure ring clamp(9) can not rotate. If ring clamp rotates, repeat steps (6) and (7).
- (9) Tighten detail-15 knurled knobs(1) handtight to hold running position of rotor.
- (10) Tighten detail-14 knurled knobs(10) securing detail-2 ring clamp(9) to detail-1 base(3).

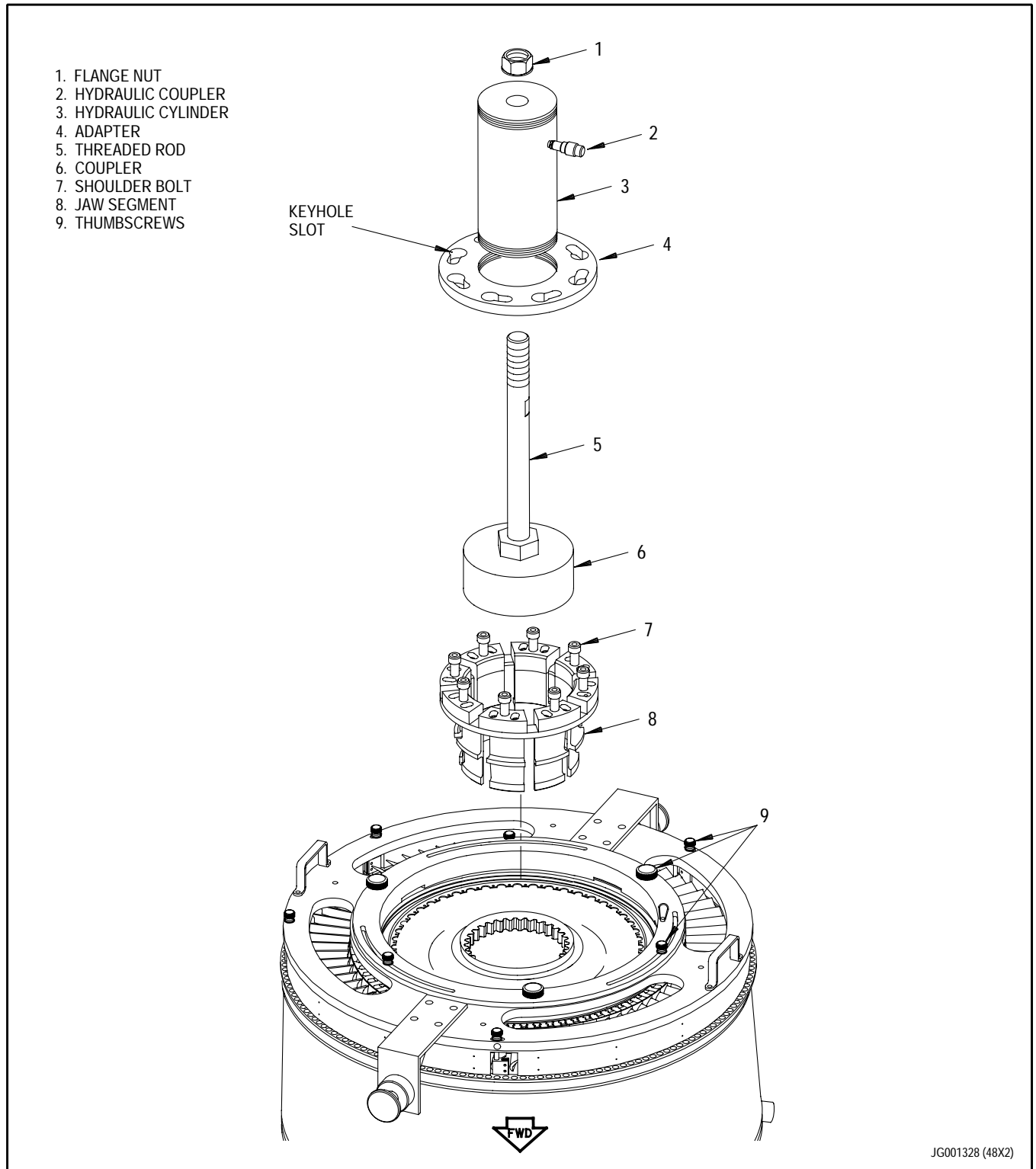
c. Install PWA 57530 pusher and puller on 2nd stage disk as follows:

- (1) Slide jaw segments(8, figure 4) into hub between 2nd stage rotor disk and rear compressor driveshaft engaging jaws with 2nd stage disk. Expand jaws outward.



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Figure 3. PWA 57712 Adapter - Installation



**Figure 4. Removal of Rear Compressor Drive Turbine Rotor and Stator Assembly
With PWA 57530 Pusher and Puller**

NOTE

PWA 57530 threaded rod(5) and coupler(6) are installed as an assembly.

- (2) Install PWA 57530 coupler(6) onto rear compressor driveshaft so that jaw segments(8) engage ID of 2nd stage rotor disk.

NOTE

PWA 57530 coupler(6) has left-hand thread.

- (3) Thread coupler(6) counterclockwise on rear compressor driveshaft until it bottoms out, then back off two full turns.

NOTE

PWA 57530 detail-6 hydraulic cylinder(3) is used for removal and installation of turbine rotor assembly. Outer end of hydraulic cylinder is marked THIS SURFACE FWD FOR INSTALLATION, AFT FOR REMOVAL.

- (4) Thread hydraulic cylinder(3) into flat side of adapter(4) with coupler(2) positioned outward away from adapter.
- (5) Install assembled cylinder and adapter over threaded rod(5). Position keyhole slots of adapter over shoulder bolts(7) and rotate adapter clockwise to engage.



Threading flange nut all the way onto hydraulic cylinder can result in damage to engine hardware or tool.

- d. Install flange nut(1) onto threaded rod(5) until 0.370 to 0.500 inch gap exists between nut and hydraulic cylinder(3).

e. Connect PWA 55380 hydraulic pump to hydraulic coupler(2). Actuate pump until turbine rotor and stator assembly has separated from rear compressor driveshaft, at which time hydraulic pressure will drop. Continue pumping until hydraulic pressure increases 500 to 1000 psig, indicating HPT hub has contacted coupler(6). Do not exceed 6,500 psig.

f. Take up slack in overhead hoist to prevent turbine from falling back on rear compressor driveshaft.

g. Release pump pressure and remove pump.

h. Remove PWA 57530 pusher and puller.

i. Lift turbine rotor and stator assembly upward using hoist.

j. Place turbine on work bench.

k. If required, refer to T.O. 2J-F100-53-8 for rear compressor drive turbine rotor and stator assembly maintenance.

c. Remove lockwire and disconnect coupling nuts(10) connecting left and right fuel manifold assemblies(1 and 6) to fuel supply manifold tube connector assembly(9).

d. Remove bolts(8) and fuel supply manifold tube connector assembly(9).



Allowing tools to contact conical seat of inlet fitting during loosening of bolts will damage inlet fittings. Fittings on fuel nozzles at locations 12 and 13 (bottom center) are particularly susceptible to damage.

e. Ensure protective caps are installed on all fuel nozzle inlet fittings prior to removing loop clamp nuts and bolts.

NOTE

It is permissible to leave loop clamps on manifold assembly. Loop clamps that are removed from manifold must be discarded and replaced with new loop clamps.

f. Remove nuts(11) and bolts(13) securing loop clamps(12), and cushion loop clamps(16 or 18). Remove fuel manifold assemblies(1 and 6). Discard loop clamps that are bent, distorted, twisted, or worn.

g. Remove lockwire and bolts(15) securing fuel nozzles(7) and brackets(14 and 19).

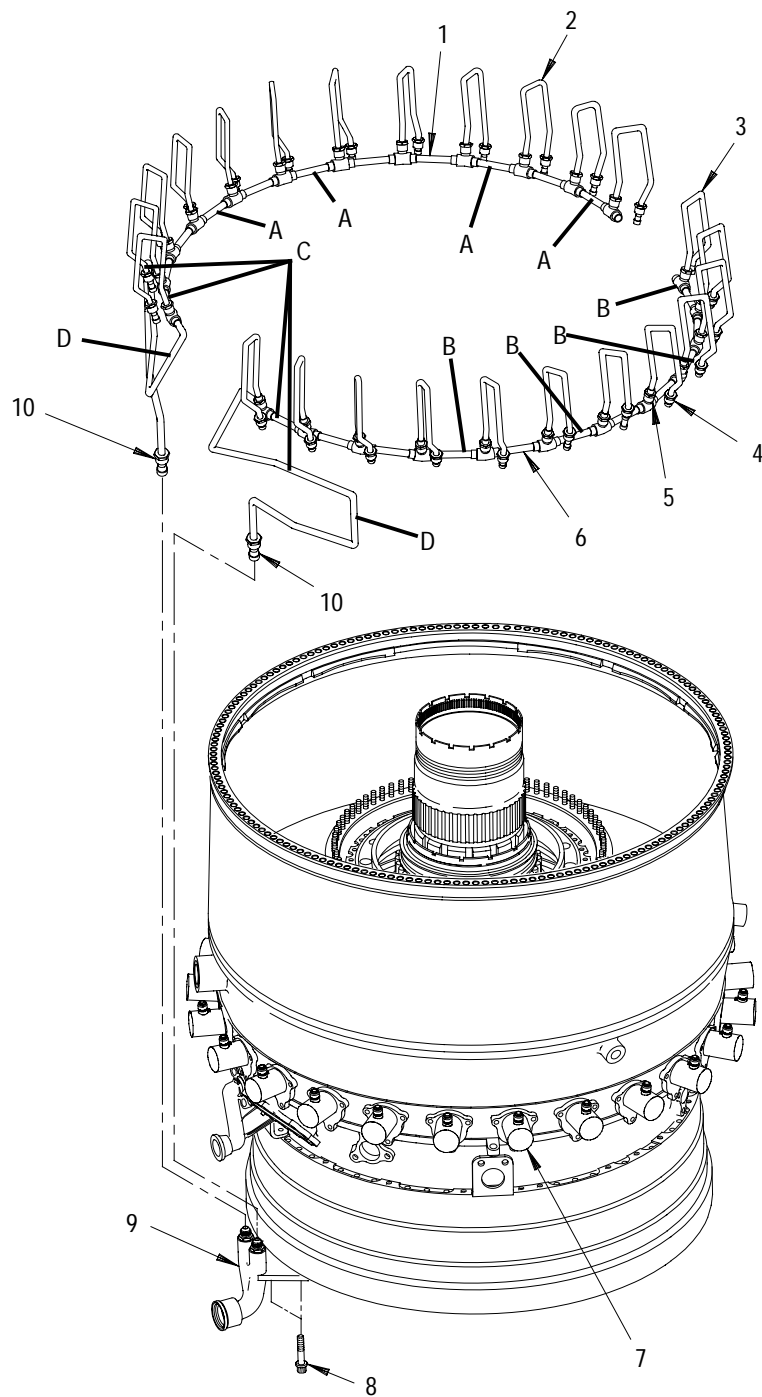
h. Remove fuel nozzles(7) and discard gaskets.

3A. LEFT AND RIGHT FUEL SUPPLY MANIFOLDS AND FUEL NOZZLES - REMOVAL (BEFORE INCORPORATION OF TCTO 2J-F100229(II)-559 OR 2J-F100229(II)-560).

(See Figure 4A.)

a. Number each fuel supply tube(2 and 3, figure 4A) and fuel nozzles(7) in a clockwise direction (viewed from rear) with silver pencil or equivalent. No 1 position is at 12:30 o'clock position.

b. Remove lockwire and disconnect coupling nuts(4 and 5) and remove fuel supply tubes(2 and 3).



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Figure 4A. Fuel Manifolds and Fuel Nozzles - Removal (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 1 of 3)

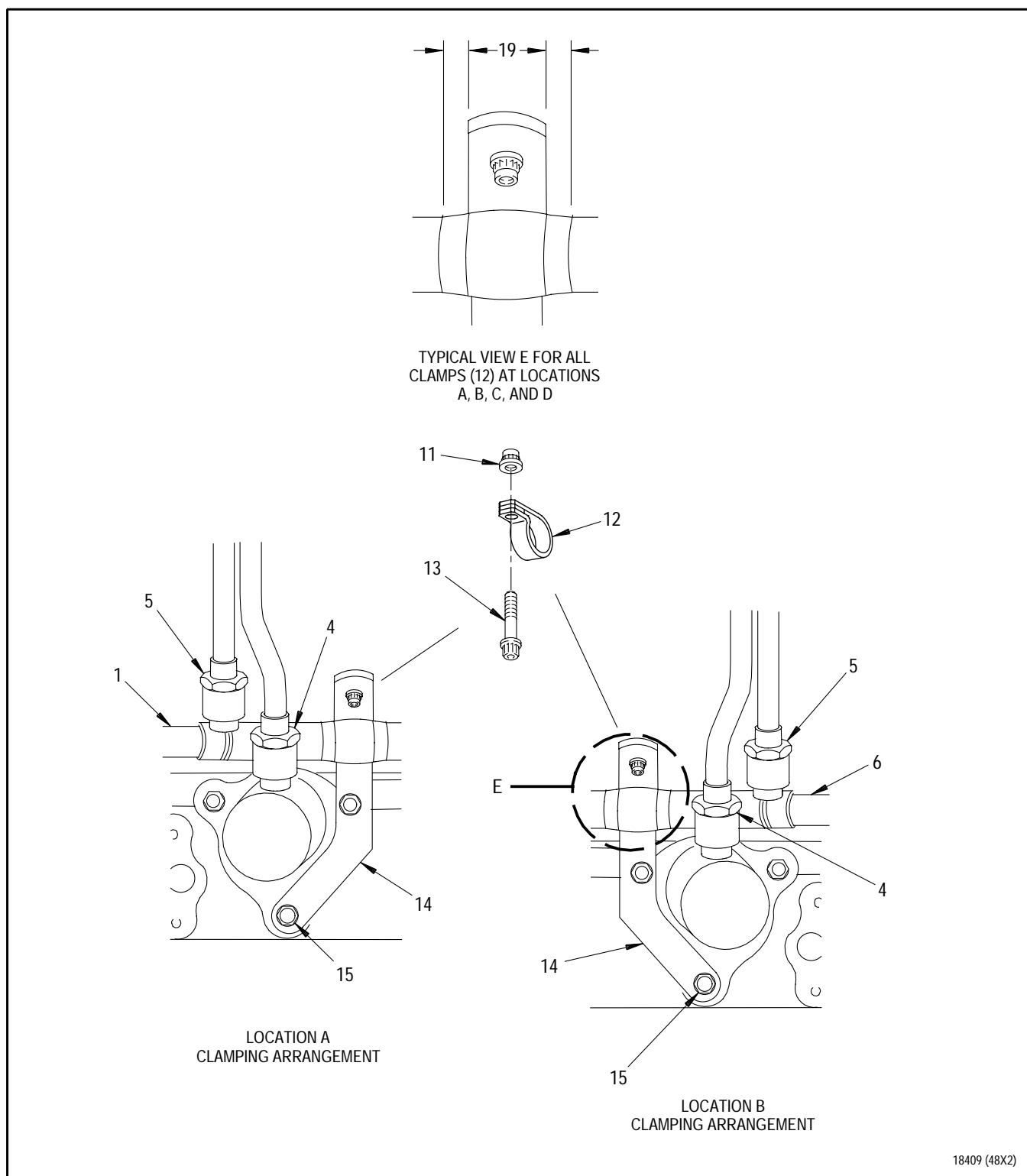


Figure 4A. Fuel Manifolds and Fuel Nozzles - Removal (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 2 of 3)

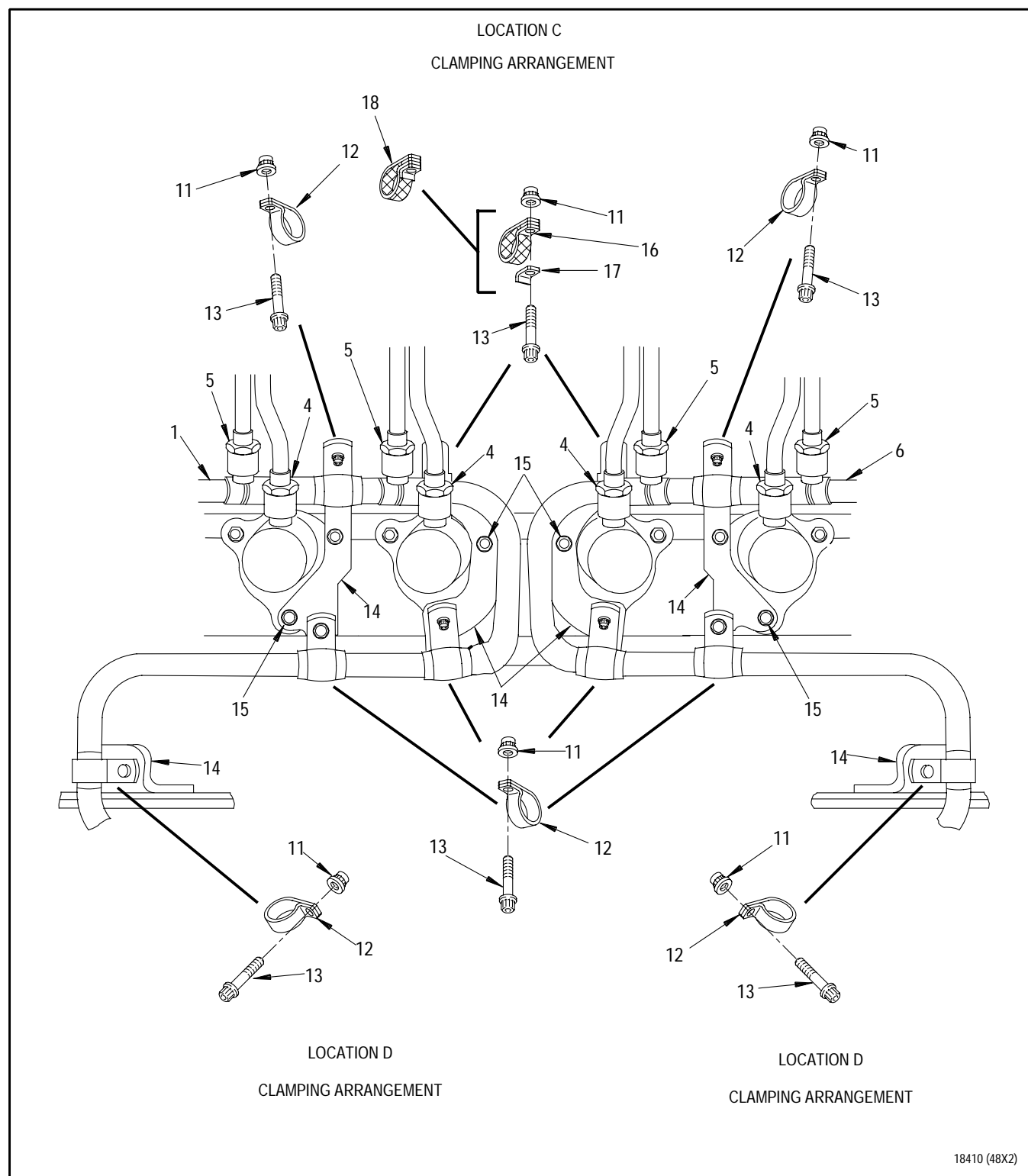


Figure 4A. Fuel Manifolds and Fuel Nozzles - Removal (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 3 of 3)

Legend for figure 4A

1. Fuel manifold assembly (left)
2. Fuel supply tube (left)
3. Fuel supply tube (right)
4. Coupling nut (supply tube to fuel nozzle)
5. Coupling nut (supply tube to manifold)
6. Fuel manifold assembly (right)
7. Fuel nozzle
8. Bolt
9. Fuel supply manifold tube connector assembly
10. Coupling nut
11. Nut
12. Loop clamp
13. Bolt
14. Bracket
15. Bolt
16. Cushion loop clamp
17. Plate
18. Cushion loop clamp assembly
19. Clamp edge to sleeve edge 3/16 inch minimum

**3B. LEFT AND RIGHT FUEL SUPPLY
MANIFOLDS AND FUEL NOZZLES - REMOVAL
(AFTER INCORPORATION OF TCTO
2J-F100229(II)-559 OR 2J-F100229(II)-560).**

(See Figure 4B.)

- a. Number each fuel supply tube(2 and 3, figure 4B) and fuel nozzle(7) in clockwise direction (viewed from rear) with silver pencil or equivalent. No. 1 position is at 12:30 o'clock position.
- b. Remove safety cables and disconnect coupling nuts(4 and 5). Remove fuel supply tubes(2 and 3).
- c. Remove safety cable and disconnect coupling nuts(10) connecting left and right fuel manifold assemblies(1 and 6) to fuel supply manifold tube connector assembly(9).
- d. Remove bolts(8) and fuel supply manifold tube connector assembly(9).



Allowing tools to contact conical seat of inlet fitting during loosening of bolts will damage inlet fittings. Fittings on fuel nozzles at positions 12 and 13 (bottom center) are particularly susceptible to damage.

- e. Ensure protective caps are installed on all fuel nozzle inlet fittings prior to removing bracket and clamp nuts and bolts.

- f. Remove nuts(11) and bolts(13) securing fuel manifold bracket(18) to bracket assemblies(19) at location E and remove bracket(18). Bracket assemblies(19) should be left on fuel manifold assemblies unless bent, distorted, twisted, worn, or removal is necessary for inspection or replacement of manifold.

NOTE

It is permissible to leave loop clamps on fuel manifold assembly. Loop clamps that are removed from manifold must be discarded and replaced with new loop clamps.

- g. Remove nuts(11), bolts(13), and bolts(15) securing fuel manifold brackets(20) and cushion loop clamps(16) at Locations A, B, and C and saddle loop clamps(12) to angle bracket(17) at Locations D. Remove fuel manifold assemblies(1 and 6). Discard clamps that are bent, distorted, twisted, worn, or removed from manifold.
- h. Remove safety cable and bolts(15) securing fuel nozzles(7) and fuel nozzle brackets(14).
- i. Remove brackets and fuel nozzles and discard gaskets.
- j. If fuel nozzles are to be shipped, or stored for more than seven days, preserve per WP 006 00.

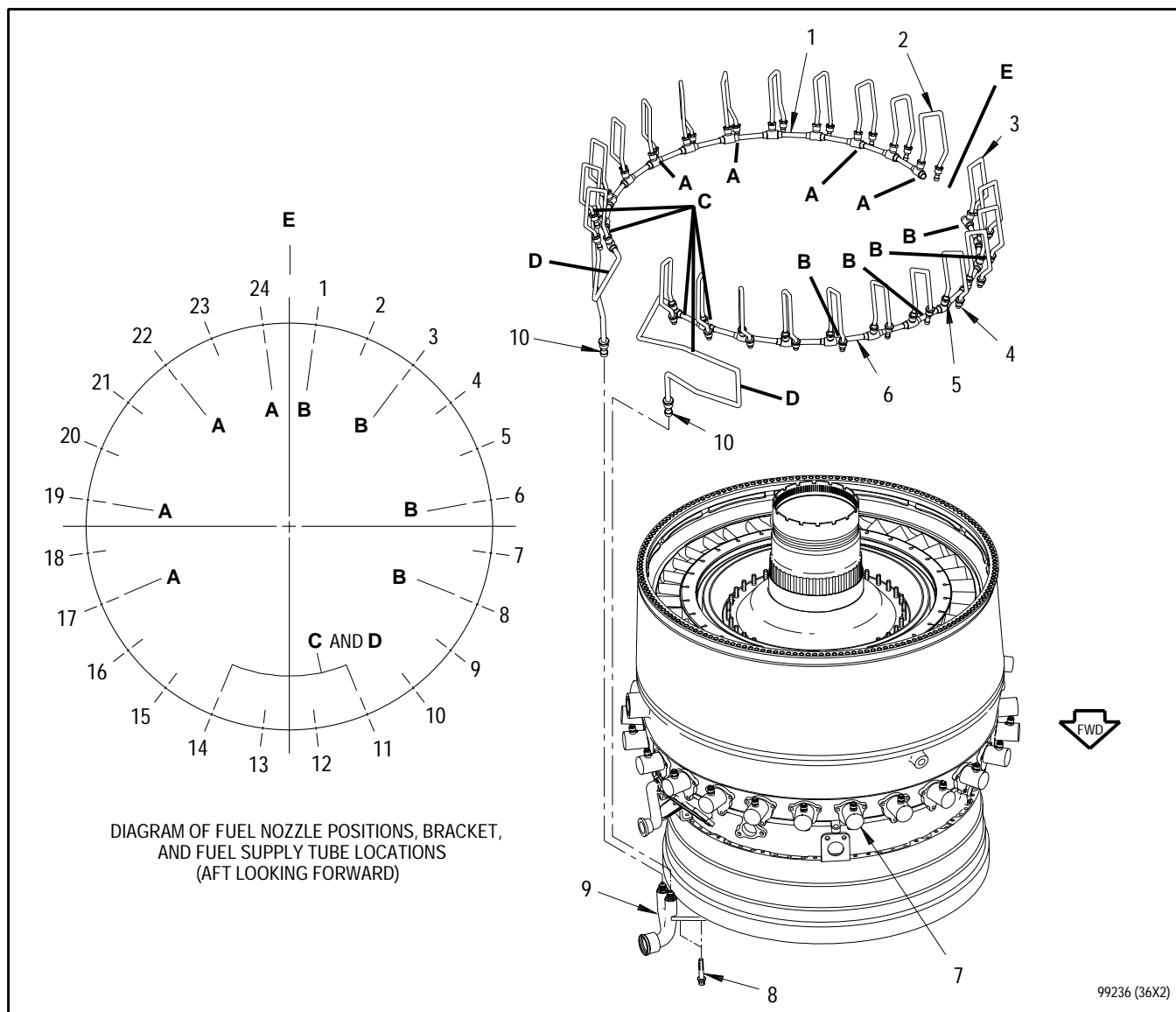


Figure 4B. Fuel Manifolds and Fuel Nozzles - Removal (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 1 of 4)

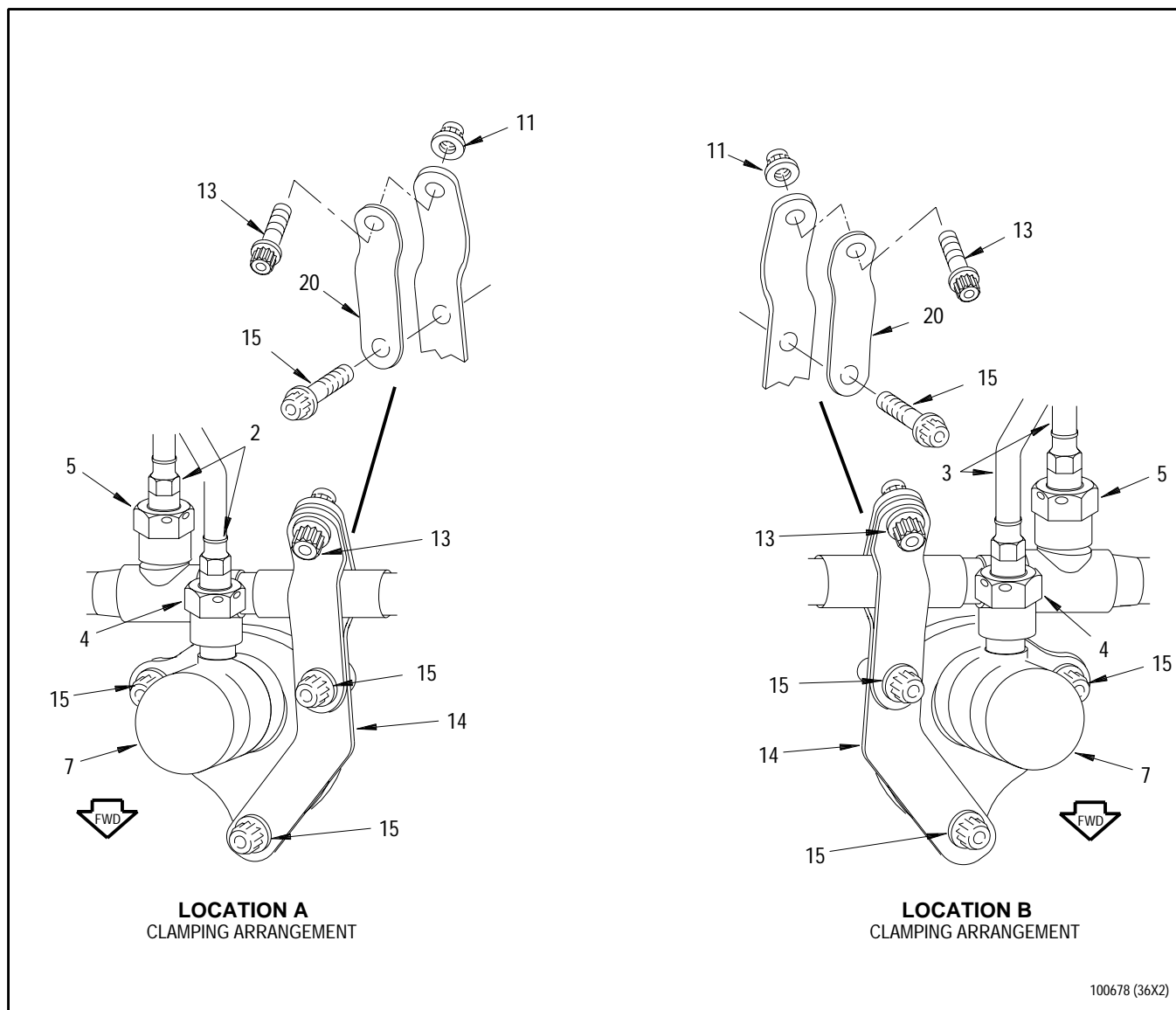


Figure 4B. Fuel Manifolds and Fuel Nozzles - Removal (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 2 of 4)

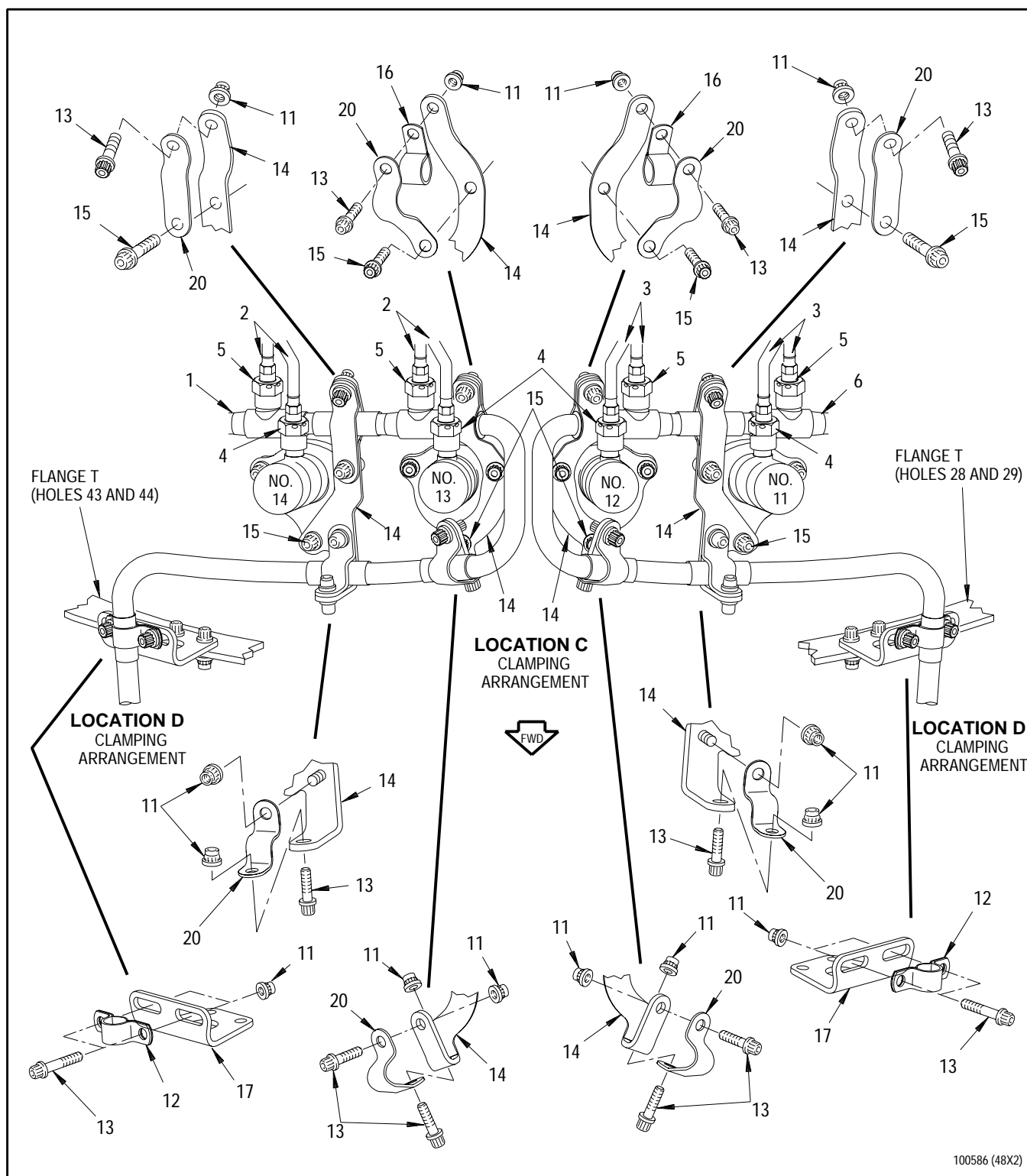


Figure 4B. Fuel Manifolds and Fuel Nozzles - Removal (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 3 of 4)

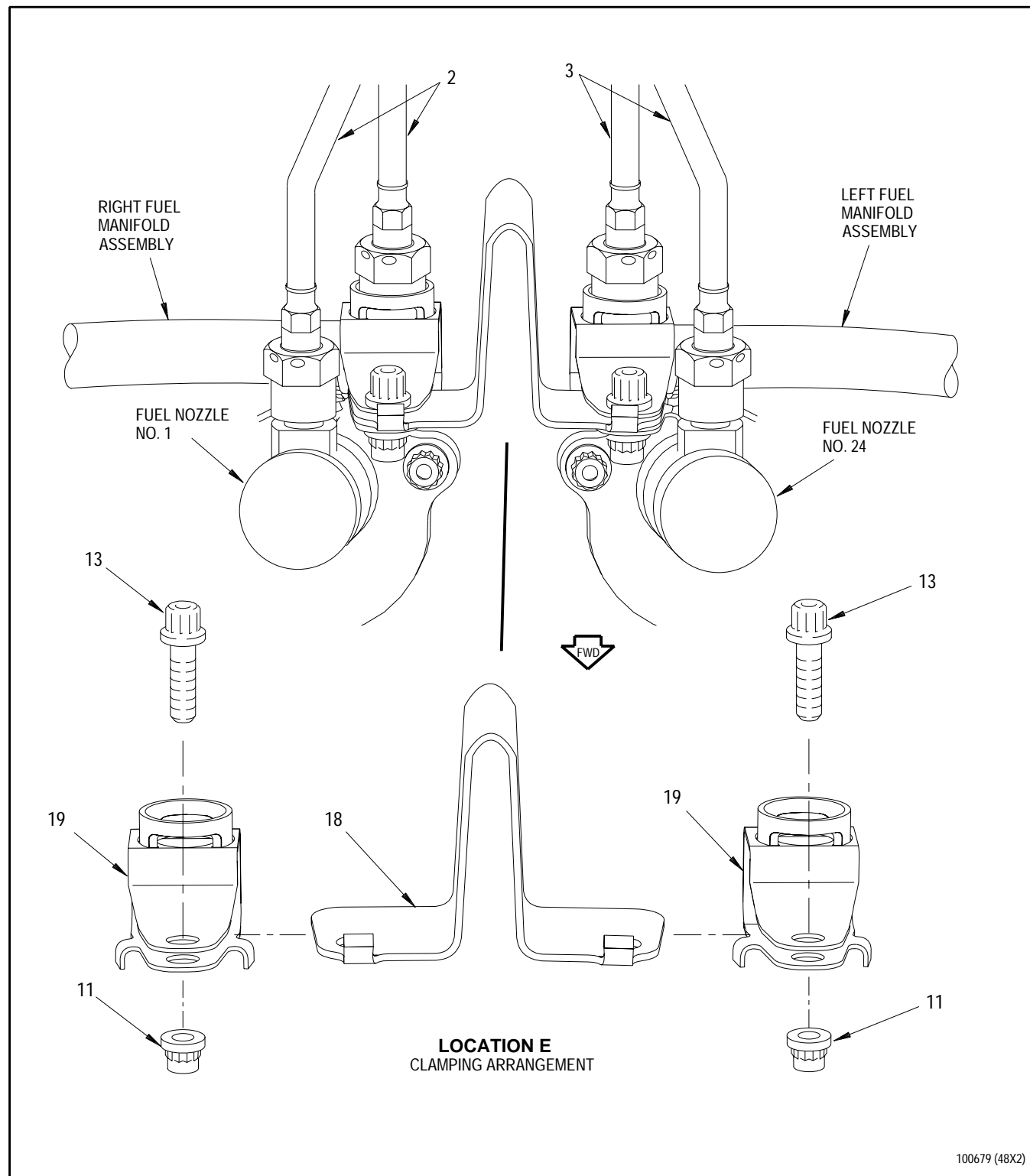


Figure 4B. Fuel Manifolds and Fuel Nozzles - Removal (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 4 of 4)

Legend for figure 4B

1. Fuel manifold assembly (left)
2. Fuel supply tube (left)
3. Fuel supply tube (right)
4. Coupling nut (supply tube to fuel nozzle)
5. Coupling nut (supply tube to manifold)
6. Fuel manifold assembly (right)
7. Fuel nozzle
8. Bolt
9. Fuel supply manifold tube connector assembly
10. Coupling nut
11. Nut
12. Saddle loop clamp
13. Bolt
14. Fuel nozzle bracket
15. Bolt
16. Cushion loop clamp
17. Angle bracket
18. Fuel manifold bracket
19. Bracket assembly
20. Fuel manifold bracket

**3C. FRONT TURBINE CASE, FIRST STAGE
TURBINE STATOR VANES, FIRST STAGE
TURBINE STATOR SUPPORT (TOBI),
COMBUSTION CHAMBER, AND FIRST STAGE
TURBINE INNER AIR SEALING RING -
REMOVAL.**

(See Figures 4C through 4E.)

NOTE

- Fuel supply manifolds and fuel nozzles shall be removed prior to this procedure.
- Two core (rear) configurations exist. One configuration includes 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is removed from diffuser case assembly per paragraph 4. Second configuration includes front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is removed from short diffuser case assembly as follows:
 - a. Remove nuts(2, figure 4C) securing 1st stage turbine stator support (TOBI)(3) to inner flange of diffuser case as follows:
 - (1) Record runoff torque of each nut(2). If runoff torque of any one of 37 nuts(2) exceeds 200 pound-inches, replace all 37 nuts(2) and bolts(4) per WP 434 00. If runoff torque does not exceed 200 pound-inches and nuts(2) can be verified as silver plated, 37 nuts(2) and bolts(4) can be reused. Otherwise, do not reuse nuts and bolts.

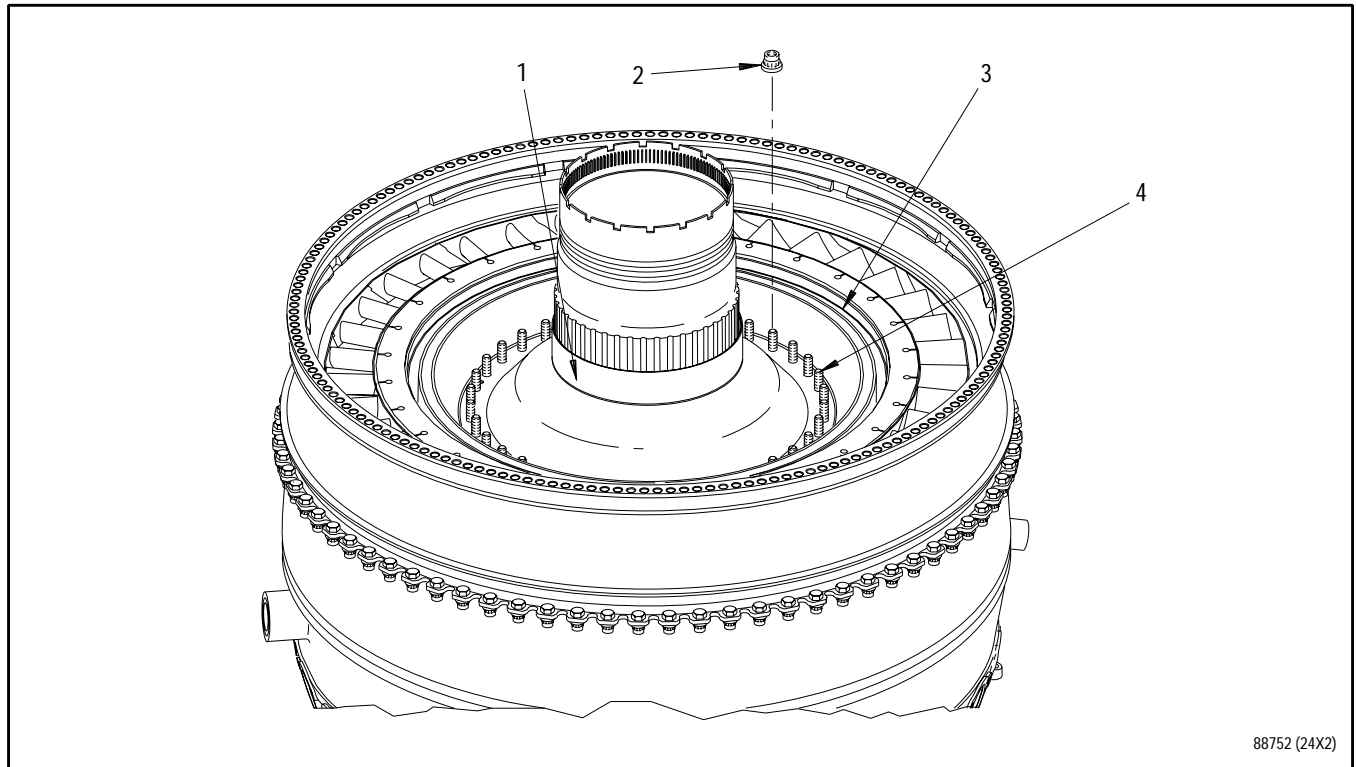
- b. Spray OD area of TOBI(3) bolt circle with penetrating fluid.

NOTE

Front turbine case is separated, but not removed, from diffuser case during following step.

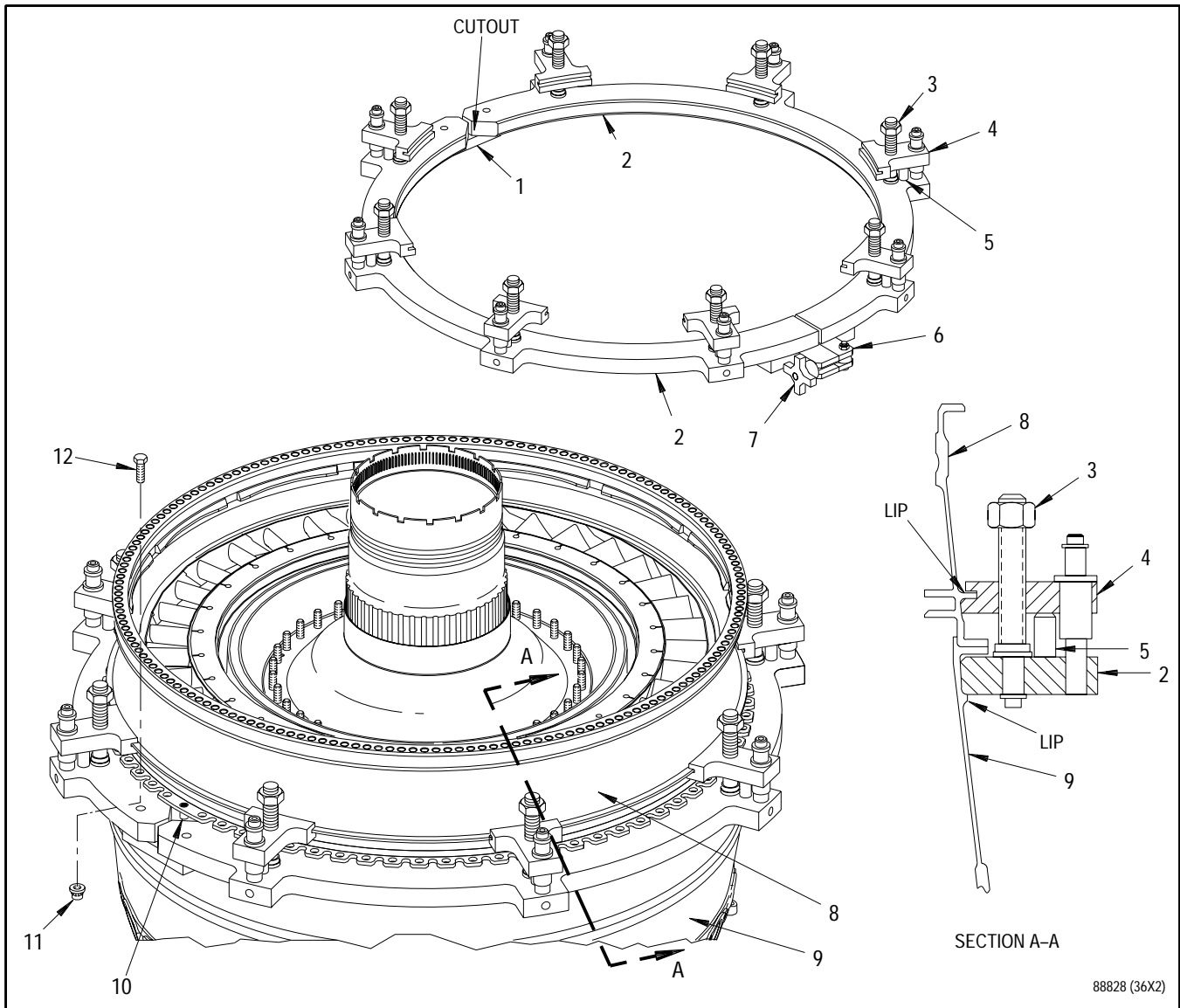
- c. Separate front turbine case(8, figure 4D) from diffuser case(9) using PWA 57921 puller as follows:
 - (1) Remove nuts(11) and bolts(12) (75 places) from flange securing front turbine case(8) to diffuser case(9).
 - (2) Loosen screw assembly(3) until jaw(4) contacts stop pin(5) (8 places).
 - (3) Loosen hand knob(7) and rotate clear of clamp assembly(6) to allow half rings(2) to be opened.
 - (4) Open half rings(2) enough to allow puller to be placed around diffuser case(9).
 - (5) Position puller on diffuser case(9) as follows:
 - (a) Align "V" cutout of hinge(1) directly below locating pin(10) in flange as shown in figure 4D.
 - (b) Close PWA 57921 puller while ensuring both half rings(2) are located between diffuser case(9) lip and flange, and groove in jaws(4) engage front turbine case lip (8 places) as shown in figure 4D.

- (c) Engage hand knob(7) in clamp assembly(6).
- (d) Tighten hand knob(7) until PWA 57921 puller is snug to diffuser case(9)
- (6) Finger tighten eight screw assemblies(3).
- (7) Working in clockwise direction, tighten each adjacent screw assembly(3) 1/4 turn. Continue tightening 1/4 turn until front turbine case(8) is separated from diffuser case(9).
- (8) Remove PWA 57921 puller.



1. Inner air sealing ring
2. Nut
3. 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring
4. Bolt

Figure 4C. Front Turbine Case, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Removal



88828 (36X2)

- | | | |
|-------------------|-----------------------|------------------|
| 1. Hinge | 5. Stop pin | 9. Diffuser case |
| 2. Half ring | 6. Clamp assembly | 10. Locating pin |
| 3. Screw assembly | 7. Hand knob | 11. Nut |
| 4. Jaw | 8. Front turbine case | 12. Bolt |

Figure 4D. Front Turbine Case, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Installation of PWA 57921 Puller

- d. Remove front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring from diffuser case as follows:

- (1) Install PWA 57919 lift fixture as follows:

NOTE

Jackscrews(12, figure 4E) used for the following procedure (removal) can be identified by presence of longer threads and shoulder beneath socket head. Jackscrews(11) used during installation have shorter threads and no shoulder beneath socket head.

- (a) Ensure jackscrews(12) used for removal are installed in outer position of plate(13).
- (b) Insert centering assembly(4) into rear compressor driveshaft.

NOTE

Rear compressor driveshaft has left-hand threads.

- (c) Thread centering assembly(4) counterclockwise on rear compressor driveshaft until it bottoms out, then back off 1/2 turn.

- (d) Install PWA 26147 adapters on trunnions(10). Attach PWA 56336 sling to overhead hoist with PWA 2388 hook then connect sling to PWA 26147 adapters.

- (e) Prepare PWA 57919 fixture for installation on engine assembly as follows:

1 Loosen six hand knobs(1) and slide clamps(2) to outermost position.

2 Locate TDC marking(8) on fixture.

3 Locate locating pin(6) on diffuser case flange.

4 Align TDC marking(8) with locating pin(6).

5 Center guide(7) above centering assembly(4).

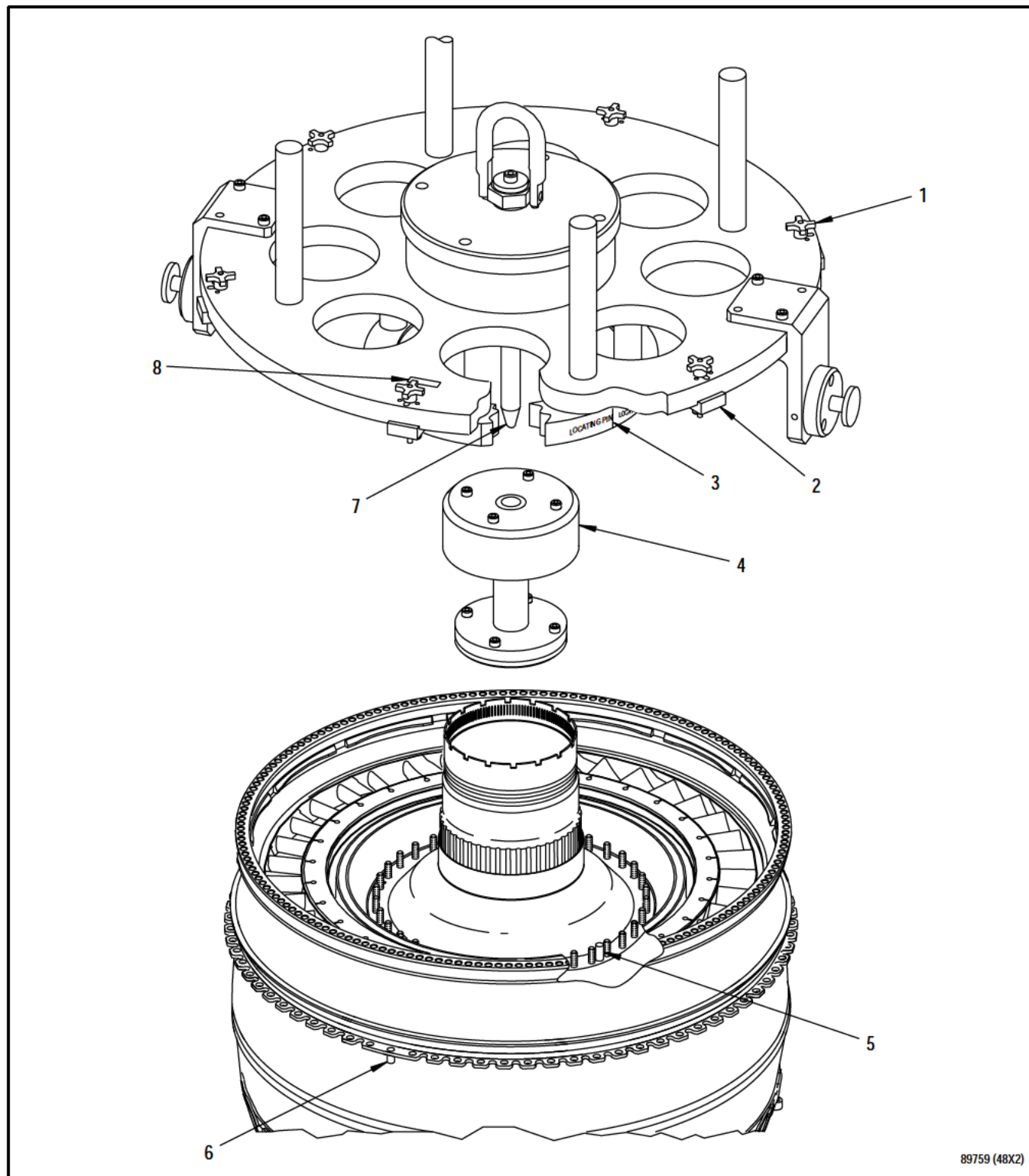
- (f) Lower PWA 57919 fixture slowly onto assembly ensuring TDC marking(8) aligns with locating pin(6), guide(7) engages centering assembly(4), and extra hole in lift/puller plate(13) aligns with locating pin(5).

- (g) Slide six clamps(2) inward to engage flange of front turbine case(8, figure 4D). Tighten hand knobs(1, figure 4E).
- (h) Finger tighten jackscrews(12) until contact is made with diffuser case inner flange(15) through holes in turbine stator support(14).
- (i) Working in clockwise direction, tighten each adjacent jackscrew(12) 1/4 turn. Continue tightening 1/4 turn at a time until turbine stator support(14) is separated from diffuser case inner flange(15).
- (j) Remove long thread removal jackscrews(12) one at a time and install short thread installation jackscrews(11) to engage flange of turbine stator support(14). Torque screws 30 pound-inches. Install removal jackscrews(12) in inner storage position of lift/puller plate(13).



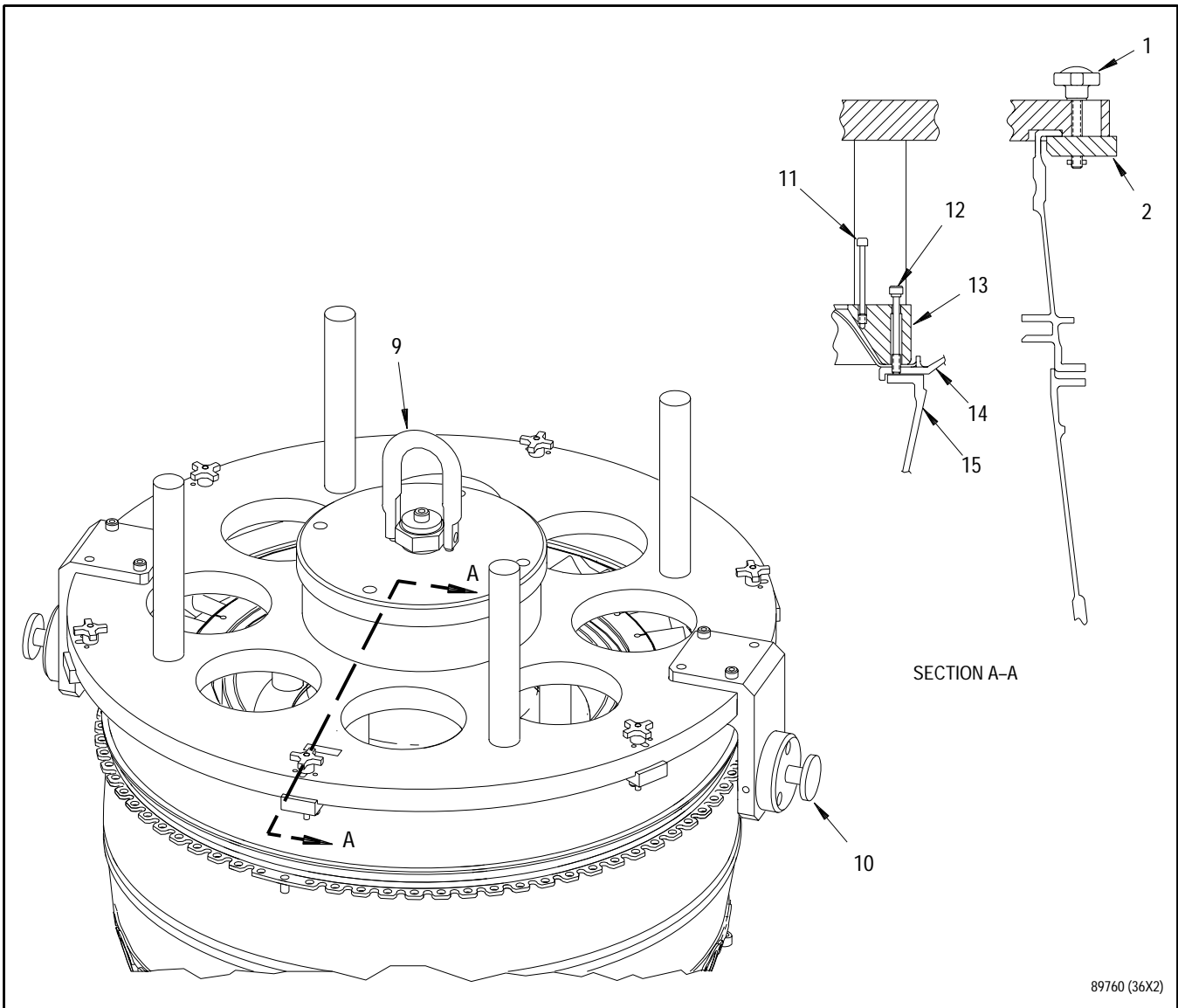
Storing combustion chamber assembly on dome end or on its side may cause damage to float wall panel retainers or dome assembly.

- (k) Using hoist, remove assembly clear of engine and place on workbench or equivalent, rear end down.
- (l) Inspect shoulder bolts on diffuser case inner flange(15) per WP 370 00.



89759 (48X2)

Figure 4E. PWA 57919 Fixture - Installation (Sheet 1 of 2)



- | | | |
|-----------------------|------------------------------|-----------------------------------|
| 1. Hand knob | 7. Guide | 12. Jackscrew (removal) |
| 2. Clamp | 8. TDC marking | 13. Lift/puller plate |
| 3. Scribed line | 9. Swivel ring | 14. Turbine stator support (TOBI) |
| 4. Centering assembly | 10. Trunnion | 15. Diffuser case inner flange |
| 5. Locating pin | 11. Jackscrew (installation) | |
| 6. Locating pin | | |

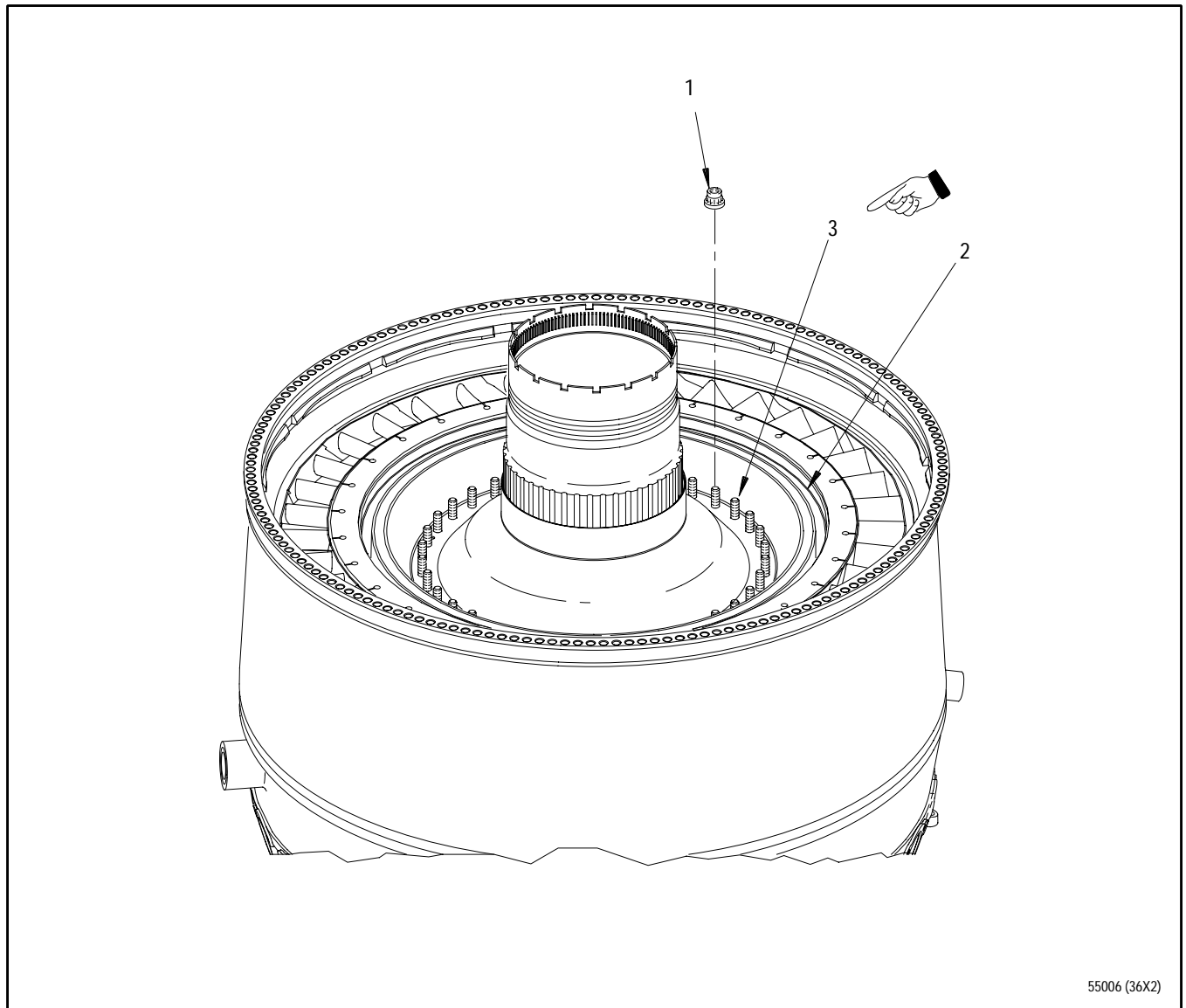
Figure 4E. PWA 57919 Fixture - Installation (Sheet 2 of 2)

4. FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER, AND FIRST STAGE TURBINE INNER AIR SEALING RING - REMOVAL.

(See Figures 5 and 6.)

NOTE

- Fuel supply manifolds and fuel nozzles shall be removed prior to this procedure.
- Two core (rear) configurations exist. One configuration includes front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is removed from short diffuser case assembly per paragraph 3C. Second configuration includes 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is removed from long diffuser case assembly as follows:
 - a. Remove nuts(1, figure 5) securing 1st stage turbine stator support (TOBI)(2) to inner flange of diffuser case as follows:
 - (1) Record runoff torque of each nut(1). If runoff torque of any one of 37 nuts(1) exceeds 200 pound-inches, replace all 37 nuts(1) and bolts(3) per WP 434 00. If runoff torque does not exceed 200 pound-inches and nuts(1) can be verified as silver plated, 37 nuts(1) and bolts(3) can be reused. Otherwise, do not reuse nuts and bolts.
 - b. Spray OD area of TOBI(2) bolt circle with penetrating fluid.



55006 (36X2)

Index Number	Description
1.	Nut
2.	First stage turbine stator support (TOBI)
3.	Bolt

Figure 5. First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Removal

- c. Install PWA 57506 guide fixture(2, figure 6) as follows:

- (1) Ensure No. 1 vane locating detail(6) is positioned aft.

NOTE

Rear compressor driveshaft has left-hand threads.

- (2) Thread PWA 57506 guide fixture, detail-13 slide(4) on rear compressor driveshaft until it bottoms out, then back off 1/2 turn. Shaft has left-hand threads.
- (3) Attach PWA 26147 adapters to PWA 57506, detail-7 trunnions(3). Attach PWA 6580 or PWA 56336 sling to overhead hoist with PWA 2388 hook and connect sling to PWA 26147 adapters.

NOTE

Twelve o'clock position is marked with an X on diffuser case OD flange.

- (4) Raise PWA 57506 guide fixture(2) and position on PWA 57506, detail-13 slide(4) with ``OFFSET`` stamped on OD of guide fixture at 12 o'clock position.
- (5) Install four 0.190-32 X 1.0 inch jacking screws(1) through slots in guide fixture(2) and screw into

jacking holes in first stage turbine support (TOBI).

NOTE

First stage turbine stator vanes, first stage turbine stator support (TOBI), combustion chamber, and first stage turbine inner air sealing ring are removed as an assembly(5).

- (6) Turn each jacking screw(1), 1/4 turn in an alternating pattern until assembly(5) is loose.
- (7) Tighten jacking screws(1) to secure guide fixture(2) to first stage turbine stator support (TOBI).



Do not store combustion chamber assembly on dome end or on its side. Damage to float wall panel retainers or dome assembly may result.

- d. Remove assembly(5) clear of engine and place on workbench or equivalent, rear end down.
- e. Remove PWA 57506 guide fixture, detail-13 slide(4) from rear compressor driveshaft.
- f. Inspect shoulder bolts (7) per WP 370 00.

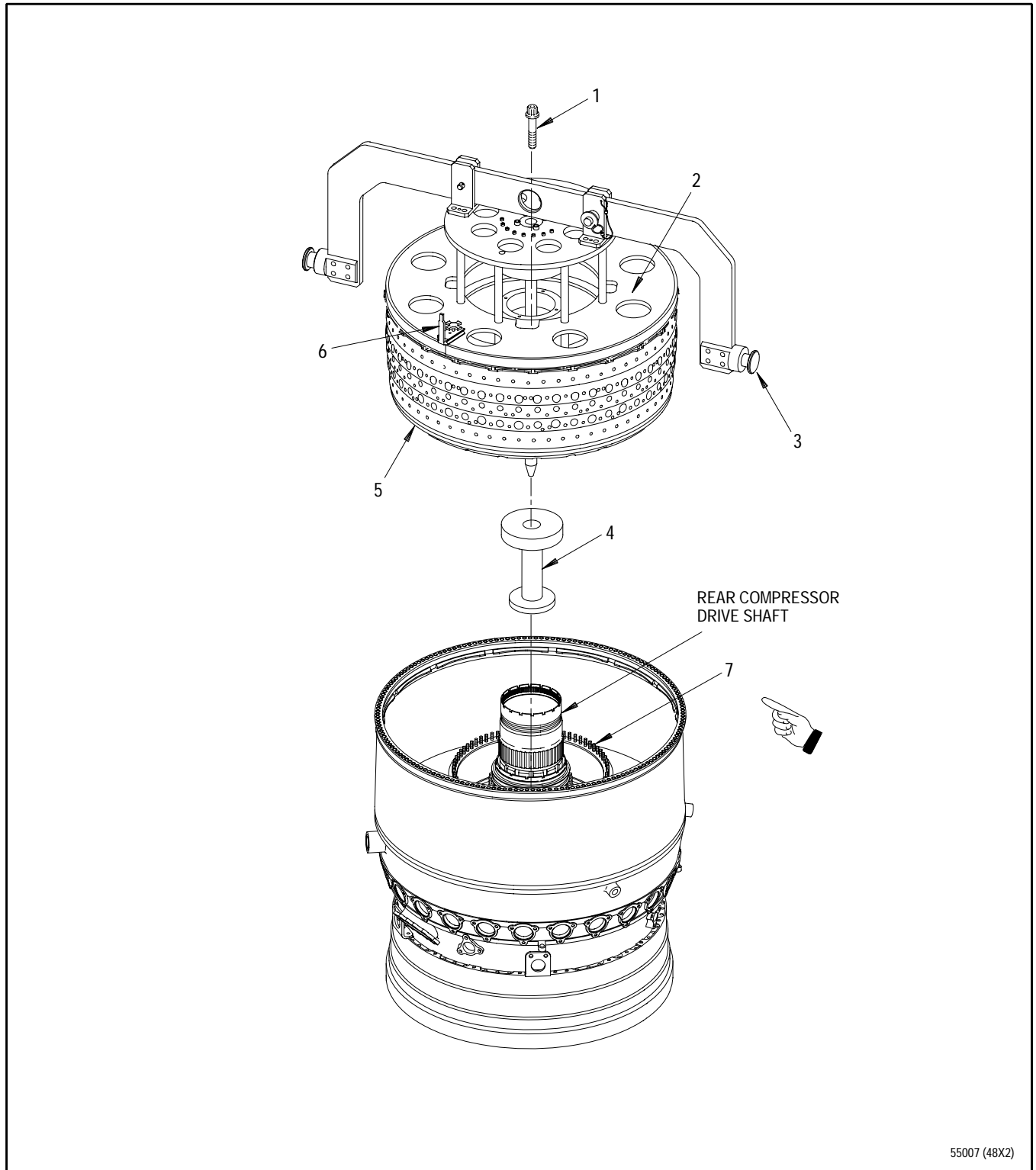


Figure 6. Installation of PWA 57506 Guide Fixture

Legend for figure 6

Index Number	Description
1.	Jacking screws
2.	PWA 57506 guide fixture
3.	Trunnion
4.	Slide
5.	First stage turbine stator vanes, first stage turbine stator support (TOBI), combustion chamber, and first stage turbine inner air sealing ring assembly
6.	NO. 1 vane locating detail
7.	Bolt

5. NO. 4 BEARING SEAL AIR SUPPLY MANIFOLD ASSEMBLY AND STATIC PRESSURE PROBE TUBE CONNECTOR - REMOVAL

(See Figure 7.)

- a. Remove No. 4 bearing seal air supply manifold assembly(2), figure 7) as follows:

(1) Remove bolts(1) securing manifold assembly(2) to mounting pad.

(2) Disengage manifold assembly(2) from diffuser

case, slide manifold assembly rearward to disengage manifold assembly(2) from air supply manifold elbow(4). Do not remove metal seal ring(3) unless it is damaged.

(3) Remove two bolts(5) securing air supply manifold elbow(4), remove elbow.

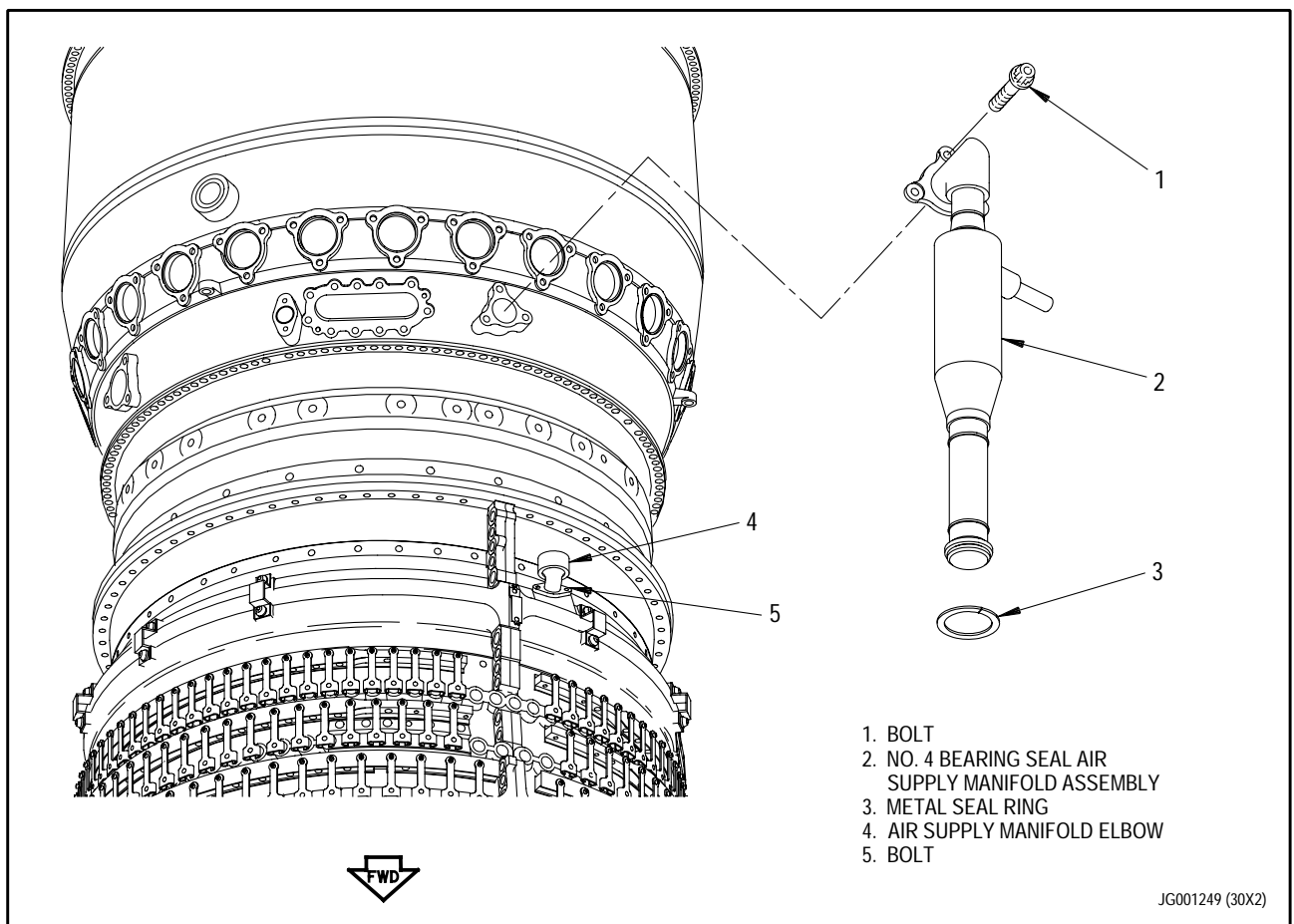


Figure 7. No. 4 Bearing Seal Air Supply Manifold Assembly - Removal

b. Remove static pressure probe tube connector(3, figure 8) as follows:

(1) Remove lockwire and bolts(2) securing tube connector(3) to diffuser case(1).

(2) Disengage tube connector(3) from diffuser case(1).

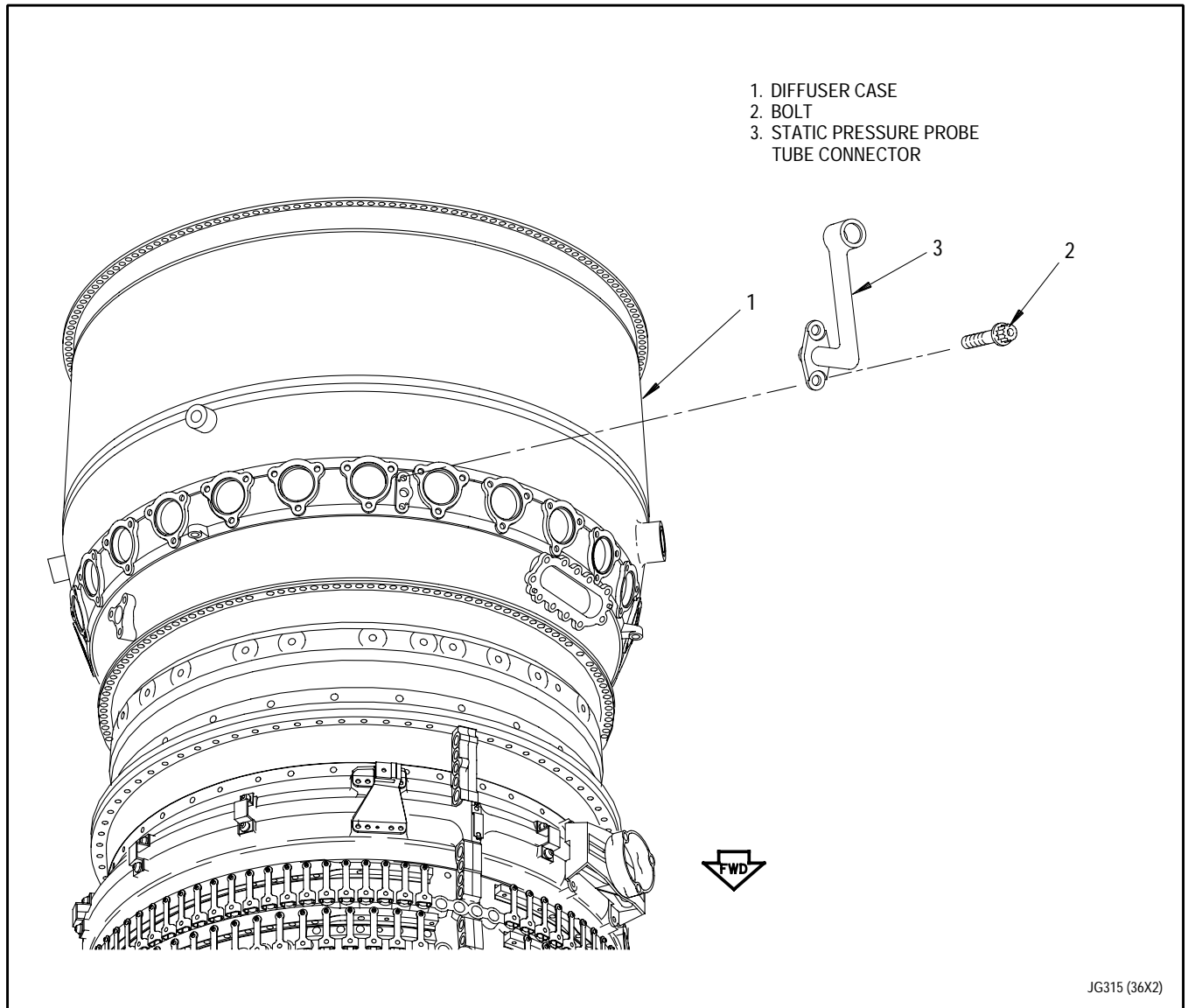


Figure 8. Static Pressure Probe Tube Connector - Removal

6. Deleted.

Figure 9. Deleted.

6A. Deleted.

Figure 9A. Deleted.

**7. NO. 4 BEARING REAR AIR SEALING RING
AND NO. 4 BEARING REAR SEAL ASSEMBLY -
REMOVAL.**

(See Figures 10 and 11.)



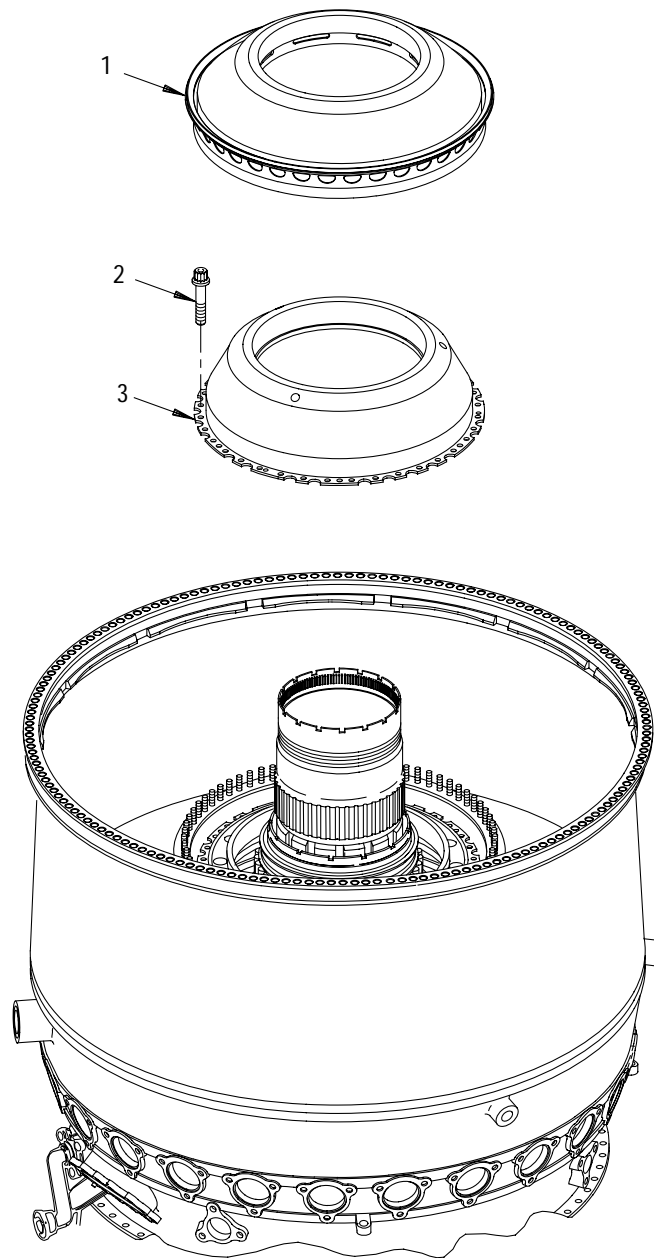
Be careful when removing No. 4 bearing rear air sealing ring. Ring is made of thin wall material.

- a. Install PWA 51838 puller behind any lug in air sealing ring(1, figure 10).
- b. Using knocker action remove air sealing ring(2, Figure 11).

- c. Remove lockwire and bolts(2, figure 10) from No. 4 bearing rear seal assembly(3).
- d. Install three 0.190-32 jackscrews in small holes of rear seal assembly(3).
- e. Tighten jackscrews 1/4 turn in an alternating pattern to force seal assembly from snap fit.
- f. Remove rear seal assembly(3) carefully to avoid damage to carbon seal.
- g. Remove jackscrews from rear seal assembly(3).
- h. For local (in-house) handling, protect rear seal assembly(3) by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal assembly in a cardboard box.

Data from paragraphs 6 and 6A, including figures 9 and 9A,
moved to paragraphs 3A and 3B.
Pages 23 through 26F deleted.

1. NO. 4 BEARING REAR AIR SEALING RING
2. BOLT
3. NO. 4 BEARING REAR SEAL ASSEMBLY



JG320X1 (51X2)

Figure 10. No. 4 Bearing Rear Air Sealing Ring and Rear Seal Assembly - Removal

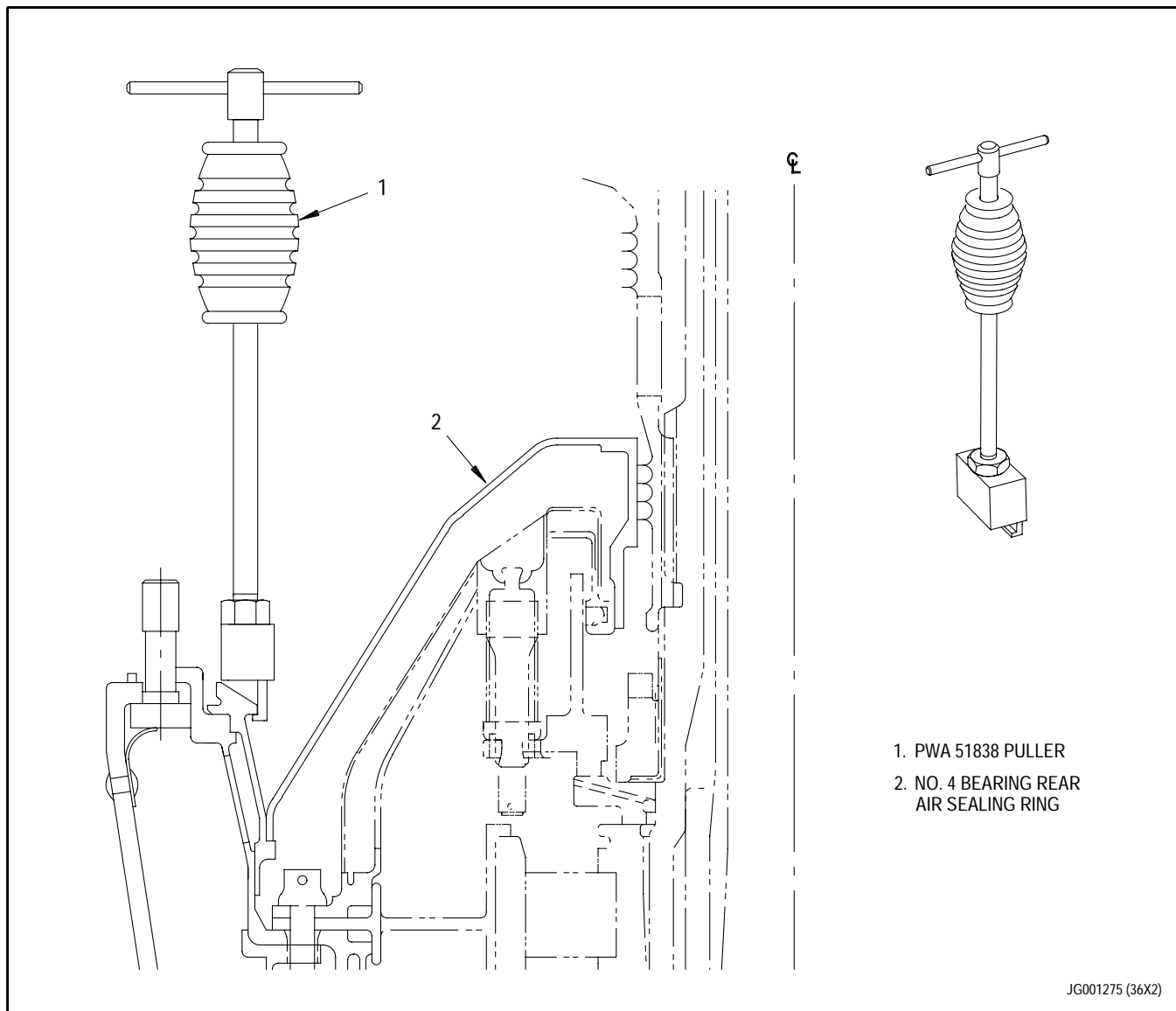


Figure 11. Removal of No. 4 Bearing Rear Air Sealing Ring with PWA 51838 Puller

- i. For shipping, protect rear seal assembly(3) with cardboard collar. Refer to T.O. 2-1-111.

8. NO. 4 BEARING HOUSING - REMOVAL.

(See Figure 12.)

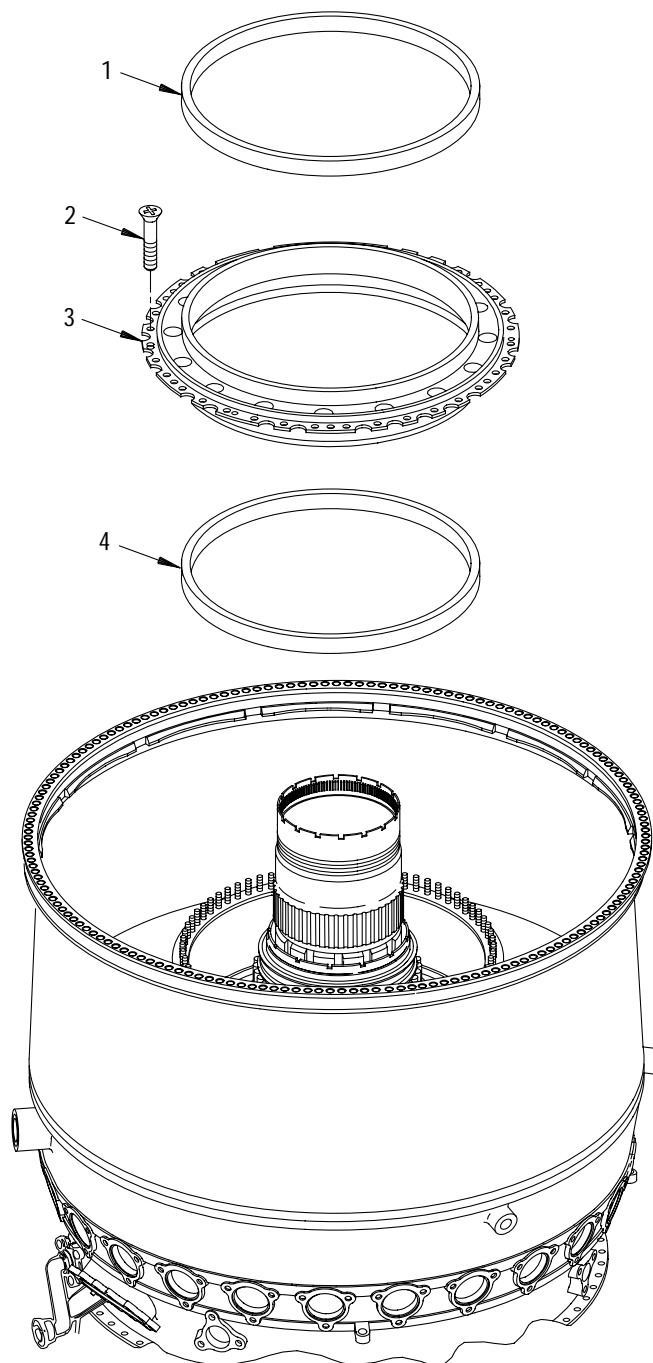
- a. Remove two countersunk screws(2, figure 12).
- b. Install 0.190-32 jacking screws in threaded holes of No. 4 bearing housing(3).
- c. Install PWA 57538 rotator through intermediate case at 6 o'clock strut. Engage splined end of rotator with gearbox bevel drivegear splines inside intermediate case.

NOTE

Jackscrews shall be tightened evenly to prevent cocking or binding of No. 4 bearing housing.

- d. Rotate rear compressor by turning PWA 57538 rotator while tightening jacking screws 1/4 turn in an alternating pattern to free No. 4 bearing housing from snap fit in diffuser case.
- e. Remove No. 4 bearing housing(3).
- f. Remove jacking screws.

1. GASKET
2. SCREW
3. NO. 4 BEARING HOUSING (AND OUTER RACE)
4. GASKET



JG001313 (48X2)

Figure 12. No. 4 Bearing Housing - Removal

- g. Coat outer race with MIL-L-7808 lubricating oil and store in protective, labeled container with other bearing details after removal.
- h. Remove gaskets(1 and 4) and discard.
- i. Remove PWA 57538 adapter.

9. NO. 4 BEARING RETAINING NUT, NO. 4 BEARING INNER RACE AND ROLLERS, NO. 4 BEARING INTERNAL PRESSURE MANIFOLD, FRONT AND REAR SEAL SEATS, AND SCOOP - REMOVAL.

(See Figures 13 through 17.)

- a. Remove No. 4 bearing retaining nut(6, figure 13) as follows:

- (1) Straighten tabs of key washer(7).

NOTE

PWA 57664 detail-2 immobilizer spline and detail-9 immobilizer shaft are installed as an assembly and are referred to as PWA 57664 detail immobilizer.

- (2) Install PWA 57664 detail immobilizer(5) to engage splines in rear compressor driveshaft.
- (3) Install PWA 57664 detail-1 adapter assembly(4) to engage in slots of No. 4 bearing retaining nut(6).

- (4) Install PWA 57806 base assembly(3) onto PWA 57664 adapter assembly(4) and tighten thumbscrews.
- (5) Ensure PWA 57806 wrench adapter assembly is disengaged from inside of adapter assembly(2). See figure 13.

- (5a) Install PWA 57806 adapter assembly(2) onto PWA 57664 adapter assembly(4). If SWE 8100/8200 torque multiplier(9) is used, install LM 1022 spacer(13) between adapter assembly(2) and adapter assembly(4).

- (5b) If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling(12) onto torque multiplier.

- (5c) Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 hydraulic wrench(1) or connect PWA 2388 hook to SWE 81001/81002 sling(12).

- (6) Install PWA 50308 hydraulic wrench(1) or SWE 8100/8200 torque multiplier(9) onto PWA 57806 base assembly(3).

Legend for figure 13

- | | |
|--------------------------------|--------------------------------------|
| 1. PWA 50308 hydraulic wrench | 8. Rear compressor driveshaft |
| 2. PWA 57806 adapter assembly | 9. SWE 8100/8200 torque multiplier |
| 3. PWA 57806 base assembly | 10. 0.750 inch drive ratchet adapter |
| 4. PWA 57664 adapter assembly | 11. 0.750 inch drive work handle |
| 5. PWA 57664 immobilizer | 12. SWE 81001/81002 sling |
| 6. No. 4 bearing retaining nut | 13. LM 1022 spacer |
| 7. Key washer | |

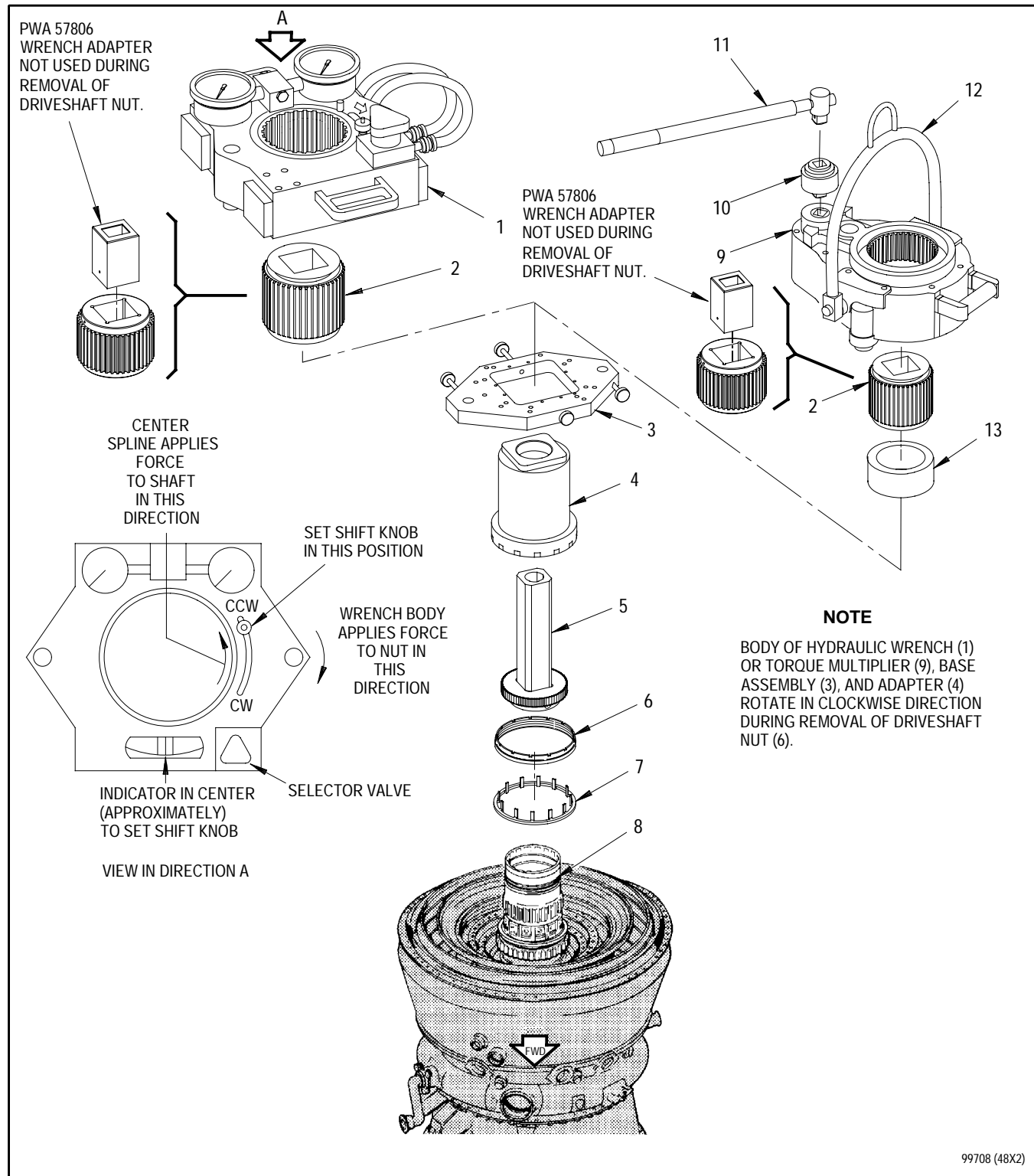


Figure 13. No. 4 Bearing Retaining Nut - Removal Tooling



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut causing damage to engine components.

NOTE

Nut has left-hand threads.

- (7) Install hoses on PWA 50308 hydraulic wrench. Attach ratchet adapter(10) and work handle(11) to SWE 8100/8200 torque multiplier. Actuate wrench or torque multiplier to turn rotor in counterclockwise direction. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
- (8) Disconnect hoses or remove work handle and ratchet adapter. Remove hydraulic wrench or torque multiplier using hoist with nylon strap or sling respectively. Remove tooling.
- (9) Remove retaining nut(6) and key washer(7). Discard key washer.

NOTE

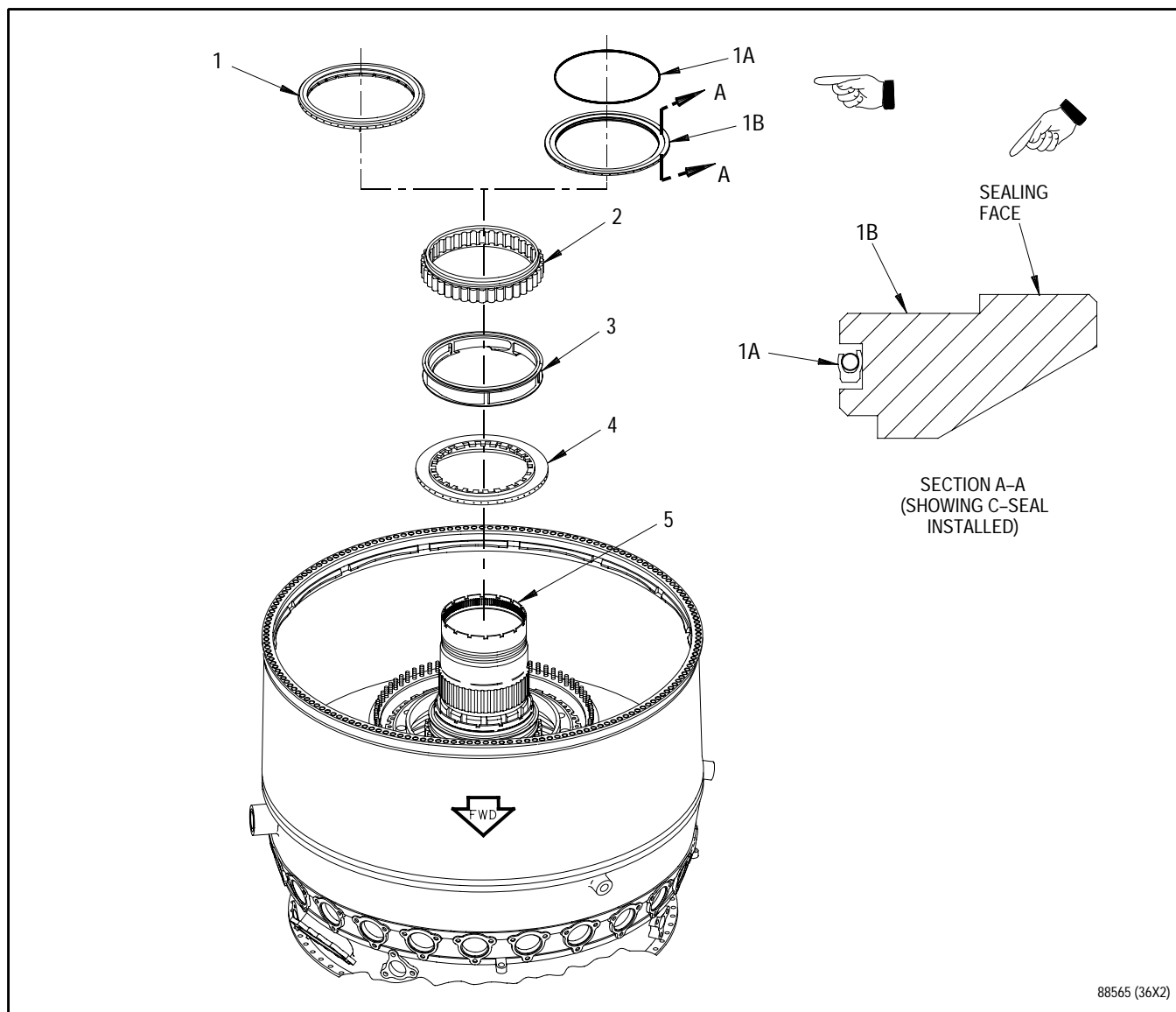
There are two configurations of No. 4 bearing rear seal seat. One incorporates a C-shaped seal, the other does not.

- b. Remove No. 4 bearing rear seal seat(1 or 1B, figure 14) and No. 4 bearing inner race and rollers(2) as follows:
- (1) Connect PWA 55380 hand pump to PWA 56309 puller.
 - (2) Extend PWA 56309 puller ram(2, figure 15) 4 inches prior to installation of puller on rear compressor driveshaft(3) to prevent damage to rear seal seat.
 - (3) Install PWA 56309 puller(1) on rear compressor driveshaft(3) engaging jaws(4) with puller groove(6) of No. 4 bearing inner race, below rear seal seat.



Damage to engine parts may result if ring(5) is not seated evenly on bottom lip of jaws(4).

- (4) Slide ring(5) down to seat on bottom lip of jaws(4) to secure jaws in position.
- (5) Visually inspect to ensure jaws(4) are properly engaged in puller groove(6) and ring(5) is seated evenly on bottom lip of jaws.



- 1. No. 4 bearing rear seal seat (not incorporating C-seal)
- 1A. C-seal
- 1B. No. 4 bearing rear seal seat (incorporating C-seal)
- 2. No. 4 bearing inner race and rollers
- 3. No. 4 bearing scoop
- 4. No. 4 bearing front seal seat
- 5. Rear compressor driveshaft

Figure 14. No. 4 Bearing Rear Seal Seat, Inner Race and Rollers, Scoop, and Front Seal Seat.

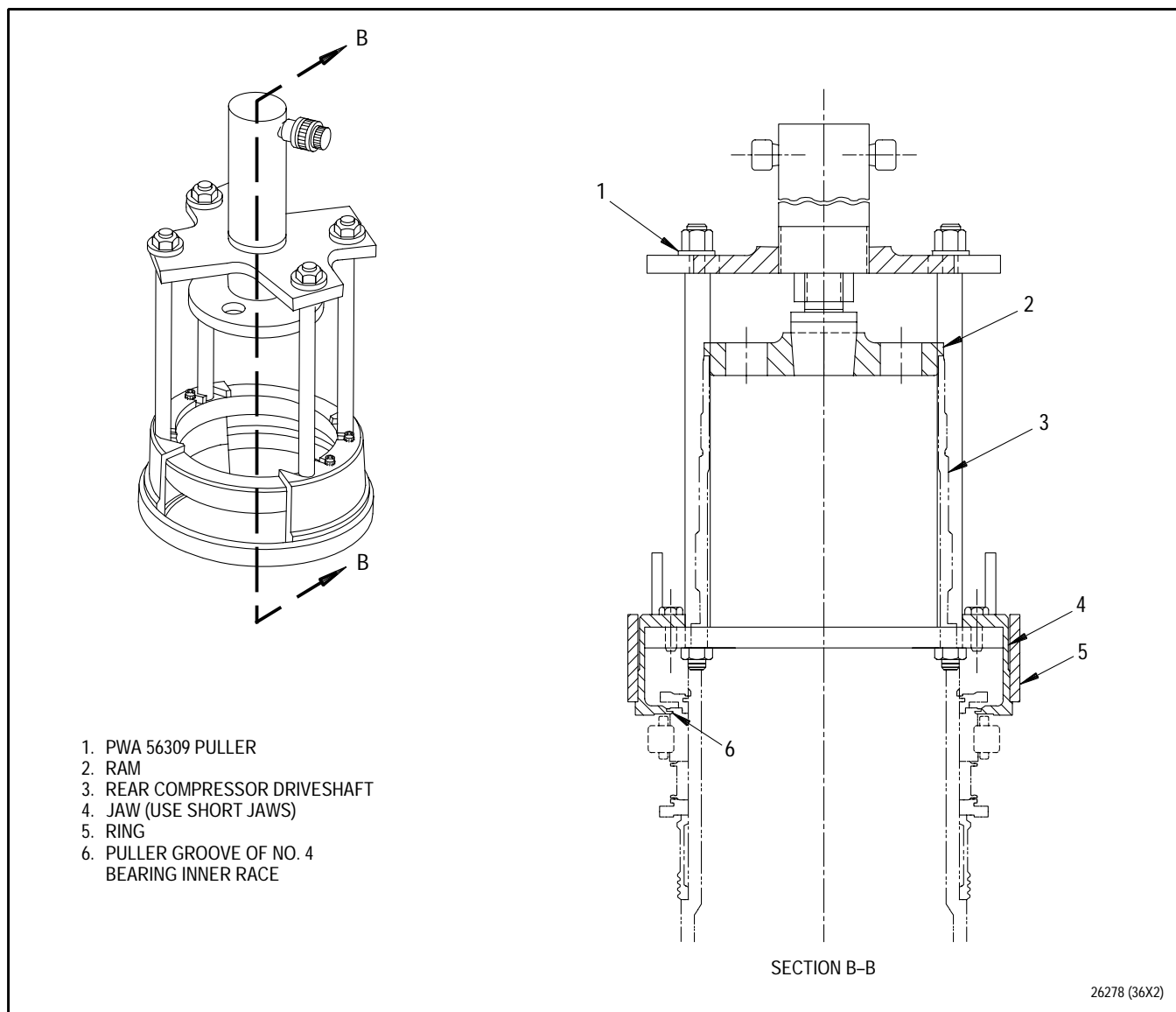


Figure 15. Removal of No. 4 Bearing Inner Race and Rollers With PWA 56309 Puller

- (6) Actuate PWA 55380 hand pump to disengage rear seal seat(1 or 1B, figure 14) and inner race and rollers(2) from rear compressor driveshaft(5).
 - (7) Hold bearing rollers inward to prevent separation of cage and rollers while removing rear seal seat(1 or 1B), inner race and rollers(2), and puller from rear compressor driveshaft.
 - (8) Remove rear seal seat(1 or 1B), and inner race and rollers(2) from puller.
 - (9) Install inner race and rollers(2) in PWA 51790 retainer.
 - (10) Coat inner race and rollers(2) with MIL-L-7808 lubricating oil and store in protective, labeled containers with bearing outer race.
 - (11) For rear seal seats(1B) incorporating ID C-seal(1A), remove and discard C-seal.
- c. Remove No. 4 bearing internal oil pressure manifold(3, figure 16) to permit clearance for No. 4 bearing scoop and front seal seat removal, per figure 16 and as follows:
- (1) Remove bolt(2) securing manifold(3) to nut(5) on end of No. 4 bearing internal pressure tube assembly(4).
 - (2) Remove bolt(1) securing manifold to diffuser case(6); remove manifold.

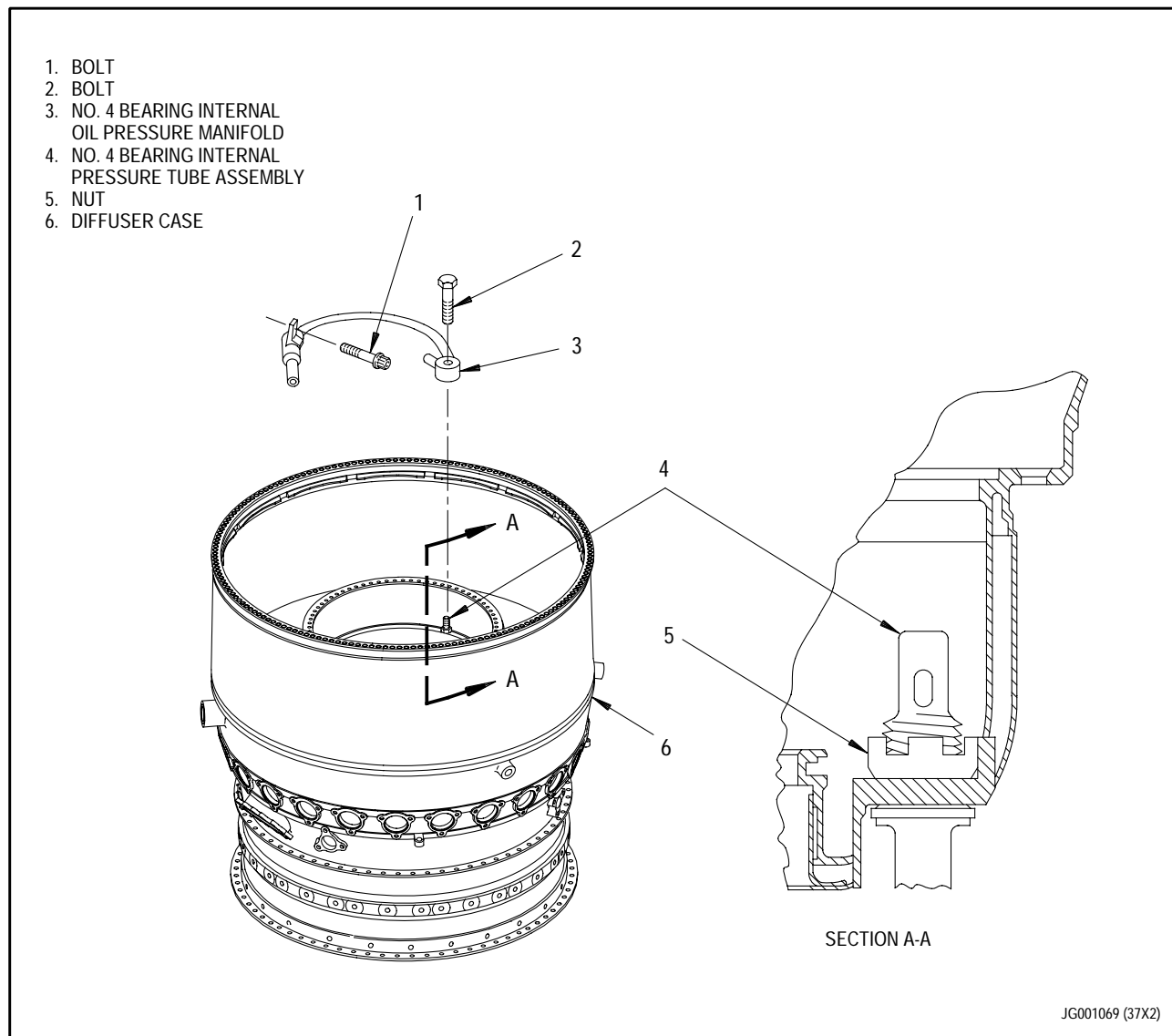


Figure 16. No. 4 Bearing Internal Oil Pressure Manifold - Removal

d. Remove No. 4 bearing scoop(3, figure 14)and front seal seat(4) as follows:

- (1) If loose, remove scoop by hand.
- (2) Install PWA 56309 puller(1, figure 17) so ram(2) fits in end of rear compressor driveshaft(3).
- (3) Engage jaws(4) with puller groove(6) in front seal seat.



Damage to engine parts may result if ring(5) is not seated evenly on bottom lip of jaws(4) as shown in figure 17.

- (4) Slide ring(5) down to secure jaws(4) in position.

- (5) Visually inspect to ensure jaws(4) are properly engaged in puller groove(6) and ring(5) is seated evenly on bottom lip of jaws.
- (6) Connect PWA 55380 hand pump to puller(1).
- (7) Actuate pump to disengage front seal seat(4, figure 14) and scoop(3) from rear compressor driveshaft.
- (8) Release pressure from pump.
- (9) Remove pump from puller.
- (10) Remove front seal seat, scoop, and puller.

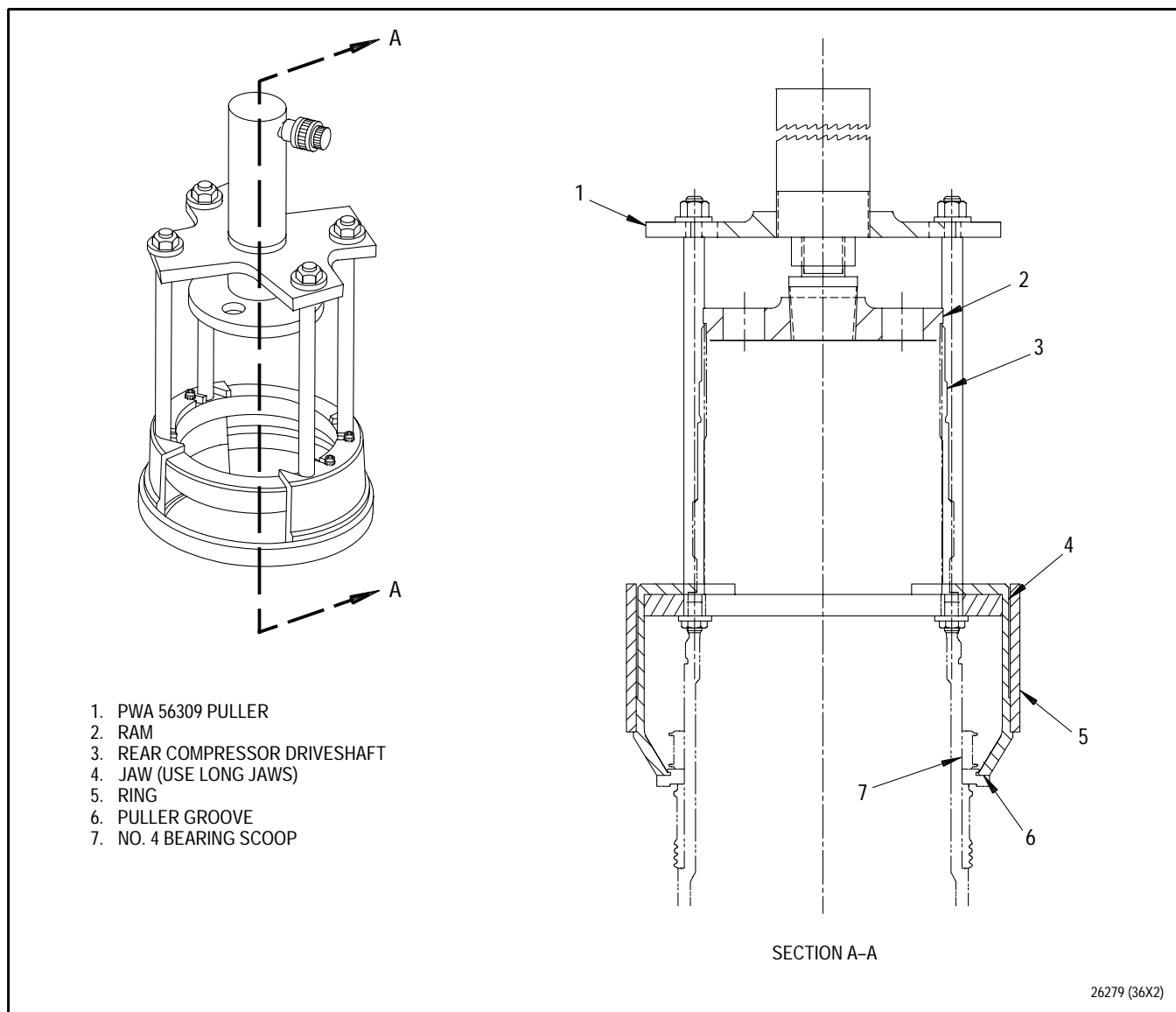


Figure 17. No. 4 Bearing Front Seal Seat - Removal Using PWA 56309 Puller

10. DIFFUSER CASE ASSEMBLY AND COMPRESSOR STATOR HEAT SHIELD - REMOVAL.

(See figure 9 and Figure 18.)

NOTE

Diffuser case may be removed with or without fuel manifolds and fuel nozzles installed.

- a. If not previously disconnected, disconnect coupling nuts(10, figure 9) connecting fuel manifolds assembly(1 and 6) to fuel manifold elbow(9).
- b. Remove bolts(5, figure 18), fuel manifold elbow(6) if not previously removed, and upper and lower compressor stator front heat shields(4).
- c. Reinstall eight bolts(5) equally spaced to secure (flange S) aft compressor case to fourth through ninth stage cases.
- d. Remove nuts(10), bolts(7), brackets(9 and 11) and compressor stator rear heat shield segments(8).
- e. Install eyebolts of PWA 14175 sling to Flange W on diffuser case(1). Secure with nuts and washers. Connect PWA 2388 hook to overhead hoist and to sling.
- f. Install four 0.250-28 UNF-28 jacking screws equally spaced into threaded holes in Flange T of diffuser case(1).
- g. Turn each jacking screws 1/4 turn in an alternating pattern to free diffuser case(1) from compressor stator support(3).
- h. Place four blocks of wood on bench for front flange of diffuser case(1) to rest on.



Keep diffuser case(1) straight and level during removal. No. 4 bearing (front) air seal(2) knife-edges could be damaged if case is not kept straight.

- i. Raise diffuser case(1). If necessary tap around Flange T with mallet to free case.
- j. Place diffuser case(1) on wooden blocks, front flange down.
- k. Remove jacking screws.

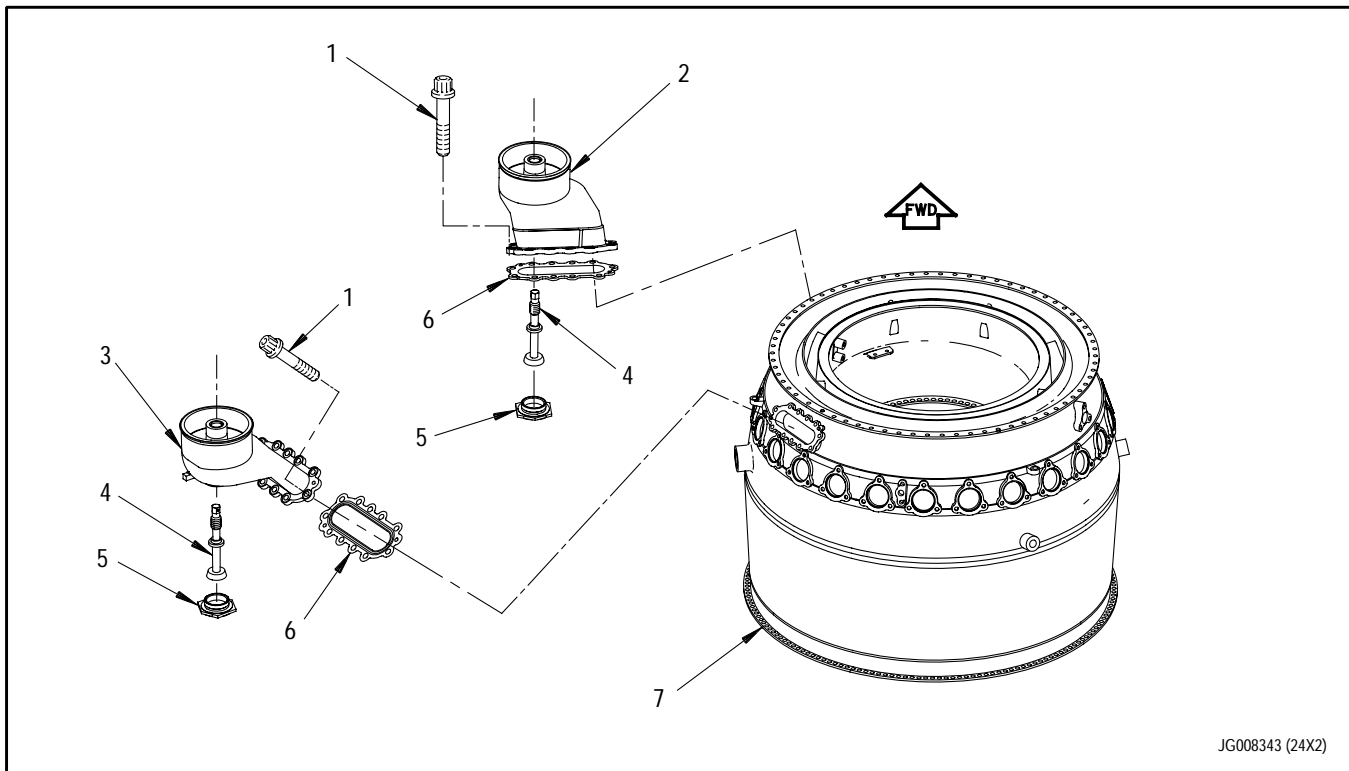
10A. LEFT AND RIGHT COMPRESSOR DISCHARGE MANIFOLD ASSEMBLIES - REMOVAL AND DISASSEMBLY. (See Figure 17A.)

a. Remove bolts(1, figure 17A) securing compressor discharge manifold assemblies to diffuser case.

b. Remove left and right manifold assemblies(2 and 3) and gaskets(6).

c. Remove safety wire securing compressor discharge manifold cap(5).

d. Remove cap(5) and rod(4).



1. Bolts
2. Compressor discharge manifold (right)
3. Compressor discharge manifold (left)
4. Rod
5. Cap
6. Gasket
7. Diffuser case

Figure 17A. Left and Right Compressor Discharge Manifold Assemblies - Removal and Disassembly

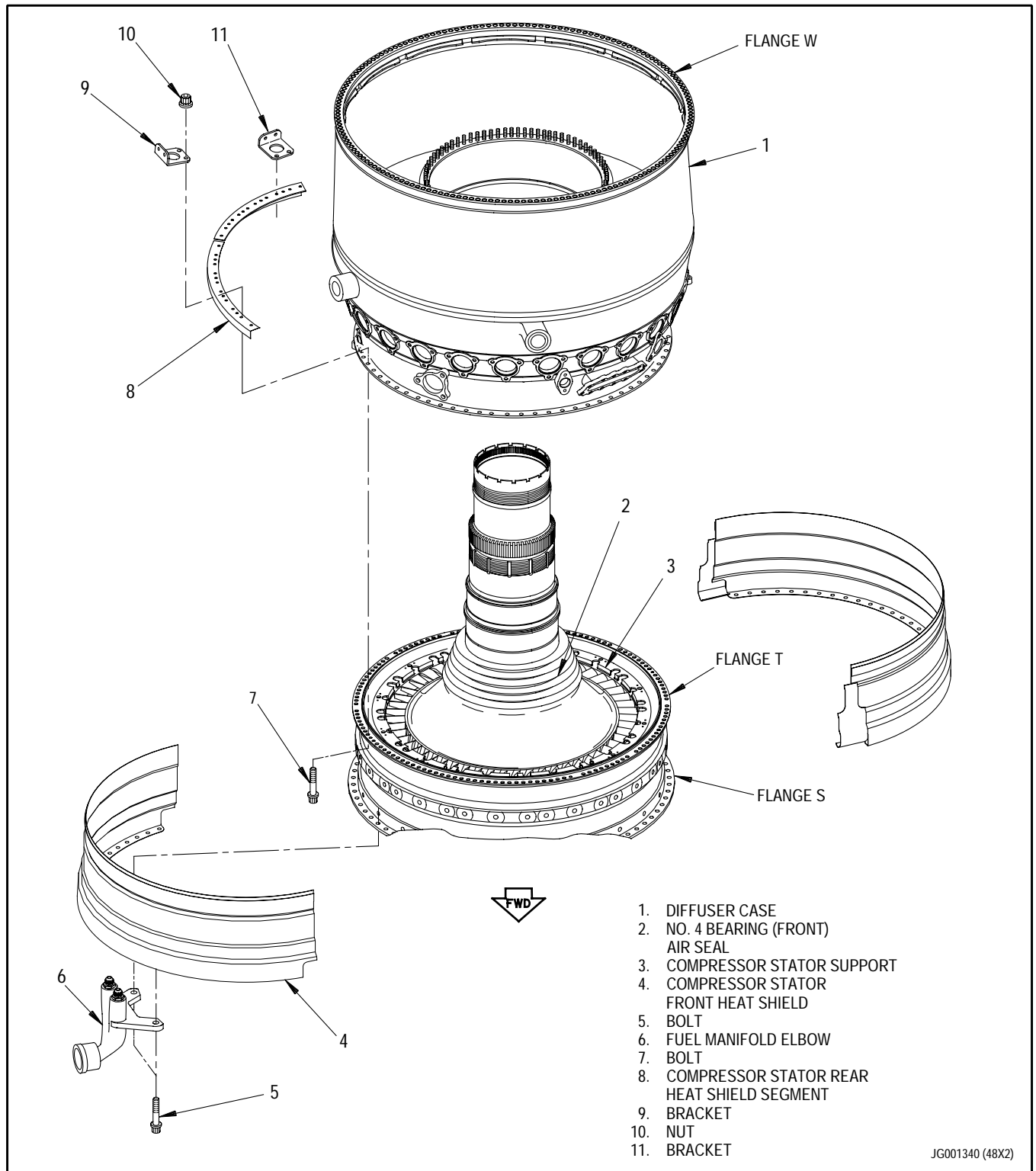


Figure 18. Diffuser Case and Compressor Stator Heat Shield - Removal

11. NO. 4 BEARING FRONT AIR SEAL - REMOVAL.

(See Figure 19.)



Be careful when removing air seal. Knife-edges are easily damaged.

- a. Thread PWA 57780 pusher/puller detail-1 hub adapter(11) onto rear compressor hub.

NOTE

Use caution when installing tube adapter to prevent engine part damage.

- b. Slide detail-3 tube adapter(10) over detail-1 hub adapter(11) until tube adapter end contacts air seal.
- c. Loosen two nuts(3) on detail-10 half adapter(1) and swing bolts(2) to unlock position to open clamshell halves.
- d. Place opened clamshell assembly around tube adapter end and airseal, capturing both air seal and adapter when closed.
- e. Swing bolts(2) to locked position and tighten nuts(3) to secure clamshell in place

- f. Remove detail-8 knurled nut(5) from detail-2 rod(8).
- g. Disengage plunger(4) to clear locking slots on detail-3 tube adapter(10).
- h. Using detail-7 handles(6), install hydraulic cylinder(7) over detail-2 rod(8) and align tabs on detail-5 adapter(9) with slots in detail-3 tube adapter(10). Rotate hydraulic cylinder in a clockwise direction until stop is met.
- i. Release plunger(4) to lock tabs in place.
- j. Install detail-8 knurled nut(5) no closer than 1 inch from top of cylinder.
- k. Connect PWA 55380 hand pump to hydraulic cylinder(7) and actuate cylinder until air seal is unseated from driveshaft.
- l. Remove puller and air seal.
- m. Install PWA 52852 protector around air seal.

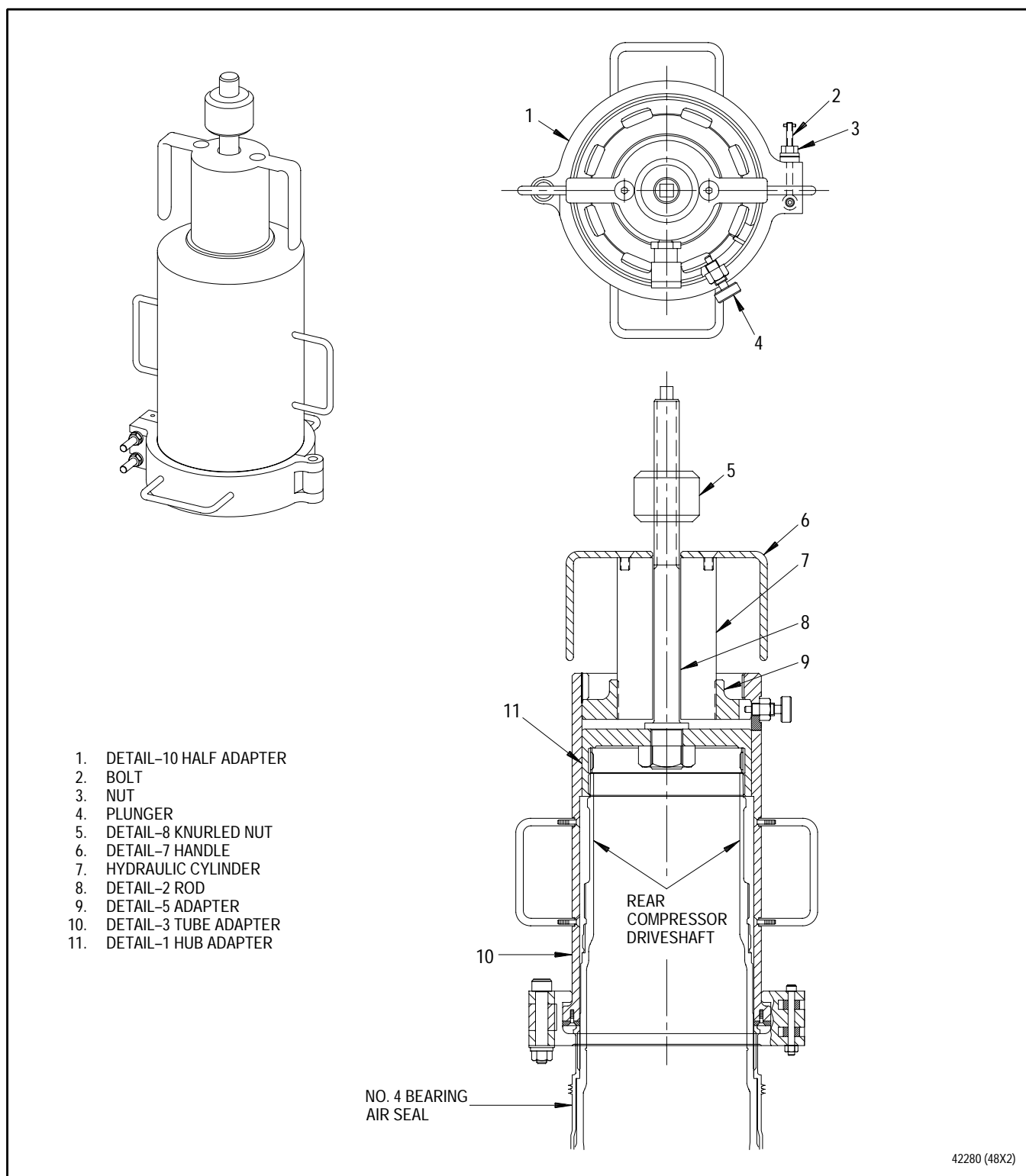


Figure 19. No. 4 Bearing Front Air Seal - Removal

Legend for figure 19

1. Detail-10 half adapter
2. Bolt
3. Nut
4. Plunger
5. Detail-8 knurled nut
6. Detail-7 handle
7. Hydraulic cylinder
8. Detail-2 rod
9. Detail-5 adapter
10. Detail-3 tube adapter
11. Detail-1 hub adapter

WORK PACKAGE

TECHNICAL PROCEDURES

CORE ENGINE MODULE - ROTATING TO FRONT END UP POSITION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	4 - 8	29	9 - 11 Added	29
3	0			12 Blank Added	29

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

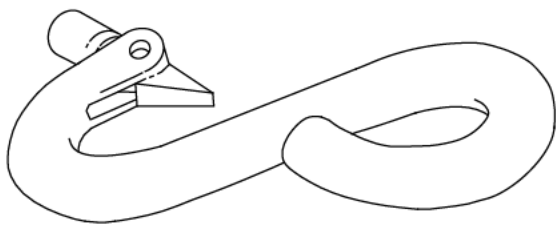
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

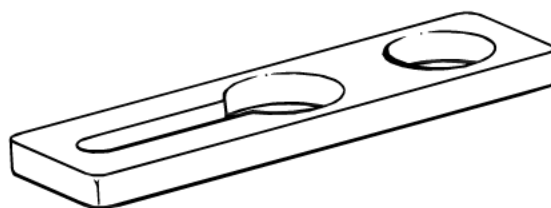
Paragraph	Function - Tool Nomenclature	Tool Number
2	PRELIMINARY INSTRUCTIONS	
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
		OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - - -	PWA 50775
	ADAPTER, TRUNNION, CORE ENGINE, FRONT - - - - -	PWA 57623
3	CORE ENGINE MODULE - ROTATING TO FRONT END UP POSITION	
	ADAPTER, TRUNNION, CORE ENGINE, REAR - - - - -	PWA 57635
		OR
	RETAINER, REAR, CORE ENGINE MODULE - - - - -	PWA 56732
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, ADJUSTABLE, MODULE HANDLING - - - - -	PWA 56336
		OR
	SLING, ONE TON CAPACITY - - - - -	PWA 37115
	HOOK, SAFETY - - - - -	PWA 2388
	RETAINER, SET, CASE SIMULATOR, HP TURB AND TURBINE FRONT - - - - -	PWA 57933
	ADAPTER, TRUNNION, CORE ENGINE, FRONT - - - - -	PWA 57623
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
		OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - - -	PWA 50775
	ADAPTER, STAND, MODULE SUPPORT - - - - -	PWA 50992

ILLUSTRATED SUPPORT EQUIPMENT



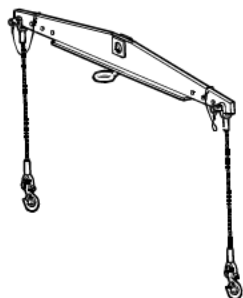
PWA 2388 -C

Figure T1. PWA 2388 Hook



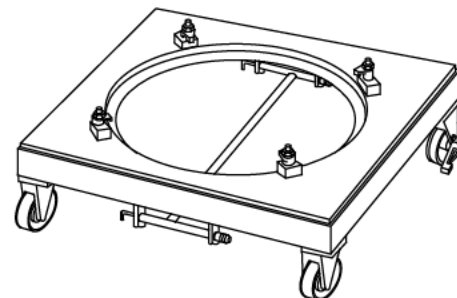
PWA 26147 -C

Figure T2. PWA 26147 Adapter



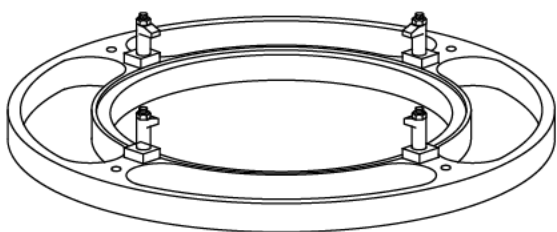
PWA37115-C

Figure T3. PWA 37115 Sling



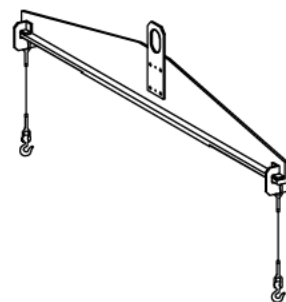
PWA 50775 -C

Figure T4. PWA 50775 Stand



PWA 50992 -C

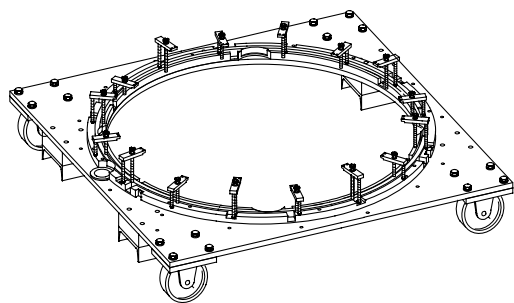
Figure T5. PWA 50992 Adapter



PWA 56336 -C

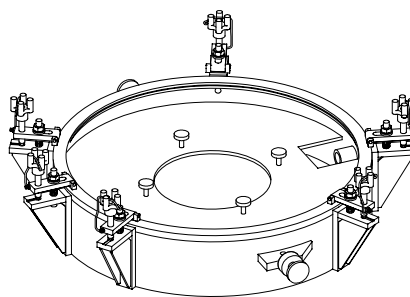
Figure T6. PWA 56336 Sling

ILLUSTRATED SUPPORT EQUIPMENT (continued)



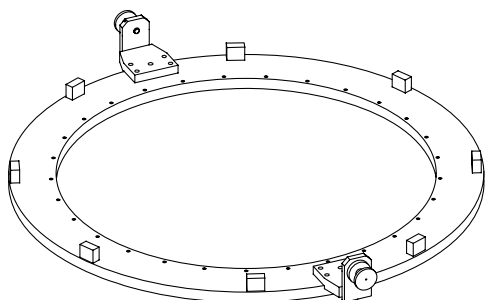
PWA 56338 -C

Figure T7. PWA 56338 STAND



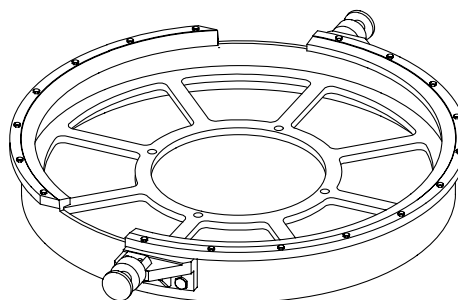
PWA 56732 -C

Figure T8. PWA 56732 RETAINER



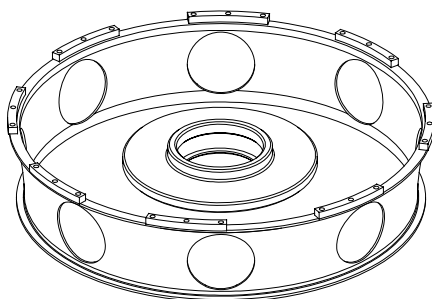
PWA 57623 -C

Figure T9. PWA 57623 ADAPTER



PWA 57635 -C

Figure T10. PWA 57635 ADAPTER



PWA 57933 -C

Figure T11. PWA 57933 RETAINER

1. INTRODUCTION.

- a. This work package contains instructions for rotating core engine module from front end down to front end up position. This procedure may be accomplished with rear of core engine module completely assembled (rear compressor drive turbine rotor is installed), or in various states of partial disassembly (rear compressor drive turbine rotor removed with or without other turbine and combustor hardware).

2. PRELIMINARY INSTRUCTIONS.

(See Figure 1.)

- a. At beginning of this procedure core engine module is installed in PWA 50775 or PWA 56338 stand(5, figure 1), front end down. Intermediate case(2) is secured to PWA 57623 adapter(1) which is held by clamps(8) to PWA 50775 or PWA 56338 stand(5).

3. CORE ENGINE MODULE - ROTATING TO FRONT END UP POSITION.

(See figures 1 through 3.)

NOTE

Two core engine module configurations exist. One configuration includes longer diffuser case which houses rear compressor drive turbine rotor. Second configuration adds front turbine case mounted to rear of shortened diffuser case to house rear compressor drive turbine rotor. Instructions for both configurations follow.

- a. If rear compressor drive turbine rotor is installed in either module configuration, install PWA 57635 adapter(3, figure 1) as follows:
 - (1) Remove PWA 57635 detail-2 and detail-8 ring segments from detail-14 base assembly.
 - (2) Install PWA 26147 adapters on PWA 57635 detail-15 and detail-16 trunnion assemblies.
 - (3) Connect PWA 37115 or PWA 56336 sling with PWA 2388 hook to an overhead hoist and to PWA 26147 adapters.

- (4) Raise PWA 57635 detail-14 base assembly and install on rear flange of core engine module. Align dowel pin in detail-14 base assembly with large hole in rear flange at 12 o'clock position.
- (5) Secure PWA 57635 detail-14 base assembly to rear flange of core engine with detail-2 and detail-8 ring segments and hex head screws provided. Torque hex head screws 110 to 135 pound-inches.

NOTE

If No. 3 bearing package is removed and disk is not supported, rear compressor rotor will shift and lose its running position.

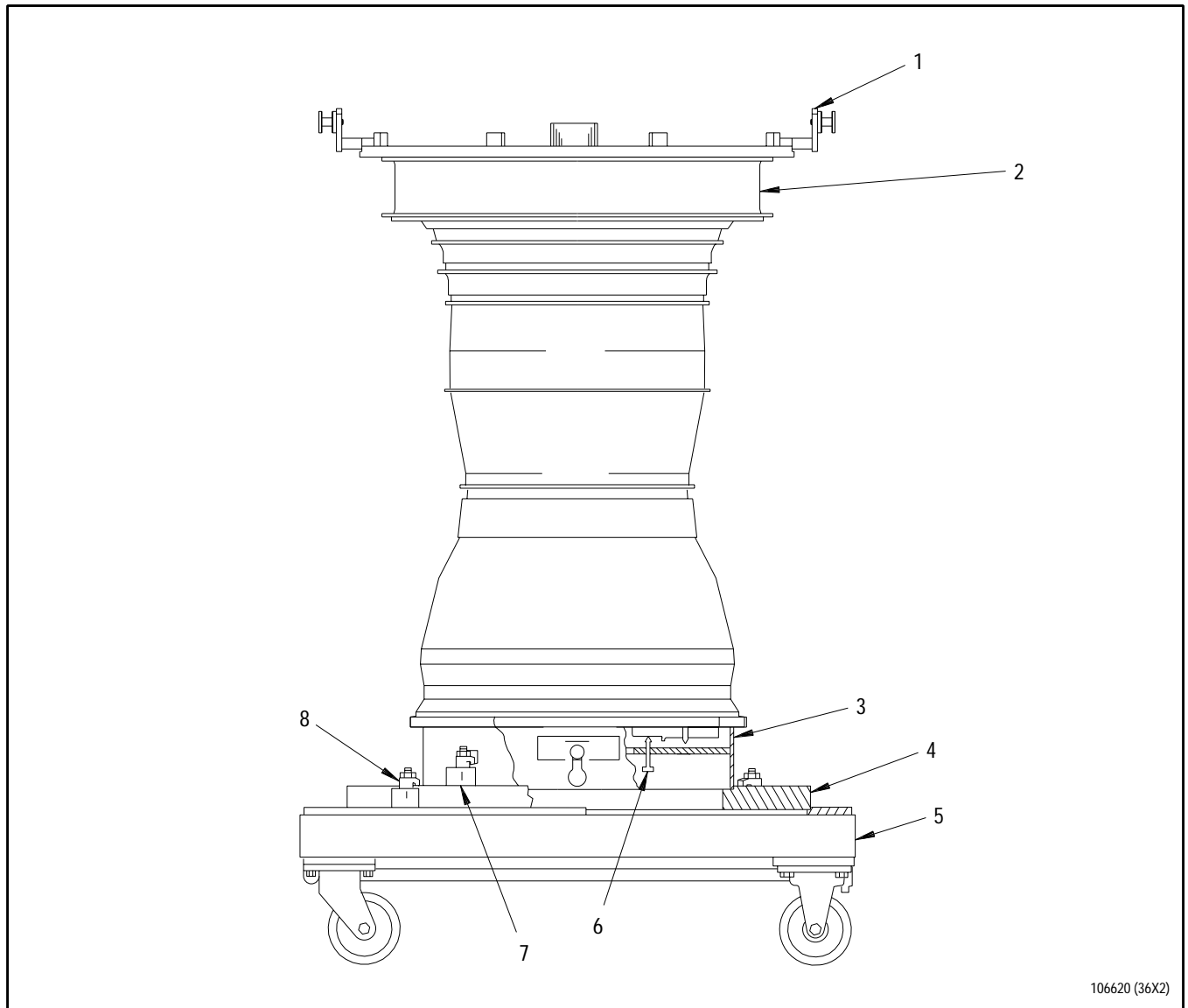
- (6) Tighten four thumbscrews(6) of PWA 57635 adapter against 2nd stage turbine disk.

- b. If rear compressor drive turbine rotor has been removed from either configuration, long diffuser case or shortened diffuser case with front turbine case installed, install PWA 57635 adapter(3, figure 2) as follows:

NOTE

Rear compressor driveshaft has left-hand threads.

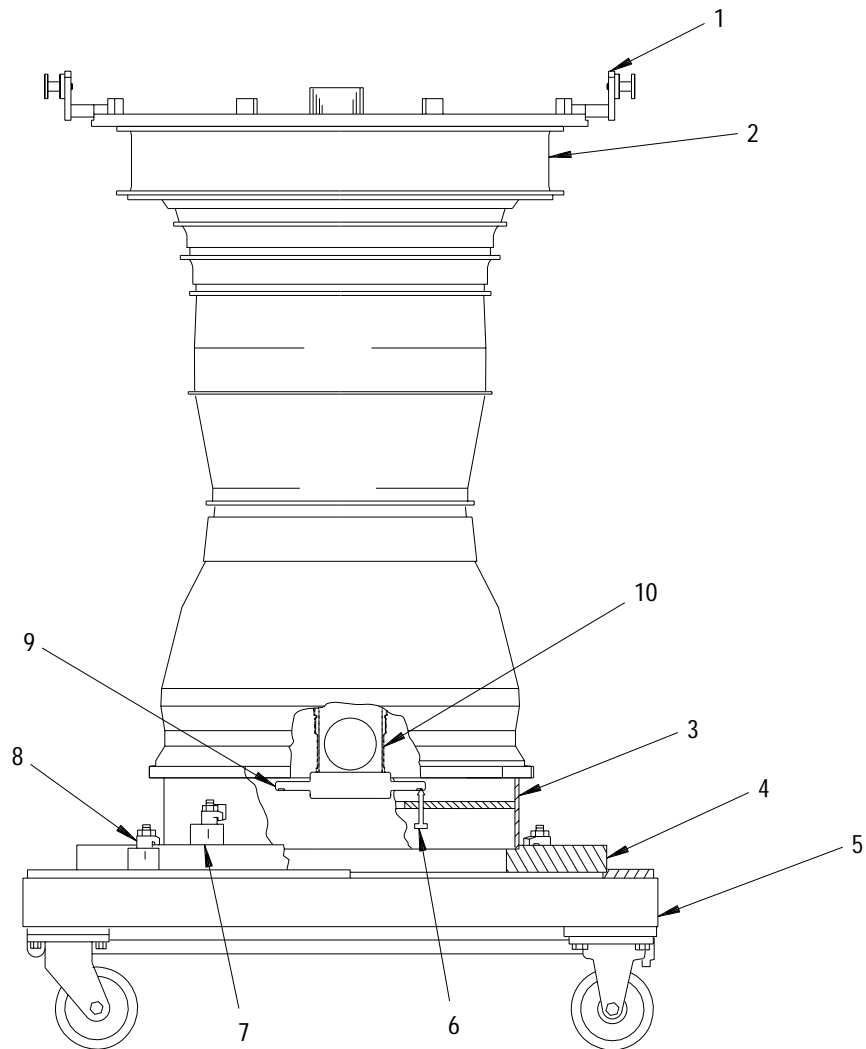
- (1) Install PWA 57933 retainer set support plate(9) by threading onto rear compressor driveshaft(10), handtight, until seated.
- (2) Remove PWA 57635 detail-2 and detail-8 ring segments from detail-14 base assembly.



106620 (36X2)

1. PWA 57623 adapter
2. Intermediate case
3. PWA 57635 adapter
4. PWA 50992 adapter
5. PWA 50775 or PWA 56338 stand
6. Thumbscrew
7. Clamp
8. Clamp

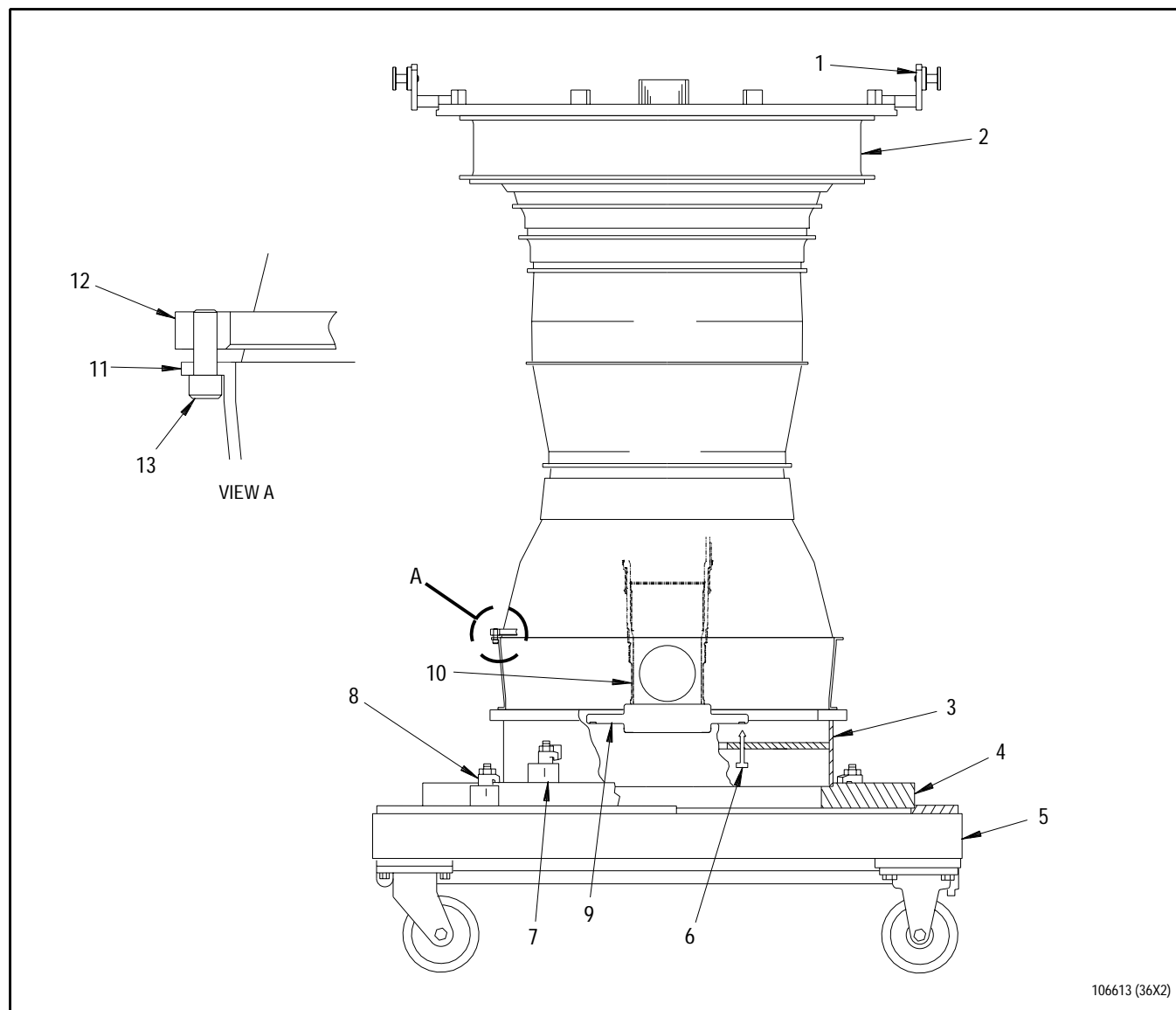
**Figure 1. Core Engine Module - Rotating to Front End Up
(Fully Assembled)**



106612 (36x2)

1. PWA 57623 adapter
2. Intermediate case
3. PWA 57635 adapter
4. PWA 50992 adapter
5. PWA 50775 or PWA 56338 stand
6. Thumbscrew
7. Clamp
8. Clamp
9. PWA 57933 retainer set support plate
10. Rear compressor driveshaft

**Figure 2. Core Engine Module - Rotating to Front End Up Position
(Rear Compressor Drive Turbine Rotor Removed)**



1. PWA 57623 adapter
2. Intermediate case
3. PWA 57635 adapter
4. PWA 50992 adapter
5. PWA 50775 or PWA 56338 stand
6. Thumbscrew
7. Clamp
8. Clamp
9. PWA 57933 retainer set support plate
10. Rear compressor driveshaft
11. PWA 57933 retainer set simulator ring
12. Nut ring segment
13. Cap screw

**Figure 3. Core Engine Module - Rotating to Front End Up Position
(Rear Compressor Drive Turbine Rotor and Front Turbine Case Removed)**

- (3) Install PWA 26147 adapters on PWA 57635 detail-15 and detail-16 trunnion assemblies.
- (4) Connect PWA 56336 sling with PWA 2388 hook to an overhead hoist and to PWA 26147 adapters.
- (5) Raise PWA 57635 detail-14 base assembly and install on rear flange of core engine module. Align dowel pin in detail-14 base assembly with large hole in rear flange at 12 o'clock position.
- (6) Secure PWA 57635 detail-14 base assembly to rear flange of core engine with detail-2 and detail-8 ring segments and hex head screws provided. Torque hex head screws 110 to 135 pound-inches.

NOTE

If No. 3 bearing package is removed and 2nd stage disk is not supported, rear compressor rotor will shift and lose its running position.

- (7) Tighten four thumbscrews(6) of PWA 57635 adapter against PWA 57933 retainer set support plate(9) ensuring thumbscrews seat on bottom of machined recess of support plate.

- c. If rear compressor drive turbine rotor and front turbine case have been removed from shortened diffuser case configuration, install PWA 57653 adapter(3, figure 3) as follows:

NOTE

Rear compressor driveshaft has left-hand threads.

- (1) Install PWA 57933 retainer set support plate(9) by threading onto rear compressor driveshaft(10), handtight, until seated.
- (2) Install PWA 57933 retainer set simulator ring(11) onto rear flange of diffuser case. Secure using nut ring segments(12) and cap screws(13).
- (3) Remove PWA 57635 detail-2 and detail-8 ring segments from detail-14 base assembly.
- (4) Install PWA 26147 adapters on PWA 57635 detail-15 and detail-16 trunnion assemblies.
- (5) Connect PWA 56336 sling with PWA 2388 hook to an overhead hoist and to PWA 26147 adapters.
- (6) Raise PWA 57635 detail-14 base assembly and install on rear flange of core engine module. Align dowel pin in detail-14 base assembly with large hole in rear flange at 12 o'clock position.

- (7) Secure PWA 57635 detail-14 base assembly to rear flange of core engine with detail-2 and detail-8 ring segments and hex head screws provided. Torque hex head screws 110 to 135 pound-inches.

NOTE

If No. 3 bearing package is removed and 2nd stage disk is not supported, rear compressor rotor will shift and lose its running position.

- (8) Tighten four thumbscrews(6) of PWA 57635 adapter against PWA 57933 retainer set support plate(9) ensuring thumbscrews seat on bottom of machined recess of support plate.
- d. Loosen and release clamps(8) securing PWA 57623 adapter(1) to PWA 50775 or PWA 56338 stand(5).
- e. Work overhead hoist to raise module.
- g. Work hoists and rotate module to front end up position.
- h. Remove sling, hook, and adapters from PWA 57635 adapter(3).
- i. Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- j. Install PWA 50992 adapter(4) into PWA 50775 or PWA 56338 stand(5). Secure the adapter with clamps(8).
- k. Lower module down into the PWA 50992 adapter(4), aligning slots in PWA 57635 adapter(3) with clamps(7).
- l. Engage clamps(7) of PWA 50992 adapter(4) with slots of PWA 57635 adapter(3). Tighten clamps.
- m. Remove PWA 57623 adapter(1) from intermediate case(2).
- n. Remove sling, hook and adapters from PWA 57623 adapter(1).

NOTE

When working with a mobile monorail hoist, use a PWA 56336 sling instead of PWA 37115 sling at PWA 57623 adapter. There is not enough height to use PWA 37115 sling at front with mobile hoist.

- f. Install a second pair of PWA 26147 adapters on trunnion assemblies of PWA 57623 adapter(1) at front of module. Connect a second PWA 37115 or PWA 56336 sling to hoist and PWA 26147 adapters.

WORK PACKAGE

TECHNICAL PROCEDURES

CORE ENGINE MODULE -

ROTATING TO FRONT END UP POSITION (DIFFUSER CASE REMOVED)

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	4	30	8 - 12	30
3	0	5 - 7	0	13 - 14	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

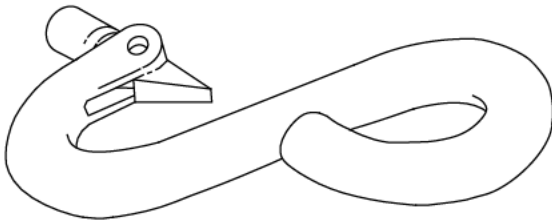
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

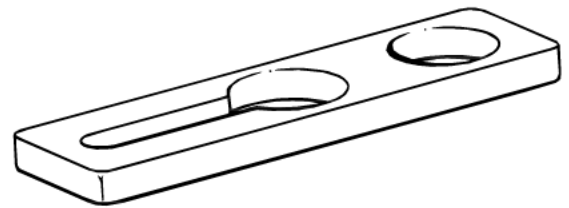
Paragraph	Function - Tool Nomenclature	Tool Number
3	CORE ENGINE MODULE - ROTATING TO FRONT END UP POSITION	
	STAND, COMPRESSOR - - - - -	PWA 57722
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR	
	REAR HUB - - - - -	PWA 57937
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 51298
	ARM, LIFT AND TURN - - - - -	PWA 26584
	HOOK, SAFETY - - - - -	PWA 2388
	SLING, ADJUSTABLE, MODULE HANDLING - - - - -	PWA 56336
		OR
	SLING, ADJUSTABLE MODULE HANDLING, MAINTENANCE - - -	PWA 53327
	ADAPTER, TRUNNION, CORE ENGINE, FRONT - - - - -	PWA 57623
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	STAND, INLET FAN MODULE, STORAGE AND DISASSEMBLY - -	PWA 56338
		OR
	STAND, INLET FAN MODULE, STORAGE AND DISASSEMBLY - -	PWA 50775
	SPACER, MODULE - - - - -	PWA 50993

ILLUSTRATED SUPPORT EQUIPMENT



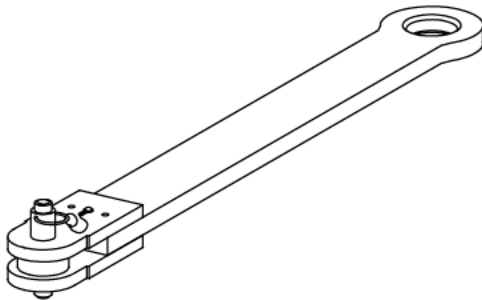
PWA 2388 -C

Figure T1. PWA 2388 Hook



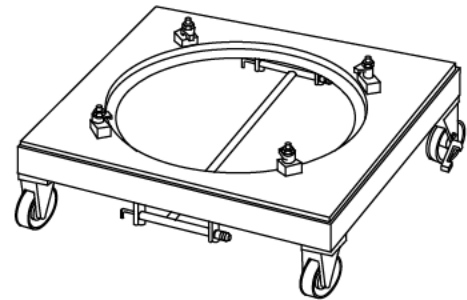
PWA 26147 -C

Figure T2. PWA 26147 Adapter



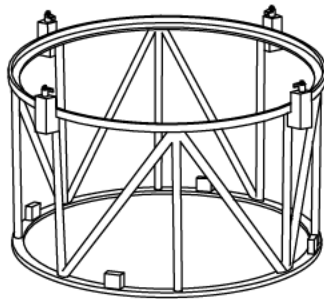
PWA 26584 -C

Figure T3. PWA 26584 Arm



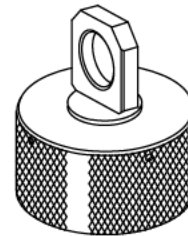
PWA 50775 -C

Figure T4. PWA 50775 Stand



PWA 50993 -C

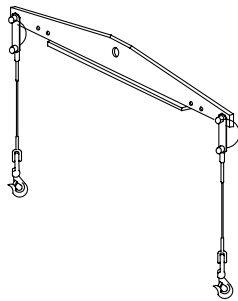
Figure T5. PWA 50993 Spacer



PWA 51298 -C

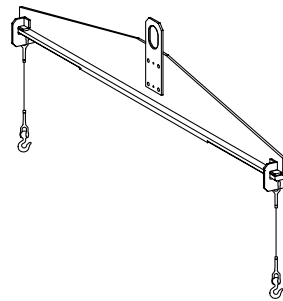
Figure T6. PWA 51298 Eye

ILLUSTRATED SUPPORT EQUIPMENT (continued)



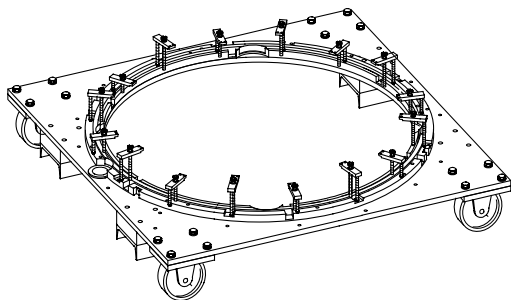
PWA 53327 -C

Figure T7. PWA 53327 SLING



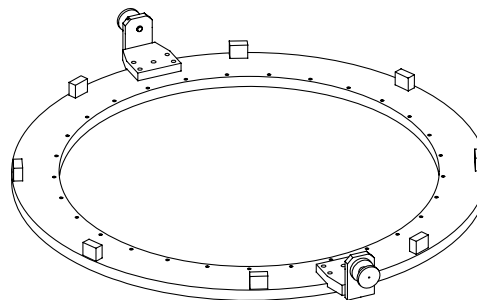
PWA 56336 -C

Figure T8. PWA 56336 SLING



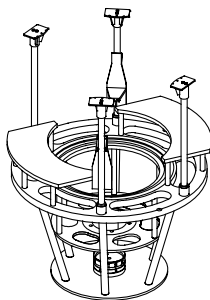
PWA 56338 -C

Figure T9. PWA 56338 STAND



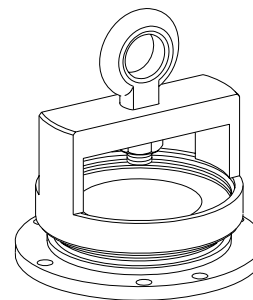
PWA 57623 -C

Figure T10. PWA 57623 ADAPTER



PWA 57722 -C

Figure T11. PWA 57722 STAND



PWA 57937 -C

Figure T12. PWA 57937 FIXTURE

1. INTRODUCTION.

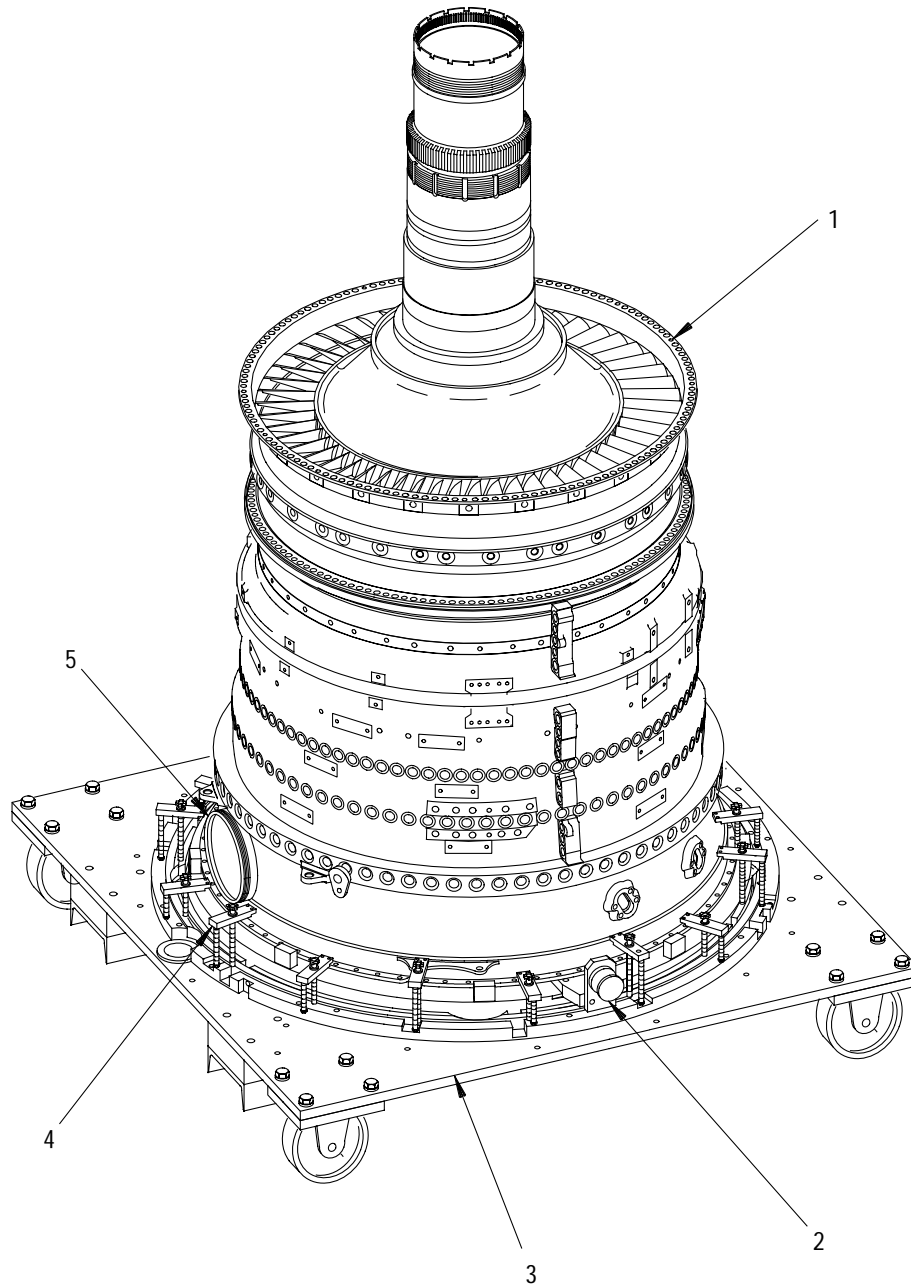
- a. This work package contains instructions for rotating the core engine module from a front end down to a front end up position. This procedure is accomplished with the diffuser case removed.

2. PRELIMINARY INSTRUCTIONS.

(See Figure 1.)

- a. At the beginning of this procedure the core engine module is installed in PWA 50775 or PWA 56338 stand(3, figure 1), front end down. Intermediate case(5) is secured to PWA 57623 adapter(2) which is held by clamps(4) to the PWA 50775 or PWA 56338 stand(3).

1. 10TH TO 12TH STAGE COMPRESSOR CASE
2. PWA 57623 ADAPTER
3. PWA 50775 OR PWA 56338 STAND
4. CLAMP
5. INTERMEDIATE CASE



JG546 (51X2)

Figure 1. Core Engine Module - Front End Down

3. CORE ENGINE MODULE - ROTATING TO FRONT END UP POSITION.

(See Figures 2 through 4.)

- a. Install PWA 57722 stand, detail-19 support plate assembly(7, figure 2) as follows:

- (1) Attach two standard lifting straps to rear side of detail-19 support plate assembly(7) 180 degrees apart.
- (2) Connect lifting straps to hoist.
- (3) Install detail-19 support plate assembly(7) down over rear compressor rear hub(6) aligning dowel pin.
- (4) Adjust cam followers (8) to center detail-19 support plate assembly(7) on rear compressor rear hub(6).
- (5) Secure detail-19 support plate assembly(7) to rear flange of 10th through 12th stage compressor case(5) and compressor stator support assembly with 14 detail screws(4).
- (6) Torque detail screws(4) 65 to 70 pound-inches.
- (7) Remove lifting straps and hoist.

Legend for figure 2

1. PWA 2388 hook
2. PWA 26584 arm
3. PWA 57937 fixture
4. Screw
5. 10th through 12th stage compressor case
6. Rear compressor rear hub
7. Support plate assembly
8. Cam followers

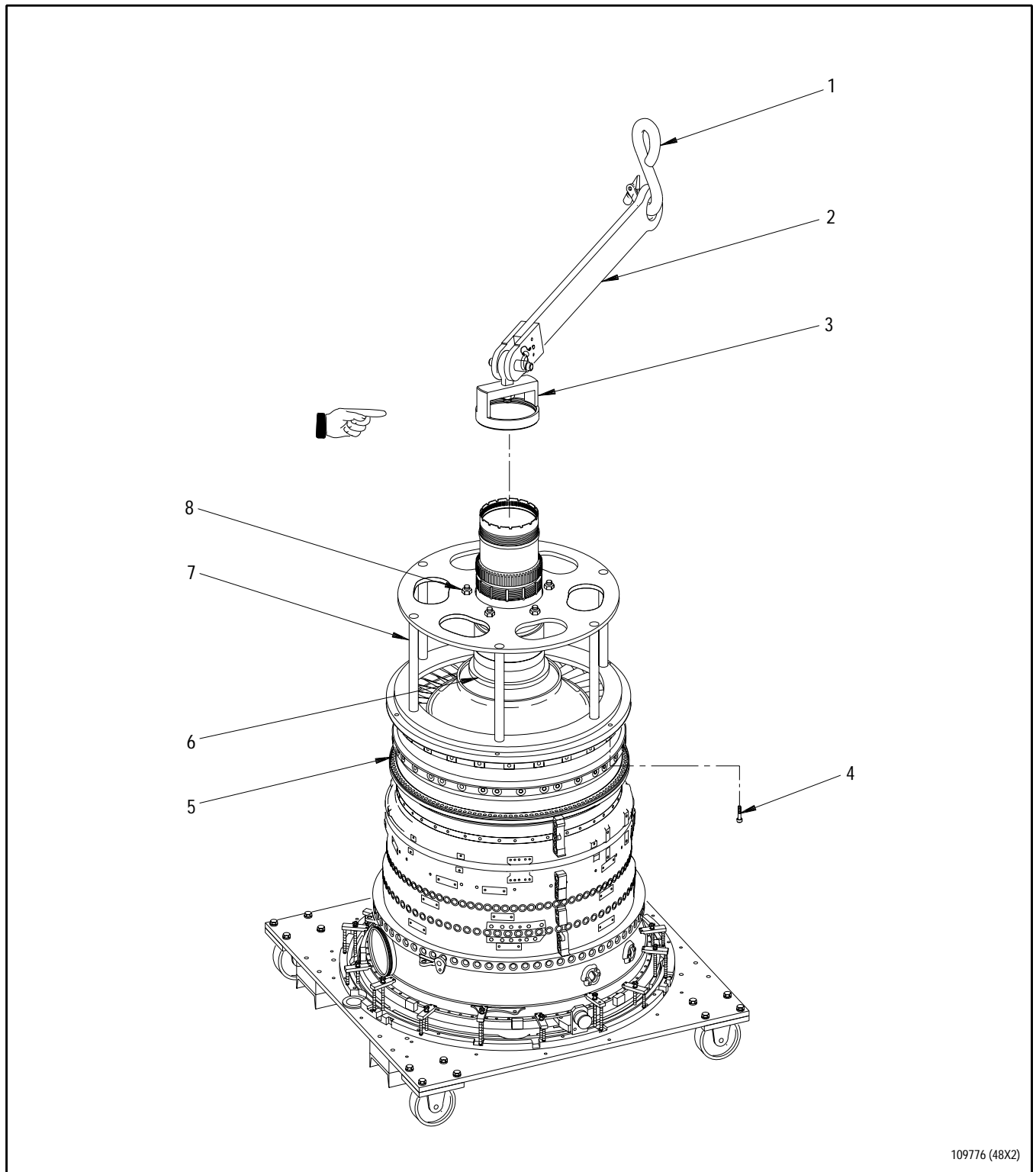


Figure 2. PWA 57722 Stand Detail-19 Support Plate Assembly - Installation

- b. Install PWA 57937 fixture(3) to rear compressor rear hub(6).
- c. Attach PWA 26584 arm(2) to PWA 57937 fixture(3) using ball lock pin.
- d. Install PWA 2388 hook(1) to end of PWA 26584 arm(2).
- e. Attach hoist to PWA 2388 hook(1).
- f. Attach second hoist to PWA 56336 sling(3, figure 3) using PWA 2388 hook(2).
- g. Install PWA 56336 sling(3) to trunnions spools on PWA 57623 adapter(6) using two PWA 26147 adapters(4).
- h. Release clamps(7) securing core engine module(8) to PWA 56338 stand(5).
- i. Lift core engine module(8) out and clear of stand(5).

Legend for figure 3

- 1. PWA 2388 hook
- 2. PWA 2388 hook
- 3. PWA 56336 sling
- 4. PWA 26147 adapter
- 5. PWA 56338 stand
- 6. PWA 57623 adapter
- 7. Clamp
- 8. Core engine module
- 9. Rear compressor rear hub
- 10. PWA 57937 fixture
- 11. PWA 26584 arm

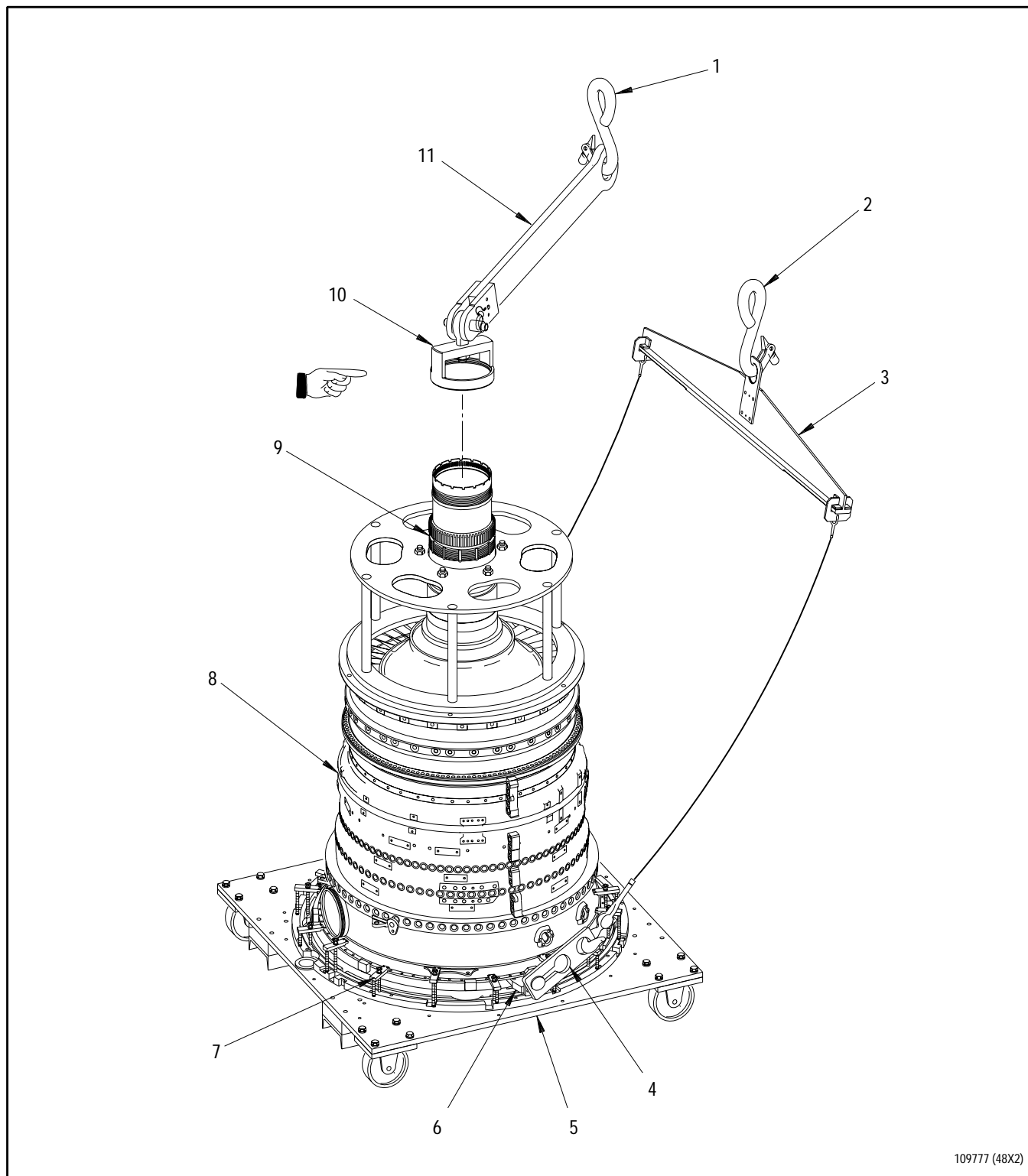


Figure 3. Core Engine Module - Trunnioning

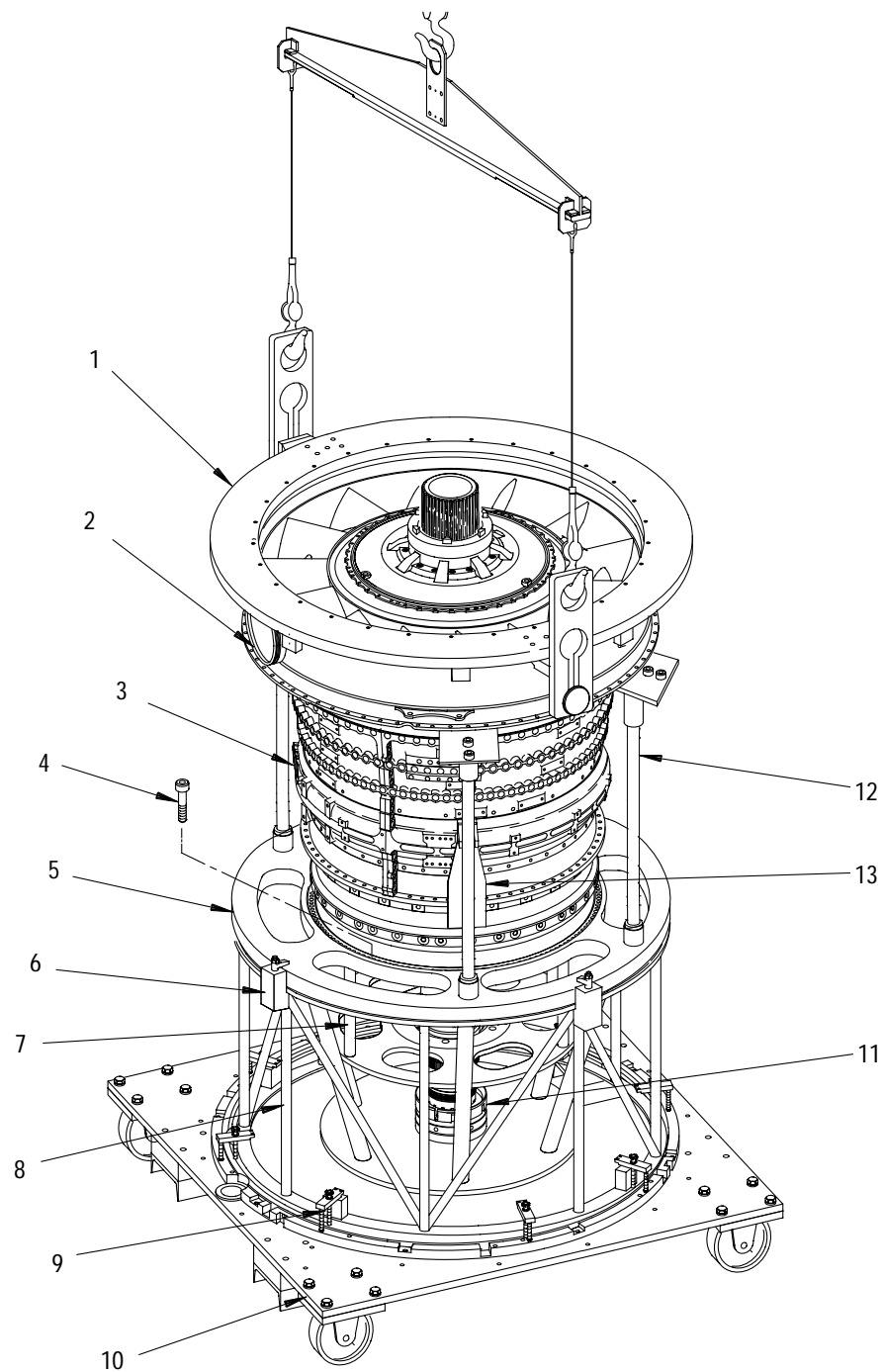
- j. Attach two standard lifting straps to top side of PWA 50993 spacer(8, figure 4) 180 degrees apart.
- k. Connect lifting straps to hoist.
- kl. Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- l. Install PWA 50993 spacer(8) onto PWA 56338 stand(10) and secure with clamps(9).
- m. Remove lifting straps and hoist.
- n. Attach two standard lifting straps to top side of PWA 57722 stand, detail-1 base assembly(5) 180 degrees apart.
- o. Connect lifting straps to hoist.
- p. Install detail-1 base assembly(5) into PWA 50993 spacer(8) and secure with clamps(6).
- q. Rotate core engine module(3) to front end up position.
- r. Remove PWA 26584 arm(11, figure 3), PWA 2388 hook(1), and PWA 57937 fixture(10) from end of rear compressor rear hub(9).
- s. Install four PWA 57722 stand detail-28 posts(12, figure 4) in detail-1 base assembly(5) with detail-25 bracket assemblies(13) 180 degrees apart.
- t. Lower detail-10 plate(11) to its lowest position.

- u. Lower core engine module(3) down into stand with rear flange of intermediate case(2) resting on posts(12) while aligning detail-1 base assembly(5) alignment pin with hole in detail-19 support plate assembly(7). At the same time, align detail-10 plate(11) so detail-36 keys align with slots in rotor driveshaft.

NOTE

Only two boltholes in intermediate case align with posts at 4 and 8 o'clock positions.

- v. Secure PWA 57722 stand posts(12) to rear flange of intermediate case(2) with detail socket head cap screws.
- w. Remove 14 detail screws securing rear flange of 10th through 12th stage compressor case to detail-19 support plate assembly(7).
- x. Secure detail-19 support plate assembly(7) to detail-1 base assembly(5) with six detail screws(4).
- y. Torque detail screws(4) 250 to 270 pound-inches.
- z. Raise detail-10 plate(11) until it contacts rotor driveshaft.
- aa. Remove detail-11 ring segments and detail screws securing PWA 57623 adapter(1) to intermediate case(2).
- ab. Remove PWA 57623 adapter(1) from intermediate case(2).



JG004959 (48X2)

Figure 4. Core Engine Module - Front End Up

Legend for figure 4

- | | |
|---------------------------|----------------------------------|
| 1. PWA 57623 Adapter | 8. PWA 50993 Spacer |
| 2. Intermediate Case | 9. Clamps |
| 3. Core Module | 10. PWA 50775 or PWA 56338 Stand |
| 4. Screws | 11. Plate |
| 5. Base Assembly | 12. Post |
| 6. Clamps | 13. Bracket Assemblies |
| 7. Support Plate Assembly | |

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****DISMANTLING (FRONT)****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 54

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	30	18	29	33	2
2 - 3	29	19	0	34	0
4	30	20 - 22	26	35	1
4A Added	26	23 - 28	0	36	19
4B Blank Added	26	29	13	37 - 40	0
5 - 6	26	30	1	41	29
7	29	31	17	42 - 43	30
8	30	32	1	44	0
9 - 15	0	32A - 32C Added	1	45	29
16	13	32D Blank Added	1	46 Blank	29
17	0			47 - 48	30

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Inspection - - - - -	WP 352 00
Stator Segment Assemblies, Compressor, Seventh Through Ninth Stage - Inspection - - - - -	WP 355 00
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operation and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS**Nomenclature****Specification/Vendor Part Number**

OIL, LUBRICATING (AERO KROIL)	NSN 9150-00-905-1387
OIL, LUBRICATING	MIL-L-7808
PENCIL (CRAYON), SILVER METAL MARKING (HARD) (PMC 4059-7)	COLORBRITE NO. 2101 OR ANADEL NO. 1936
PENCIL (CRAYON), SILVER METAL MARKING (HARD)	COLOR-TEX NO. 1843
TAPE, MASKING (CLOTH BACKING) (PMC 4001)	F.O.S. 57-2 RED OR TUCK 90-W RED OR 222 OR TB-30-113

EXPENDABLE ITEMS

None

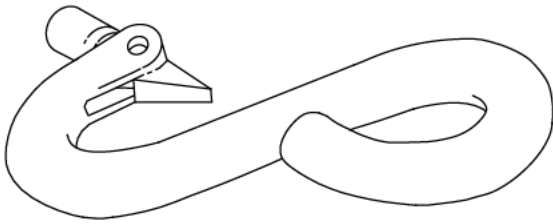
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
6	NO. 2 BEARING PACKAGE - REMOVAL	
	NO. 2 BEARING PACKAGE, REMOVAL - - - - -	
	PIN, ALIGNING - - - - -	PWA 52353
	PULLER, NO. 2 BEARING SUPPORT - - - - -	PWA 50704
7	NO. 3 BEARING FRONT SEAL SEAT - REMOVAL	
	ADAPTER, NO. 3 BEARING FRONT SEAL SEAT RETAINING NUT - - - - -	PWA 56677 OR
	ADAPTER, NO. 3 BEARING FRONT SEAL RETAINING NUT - - -	PWA 53859
	WRENCH, NO. 3 BEARING FRONT SEAL RETAINING NUT - - -	PWA 53858
	PULLER, NO. 3 BEARING FRONT SEAL SEAT - - - - -	PWA 51833
8	NO. 3 BEARING PACKAGE - REMOVAL	
	ADAPTER, ASSY/DISASSY, NO. 3 BEARING INNER RACE NUT	PWA 56688
	ADAPTER, TORQUE, NO. 3 BEARING AND GEAR ASSY, RETAINING NUT - - - - -	PWA 56586 OR
	WRENCH, NO. 3 BEARING AND GEAR ASSY RETAINING NUT -	PWA 50628
	WRENCH, HYDRAULIC, 120,000 IN. LBS - - - - -	PWA 50308 OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	ADAPTER SET, HYD WRENCH TO WRENCH - - - - -	PWA 57806
	SLING - - - - -	SWE 81001/81002
	PULLER, NO. 3 BEARING AND GEAR ASSEMBLY - - - - -	PWA 50619
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
9	NO. 3 BEARING REAR SEAL SEAT - REMOVAL	
	PULLER, NO. 3 BEARING REAR SEAL SEAT - - - - -	PWA 50635
14	FOURTH THROUGH NINTH STAGE CASE - REMOVAL	
	BUILD STAND, REAR COMPRESSOR ROTOR AND CASES - - - - -	PWA 57722
	SLING, THREE CABLE - - - - -	PWA 14175

APPLICABLE SUPPORT EQUIPMENT (continued)

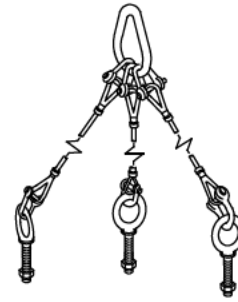
Paragraph	Function - Tool Nomenclature	Tool Number
15	INTERMEDIATE CASE - REMOVAL	
	GUIDE, INTERMEDIATE CASE INSTALLATION/REMOVAL - - - -	PWA 57726
	TRUNNION, LIFT INTERMEDIATE CASE FRONT FLANGE - - - -	PWA 57601
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, ADJUSTABLE MODULE HANDLING - - - - -	PWA 56336
	HOOK, SAFETY - - - - -	PWA 2388
	STAND, BUILD, REAR COMPRESSOR ROTOR AND CASES - - - -	PWA 57722
16	NO. 3 BEARING REAR AIR SEAL - REMOVAL	
	PULLER, NO. 3 BEARING AIR SEAL - - - - -	PWA 51678
17	TENTH THROUGH TWELFTH STAGE CASE AND STATOR SEGMENTS - REMOVAL	
	STAND, BUILD, REAR COMPRESSOR ROTOR AND CASES - - - -	PWA 57722
	FIXTURE, HOLDING, SHROUD INSTALLATION 10TH, 12TH STAGE COMPRESSOR - - - - -	PWA 57739
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 57938 OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584

ILLUSTRATED SUPPORT EQUIPMENT



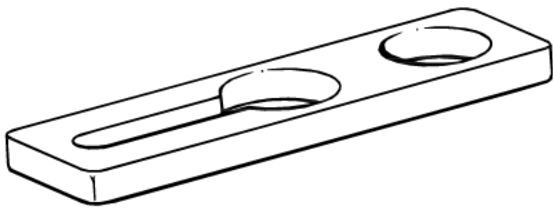
PWA 2388 -C

Figure T1. PWA 2388 HOOK



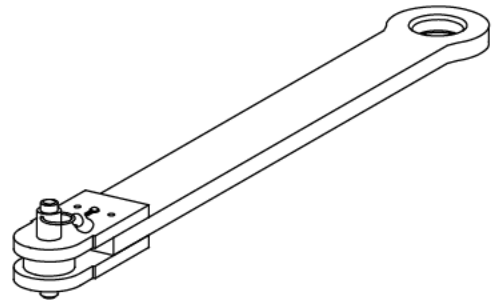
PWA14175-C

Figure T2. PWA 14175 SLING



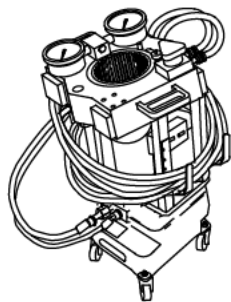
PWA 26147 -C

Figure T3. PWA 26147 ADAPTER



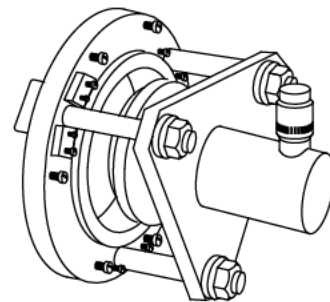
PWA 26584 -C

Figure T4. PWA 26584 ARM



PWA 50308 -C

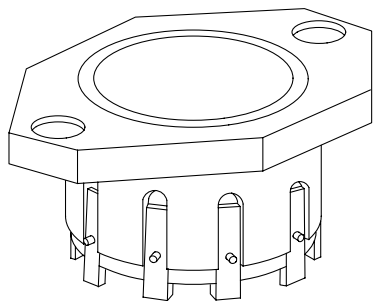
Figure T5. PWA 50308 WRENCH



PWA 50619 -C

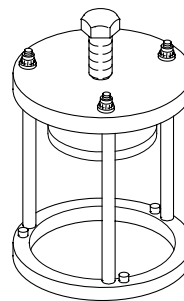
Figure T6. PWA 50619 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



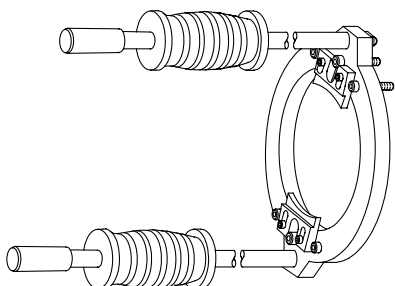
PWA 50628 -C

Figure T7. PWA 50628 WRENCH



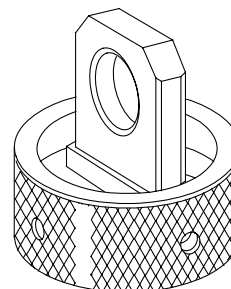
PWA 50635 -C

Figure T8. PWA 50635 PULLER



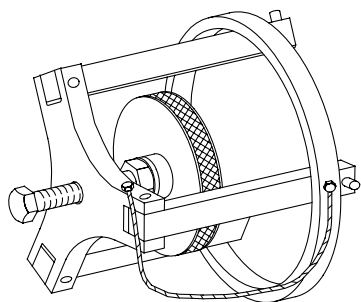
PWA 50704 -C

Figure T9. PWA 50704 PULLER



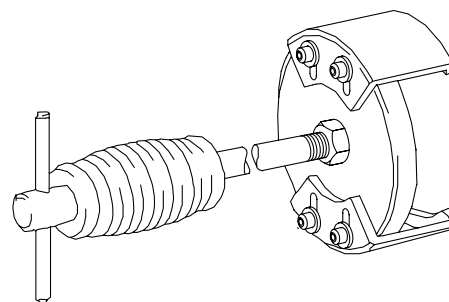
PWA 51371 -C

Figure T10. PWA 51371 EYE



PWA 51678 -C

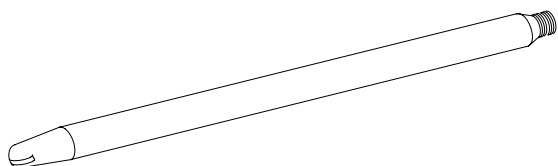
Figure T11. PWA 51678 PULLER



PWA 51833 -C

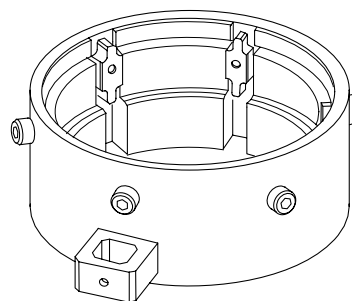
Figure T12. PWA 51833 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



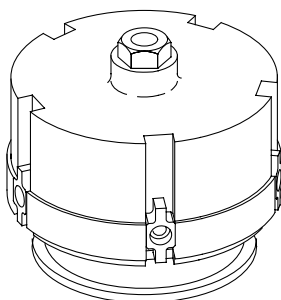
PWA 52353 -C

Figure T13. PWA 52353 PIN



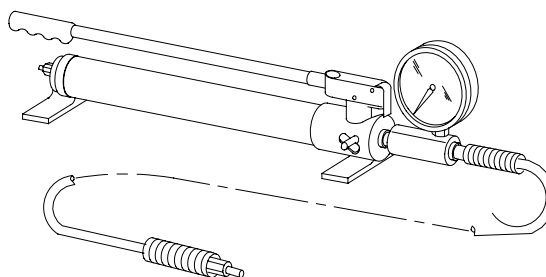
PWA 53858 -C

Figure T14. PWA 53858 WRENCH



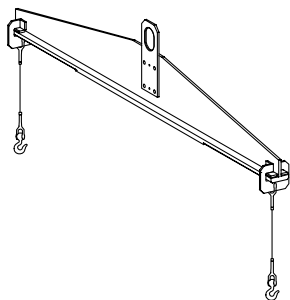
PWA 53859 -C

Figure T15. PWA 53859 ADAPTER



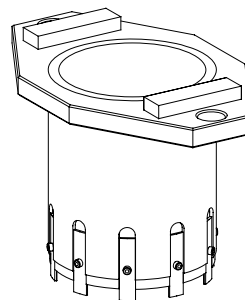
PWA 55380 -C

Figure T16. PWA 55380 PUMP



PWA 56336 -C

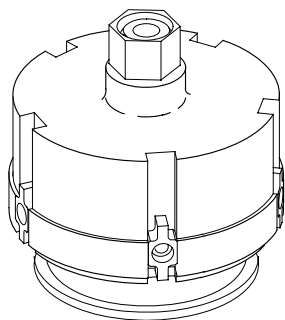
Figure T17. PWA 56336 SLING



PWA 56586 -C

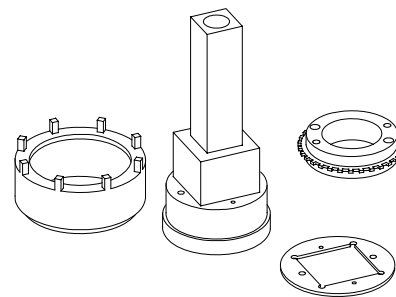
Figure T18. PWA 56586 ADAPTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



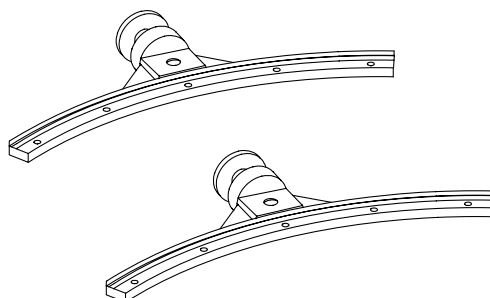
PWA 56677 -C

Figure T19. PWA 56677 ADAPTER



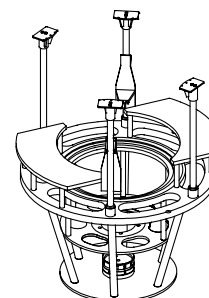
PWA 56688 -C

Figure T20. PWA 56688 ADAPTER



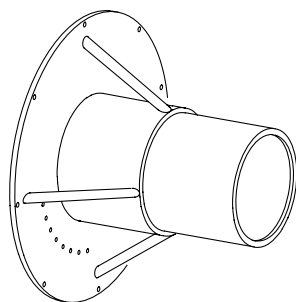
PWA 57601 -C

Figure T21. PWA 57601 TRUNNION



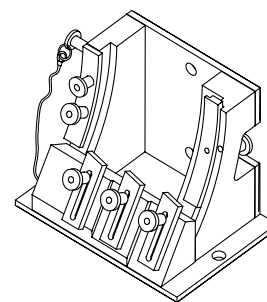
PWA 57722 -C

Figure T22. PWA 57722 BUILD STAND



PWA 57726 -C

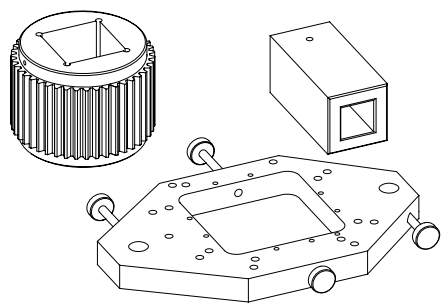
Figure T23. PWA 57726 GUIDE



PWA 57739 -C

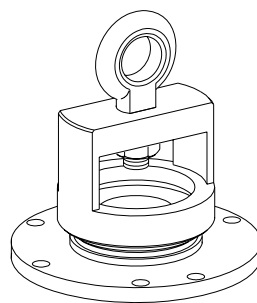
Figure T24. PWA 57739 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



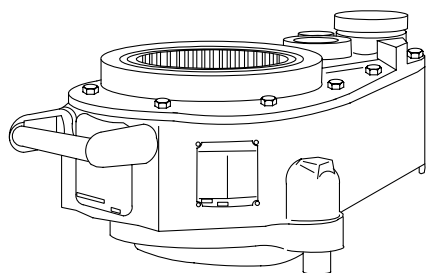
PWA 57806 -C

Figure T25. PWA 57806 ADAPTER SET



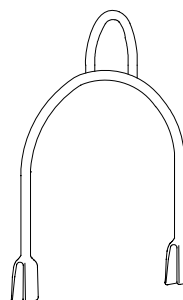
PWA 57938 -C

Figure T26. PWA 57938 FIXTURE



SWE 8200 -C

Figure T27. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T28. SWE 81001/81002 SLING

1. INTRODUCTION.

a. This work package contains instructions for vertical disassembly of the front core engine module. The following major components/sections are removed:

- No. 2 and 3 bearing internal oil pressure tubes
- No. 2 bearing seal and support assembly
- No. 2 and 3 bearing inner oil pressure tubes
- No. 2 bearing package
- No. 3 bearing front seal seat
- No. 3 bearing package
- No. 3 bearing rear seal seat
- No. 3 bearing rear carbon face seal assembly
- Bleed valve strap and actuating linkage
- Variable vanes synchronizing arm and linkage
- Fourth, fifth, and sixth stage synchronizing ring brackets
- Fourth through ninth stage case
- Intermediate case
- No. 3 bearing rear air seal
- Tenth through twelfth stage case and stator segments

2. PRELIMINARY INSTRUCTIONS.

- a. If core engine module is in shipping container, remove from shipping container per WP 004 00 and position module to front end up position.

NOTE

Rear of module shall be disassembled before front. Module cannot be rotated to gain access to the rear if the front has been disassembled.

- b. If required, disassemble rear of core engine module per WP 011 00.

- c. If rear of core engine module has been disassembled, rotate to front end up position per WP 013 00.
- d. If fully assembled core engine module is positioned front end down, rotate to front end up position per WP 012 00.

3. NO. 2 AND 3 BEARING INTERNAL OIL PRESSURE TUBES - REMOVAL.

(See Figure 1.)

- a. Remove four bolts,(1, figure 1) securing each oil pressure tube(2).

- b. Remove two oil pressure tubes(2).

- c. Remove and discard gaskets(3) and packings(4).

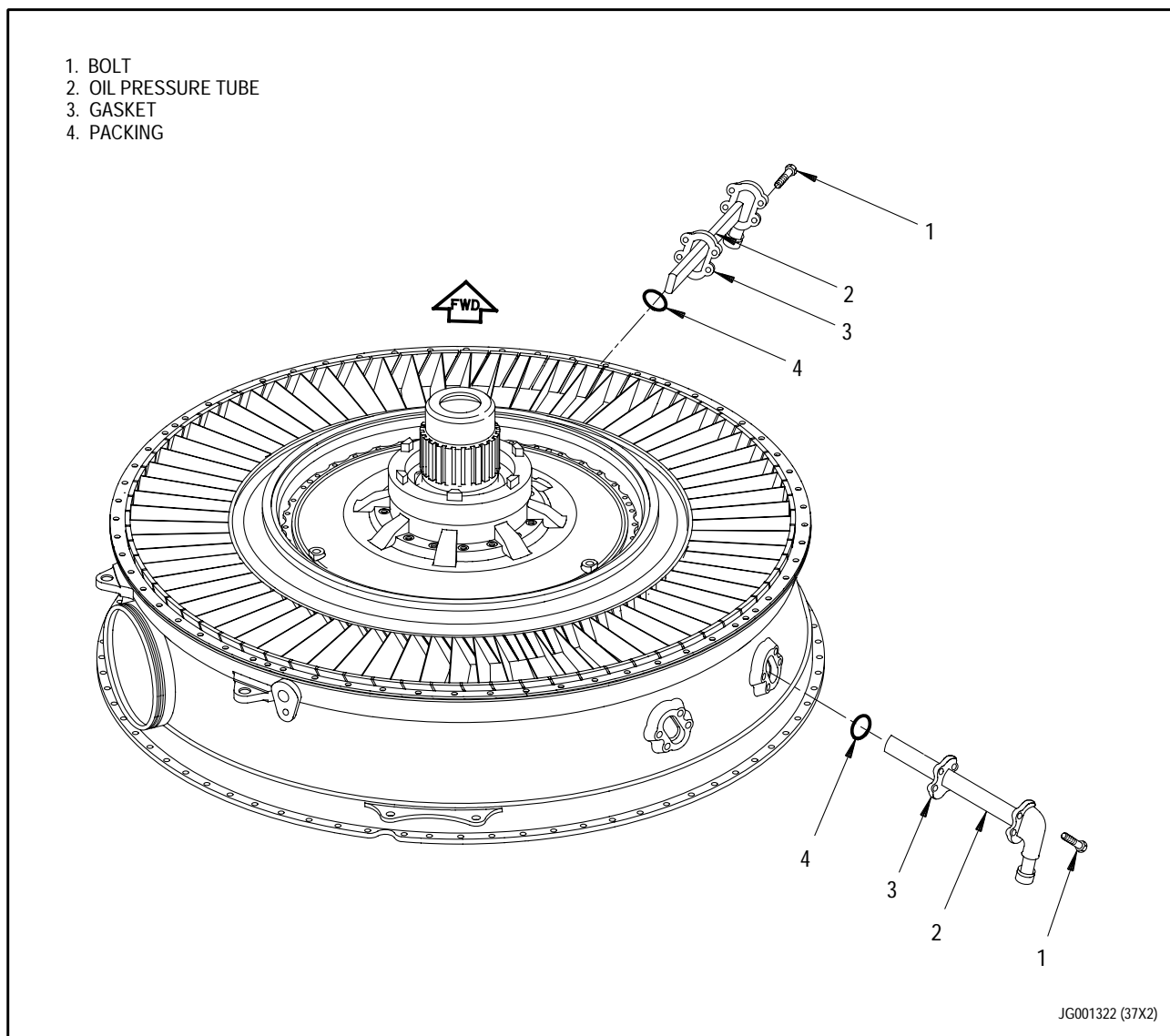


Figure 1. No. 2 and 3 Bearing Internal Oil Pressure Tubes - Removal

**4. NO. 2 BEARING SEAL AND SUPPORT
ASSEMBLY - REMOVAL.**

(See Figure 2.)

- a. Remove lockwire and bolts(1, figure 2) securing third stage compressor stator shroud(2) and outer flange of No. 2 bearing seal and support assembly(3).
- b. Remove third stage compressor stator shroud(2).
- c. Remove lockwire and bolts(18) securing inner flange of No. 2 bearing seal and support assembly(3).
- d. Install eight jackscrews with 0.250-28 UNJF threads into jackscrew holes in outer flange of No. 2 bearing seal and support assembly(3).



To prevent damage to No. 2 bearing seal and support assembly, jackscrews must be tightened evenly.

- e. Tighten jackscrews evenly to break snap fit of No. 2 bearing seal and support assembly(3). Remove jackscrews.
- f. Remove No. 2 bearing seal and support assembly(3).
- g. Remove and discard gasket(4) and packing(17) from oil boss of No. 2 bearing seal and support assembly(3).

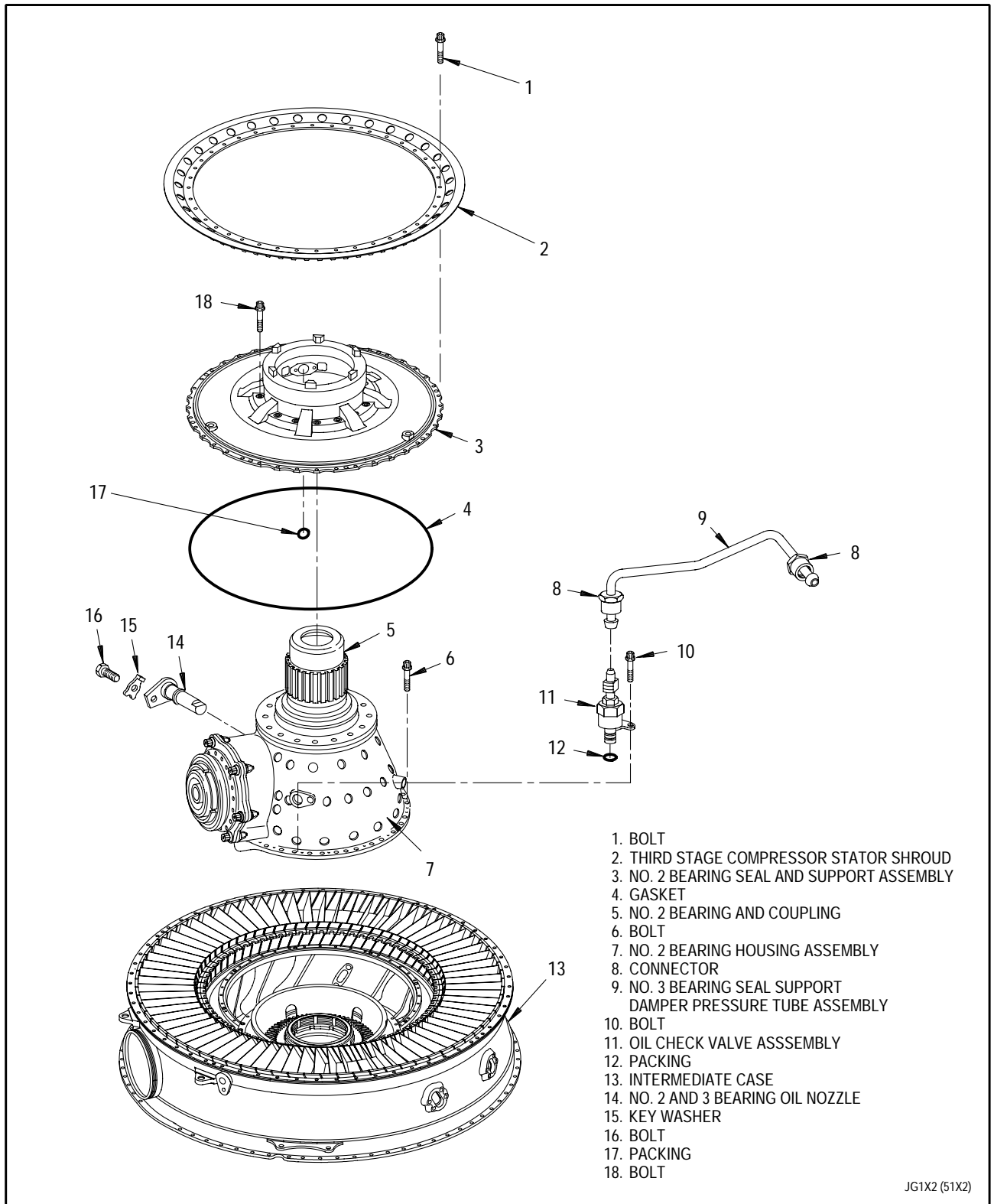


Figure 2. No. 2 Bearing Seal and Support Assembly and NO. 2 Bearing Package - Removal

**5. NO. 2 AND 3 BEARING INNER OIL
PRESSURE TUBES - REMOVAL.**

(See Figure 3.)

- a. Remove two bolts(1,figure 3)
securing each tube(5) to
intermediate case(3).
- b. Remove tubes(5) and discard
gaskets(2).
- c. Remove adapters(7) from No. 2
bearing housing assembly(4).
- d. Remove and discard two
packings(6) from each
adapter(7).

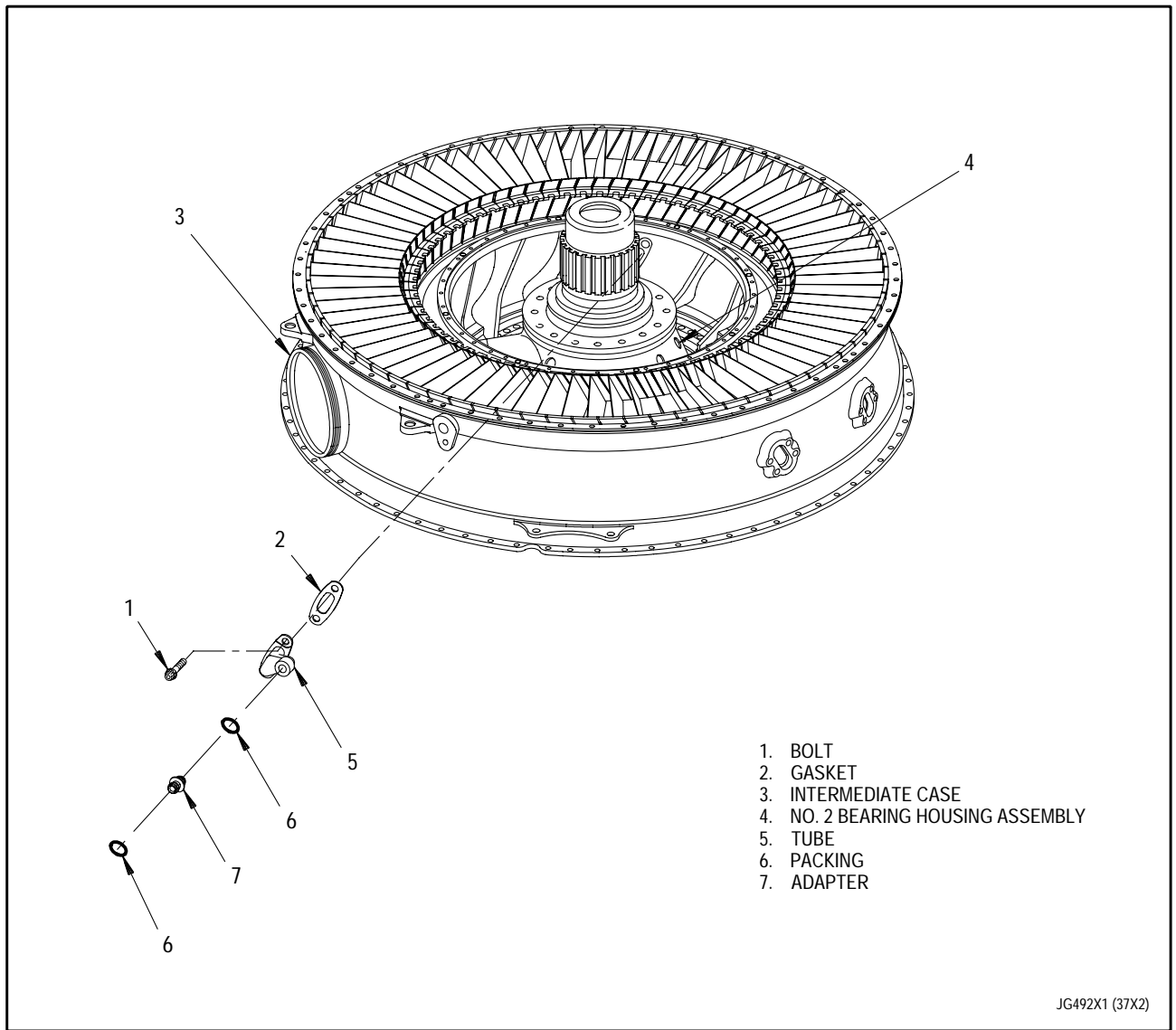


Figure 3. No. 2 and 3 Bearing Inner Oil Pressure Tubes - Removal (Typical Two Places)

6. NO. 2 BEARING PACKAGE - REMOVAL.

(See figure 2 and Figure 4.)

NOTE

No. 2 bearing package consists of the following major parts:

- No. 2 bearing housing assembly
- No. 2 bearing and coupling
- Gearbox drive bevel gearshaft assembly
- No. 2 and 3 bearing seal assembly
- a. Remove lockwire from No. 3 bearing seal support damper pressure tube assembly connectors(8, figure 2).
- b. Loosen connectors(8) and remove tube(9).
- c. Remove lockwire and two bolts(10) securing oil check valve assembly(11) to intermediate case(13).
- d. Remove oil check valve assembly(11).
- e. Remove and discard packing(12).
- f. Remove No. 2 and 3 bearing oil nozzle(14) (three places) as follows:

(1) Bend open key washers(15).

(2) Remove bolts(16) and discard key washers(15).

(3) Remove oil nozzles(14).

g. Remove lockwire and 31 bolts(6) securing No. 2 bearing housing assembly(7) to intermediate case(13).

h. Install three PWA 52353 alignment pins, equally spaced in bolt circle where bolts(6) were removed.

i. Install PWA 50704 puller as follows:

(1) Install detail-1 base(8, figure 4) onto front face of No. 2 bearing outer race(4).

(2) Install screws(2) to secure detail-1 base(8) to No. 2 bearing outer race(4) and No. 2 bearing housing assembly(3).

(3) Engage detail-2 plates(6) under No. 2 bearing front seal seat(5). Secure with screws(7).



Maintain upward pressure on No. 2 bearing housing assembly(3) while working slidehammers(1) of puller. This will stop housing from falling and damaging No. 3 front carbon seal.

- k. Remove No. 2 bearing package from intermediate case.

- j. Work slidehammers(1) of puller to break snap fit between No. 2 bearing housing assembly(7, figure 2) and intermediate case(13).

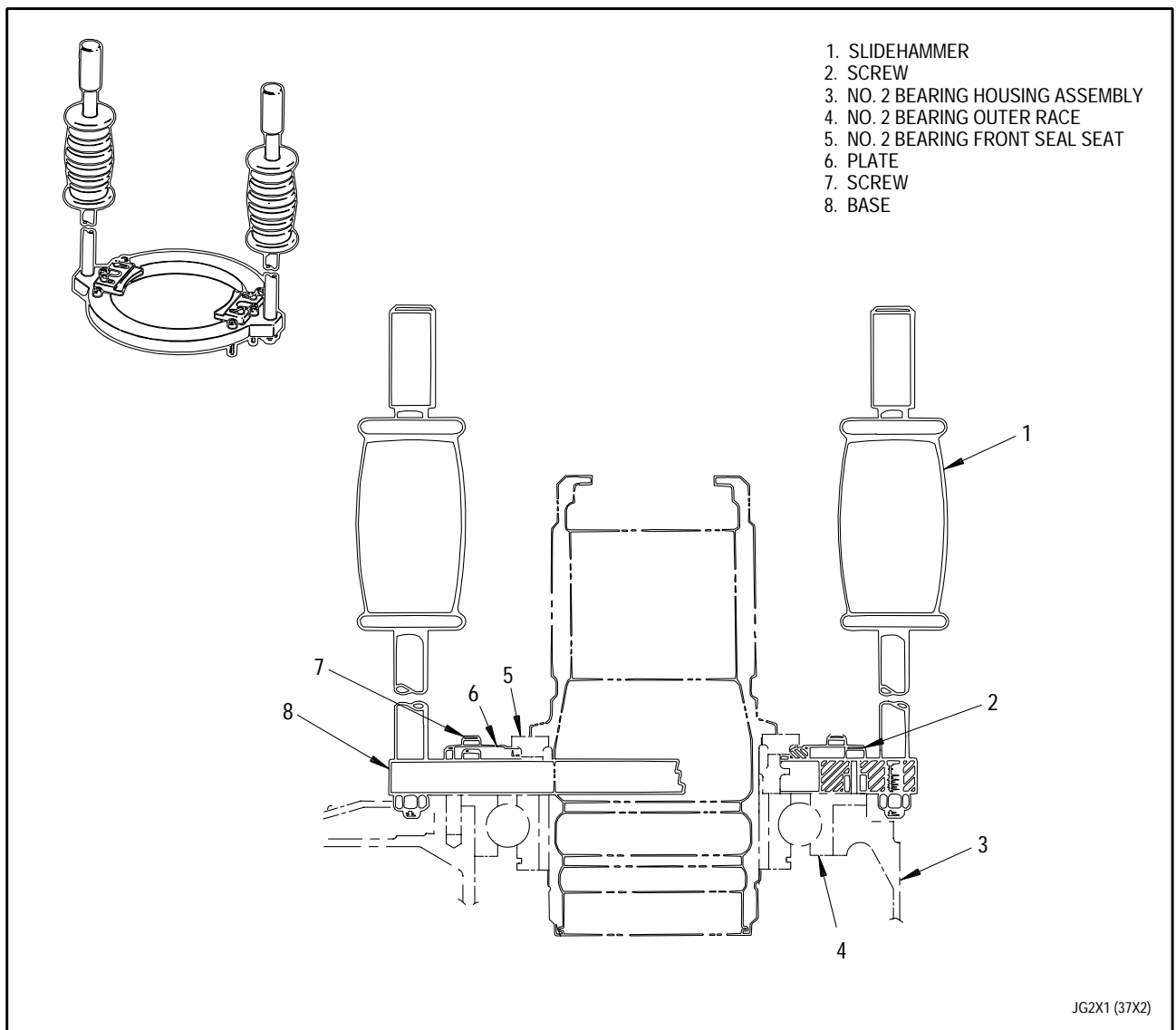


Figure 4. No. 2 Bearing Package - Removal with PWA 50704 Puller

- l. Remove PWA 50704 puller.
- m. Install two workbolts to secure No. 2 bearing and coupling(5) to No. 2 bearing housing assembly(7).
- n. Remove PWA 52353 alignment pins.

7. NO. 3 BEARING FRONT SEAL SEAT - REMOVAL.

(See Figure 5.)

- a. Remove retaining ring(1, figure 5) and key washer(2) from retaining nut(3).
- b. Install PWA 56677 adapter so it engages slots in 6th stage hub. Tighten hex-head cap screw at center so internal ring expands. This will help keep adapter centered.
- c. Install PWA 53858 wrench over adapter and engage slots in retaining nut(3).
- d. Install standard tools on adapter and wrench. Hold wrench flats on PWA 56677 adapter to prevent rear compressor rotor assembly from turning.
- e. Loosen retaining nut(3) by turning PWA 53858 wrench in a counterclockwise direction.
- f. Remove tooling and retaining nut(3).

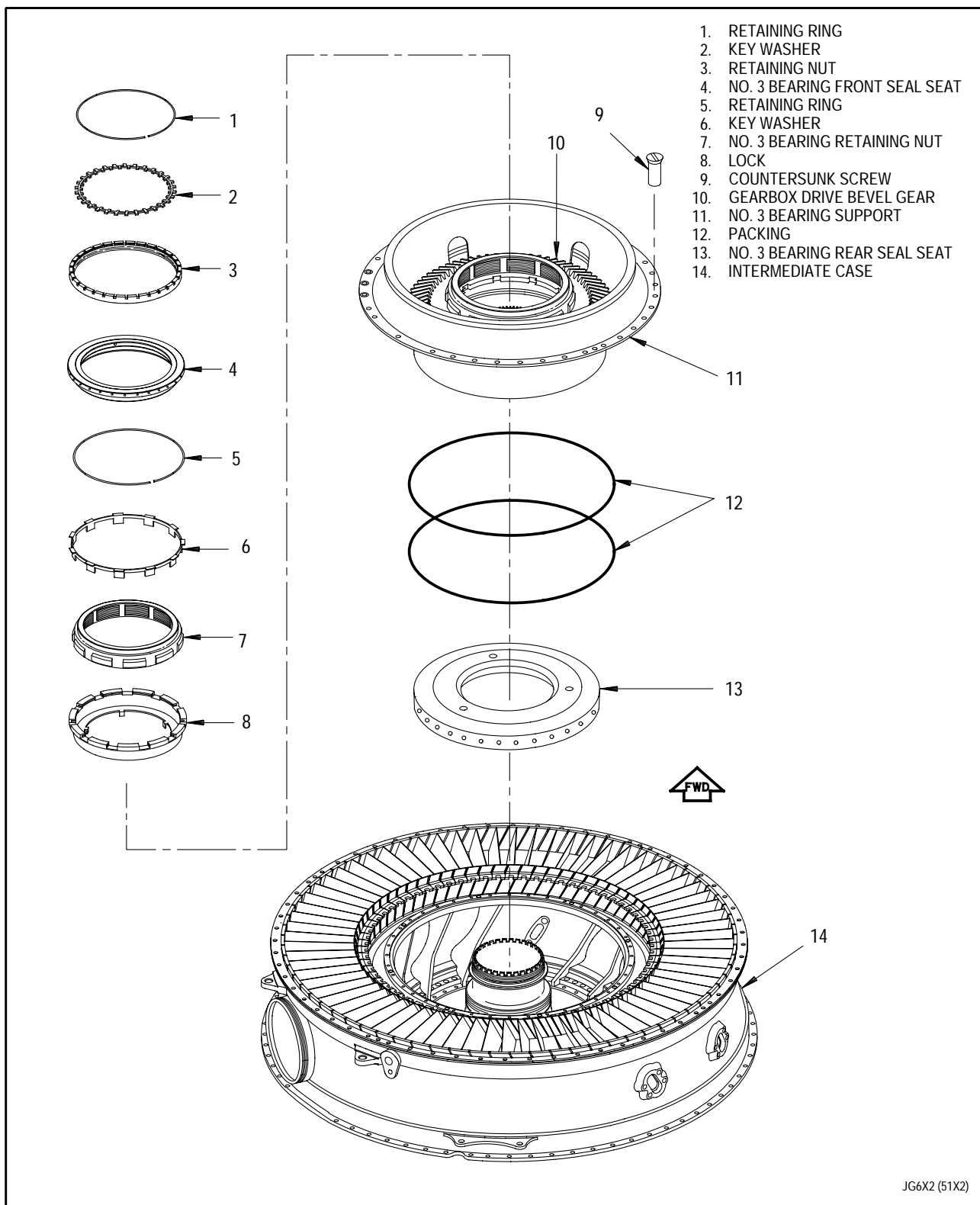


Figure 5. No. 3 Bearing Front Seal Seat, No. 3 Bearing Package, and No. 3 Bearing Rear Seal Seat - Removal

- g. Remove No. 3 bearing front seal seat(4) by hand. If any difficulty is encountered, remove seal seat with PWA 51833 puller as follows:

- (1) Install detail-9 jaw set under seal seat(4).
- (2) Secure detail-9 jaw set with detail socket head cap screws.
- (3) Work detail-6 slide hammer to remove seal seat(4).

8. NO. 3 BEARING PACKAGE - REMOVAL.

(See figure 5, Figures 6 and 7.)

NOTE

No. 3 bearing package consists of following major parts:

- No. 3 bearing
 - No. 3 bearing support
 - Gearbox drive bevel gear
- a. Remove five countersunk screws(9, figure 5) securing No. 3 bearing support(11) to intermediate case(14).
 - b. Remove retaining ring(5) and key washer(6) from No. 3 bearing retaining nut(7).
 - c. Remove No. 3 bearing retaining nut(7) as follows:

NOTE

- PWA 50628 wrench used with PWA 56688 adapter can only be used with PWA 50308 hydraulic wrench.
- PWA 56688 adapter and PWA 56586 torque adapter can be used with either PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier.
- PWA 57806 wrench adapter is only needed when PWA 56586 torque adapter is used.

- SWE 81001/81002 sling may be used to handle SWE 8100/8200 torque multiplier.

- (1) PWA 50308 hydraulic wrench shall be operated on stand before using. Refer to T.O. 32B14-5-2-1 for wrench operating instructions.
- (2) Place PWA 56688 adapter onto hub and rotate until adapter engages hub. Fully thread retaining ring of adapter onto hub then back off one quarter turn from bottom.
- (3) Install PWA 50628 wrench, PWA 57806 adapter assembly, and PWA 50308 hydraulic wrench;
or,
Assemble PWA 57806 adapter and wrench adapter and secure with set screws. Install PWA 56586 torque adapter, PWA 57806 adapter and wrench adapter, and PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier. Attach ratchet adapter and work handle if SWE 8100/8200 torque multiplier is used. See figure 6.
- (4) Set hydraulic wrench or torque multiplier to actuate splines in a clockwise direction. Body will move counterclockwise to loosen nut while splines at center remain stationary. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.

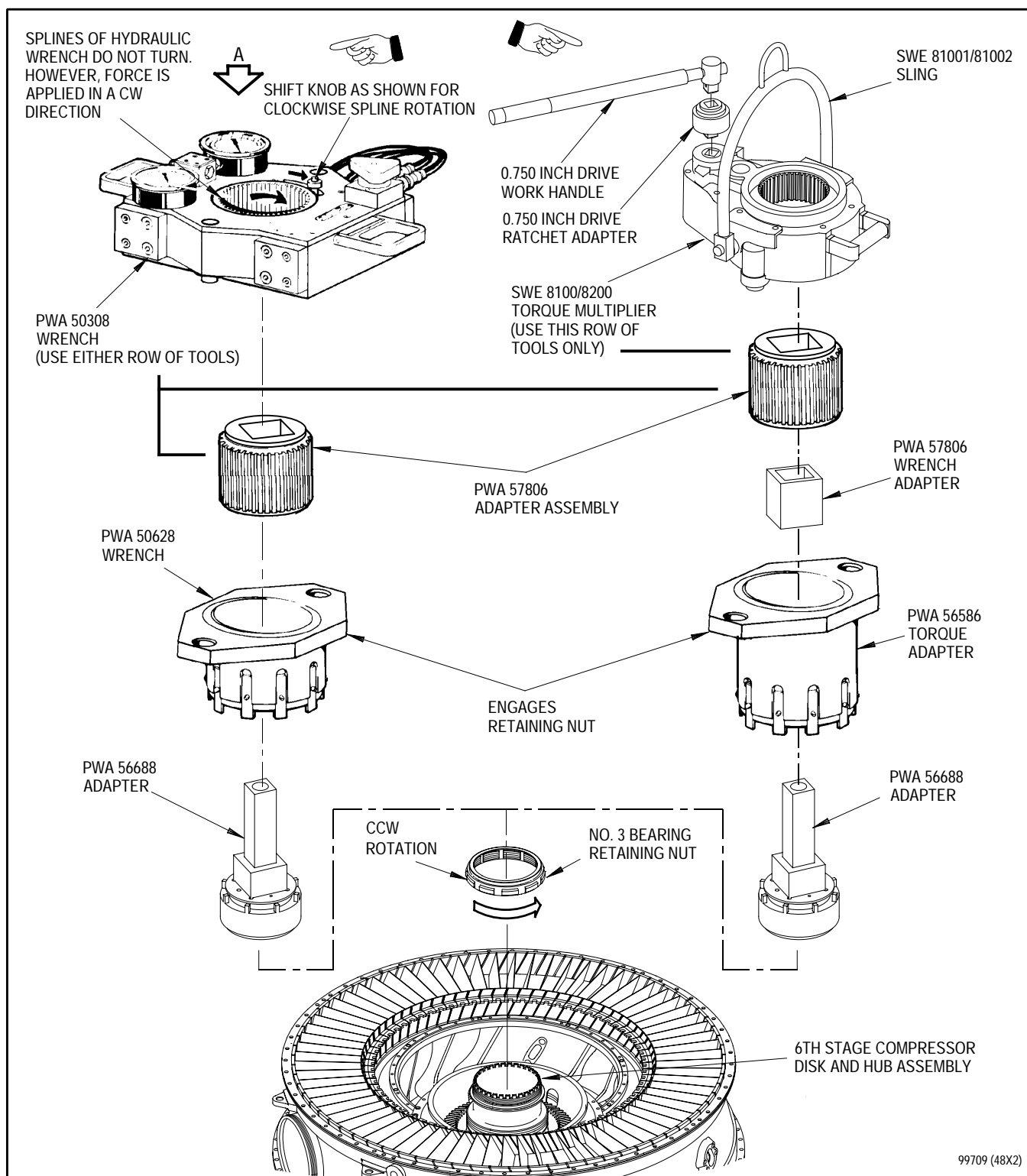


Figure 6. No. 3 Bearing Retaining Nut - Removal (Sheet 1 of 2)

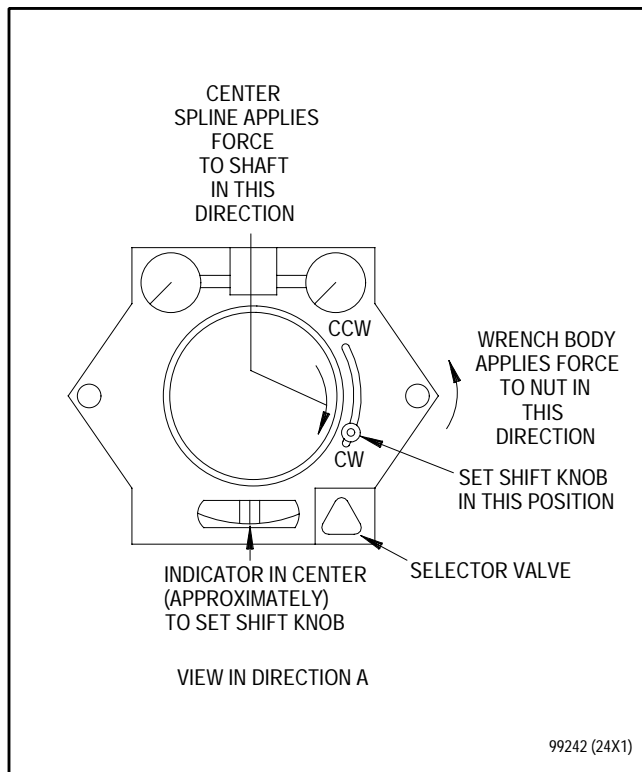


Figure 6. No. 3 Bearing Retaining Nut - Removal
(Sheet 2 of 2)



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may cause overtorque on retaining nut and damage to engine components.

NOTE

Splines of hydraulic wrench or torque multiplier do not turn. Body of hydraulic wrench moves to turn PWA 56586 torque adapter counterclockwise to loosen No. 3 bearing retaining nut.

- (5) Actuate PWA 50308 wrench or SWE 8100/8200 torque multiplier to loosen No. 3 bearing retaining nut.
- (6) Remove wrench or torque multiplier using hoist with

nylon strap or sling respectively. Remove tools. Remove No. 3 bearing retaining nut(7, figure 5) and lock(8).

- d. Remove No. 3 bearing package as follows:

- (1) Position PWA 50619 puller, detail-11 jaw set(4, figure 7) into groove in gearbox drive bevel gear(7) with PWA 50619, detail-3 adapter(2) in end of hub(3).
- (2) Attach PWA 55380 hydraulic pump to PWA 50619 puller(1).



If fewer than eight jackscrews are used, flange of No. 3 bearing support(5) could be distorted and jackscrew holes could be stripped.

- (3) Install eight 0.250-28UNJF jackscrews(6), equally spaced in flange of No. 3 bearing support(5).
- (4) Slowly work PWA 55380 hydraulic pump and tighten jackscrews(6) at the same time. Keep tightening jackscrews, one turn at a time, and working PWA 55380 hydraulic pump until No. 3 bearing support(5) is free from snap fit.
- (5) Slide No. 3 bearing package and tooling upward until it disengages splined fit area(8).
- (6) Remove PWA 50619 puller(1) and jackscrews(6).
- (7) Remove and discard packings(12, figure 5).

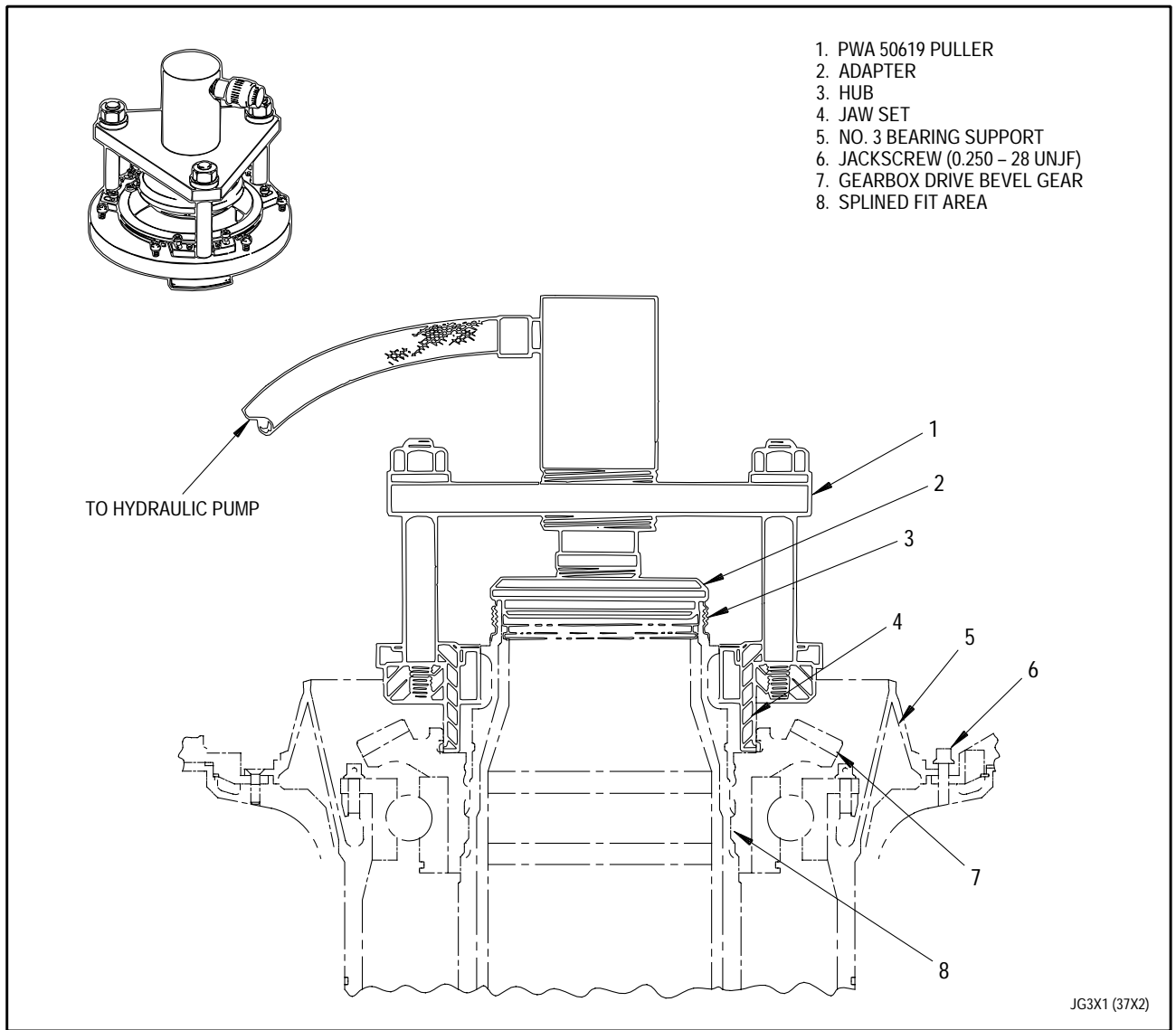


Figure 7. No. 3 Bearing Package - Removal with PWA 50619 Puller

**9. NO. 3 BEARING REAR SEAL SEAT -
REMOVAL.**

(See Figure 8.)

- a. Remove No. 3 bearing rear seal seat(7, figure 8) by hand. If any difficulty is encountered, remove seal seat with PWA 50635 puller as follows:

- (1) Position PWA 50635, detail-1 puller(6) on No. 3 bearing rear seal seat(7) and secure with three detail-2 socket screws(8).
- (2) Thread three detail-8 shafts(5) into detail-1 puller(6).
- (3) Install detail-4 plate(1) and detail-3 pusher(10) on hub(9).
- (4) Align holes in detail-4 plate(1) with detail-8 shafts(5).
- (5) Adjust detail-5 hex screw(2) and detail-3 pusher(10) so detail-8 shafts(5) are through detail-4 plate(1). Install detail washers(4) and nuts(3) on detail-8 shafts(5).
- (6) Tighten detail-5 hex screw(2) to remove No. 3 bearing rear seal seat(7).

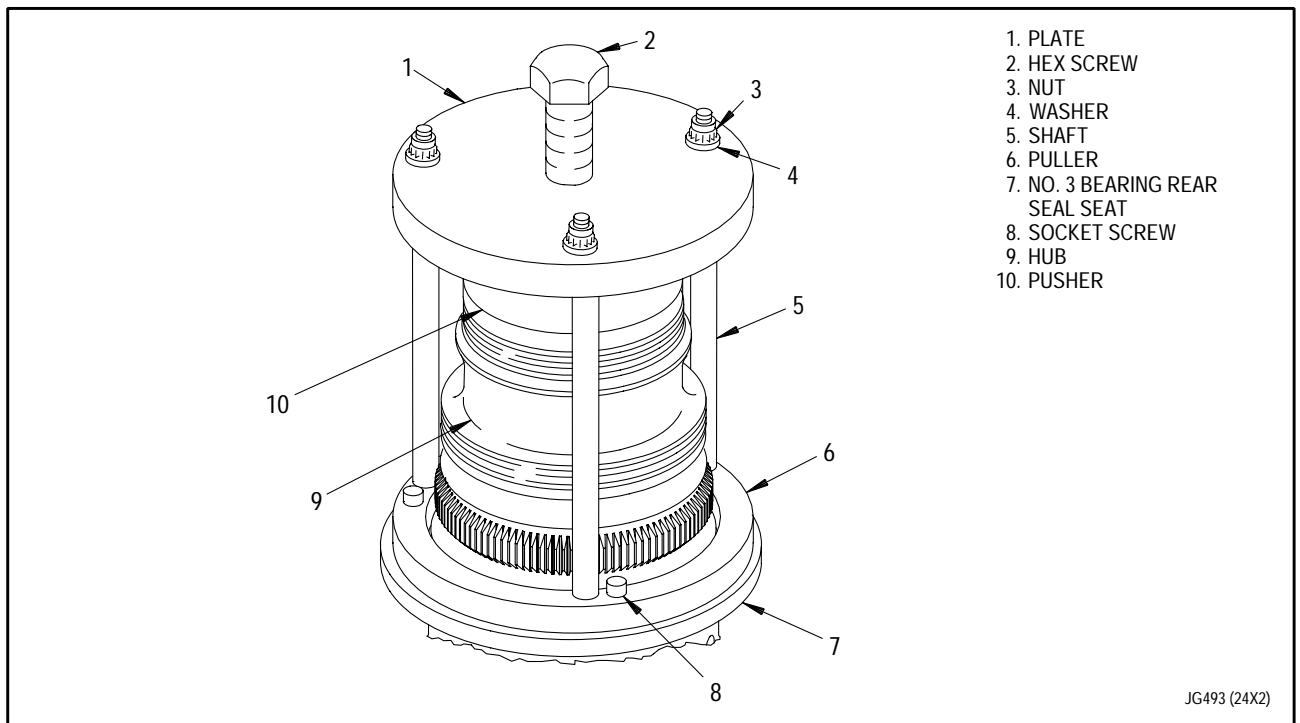


Figure 8. No. 3 Bearing Rear Seal Seat - Removal With PWA 50635 Puller

10. NO. 3 BEARING REAR CARBON FACE SEAL ASSEMBLY - REMOVAL.

(See Figure 9.)

NOTE

If no further disassembly is required, No. 3 bearing rear carbon face seal assembly(4, figure 9) can be removed at this time without removing No. 3 bearing rear seal support assembly(9) from intermediate case(1). If intermediate case is to be removed and disassembled, proceed to paragraph 11.

- a. Press down on metal edge of carbon face seal assembly(4); remove three cotter pins(2).

- b. Remove three guides(3) and carbon face seal assembly(4).
- c. Remove springs(5), spring seats(6), metal seal rings(7), and spring washer(8).
- d. For local (in-house) handling, protect carbon face seal assembly(4) by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place in a cardboard box.
- e. For shipping, protect carbon face seal assembly(4) with a cardboard collar. Refer to T.O. 2-1-111.

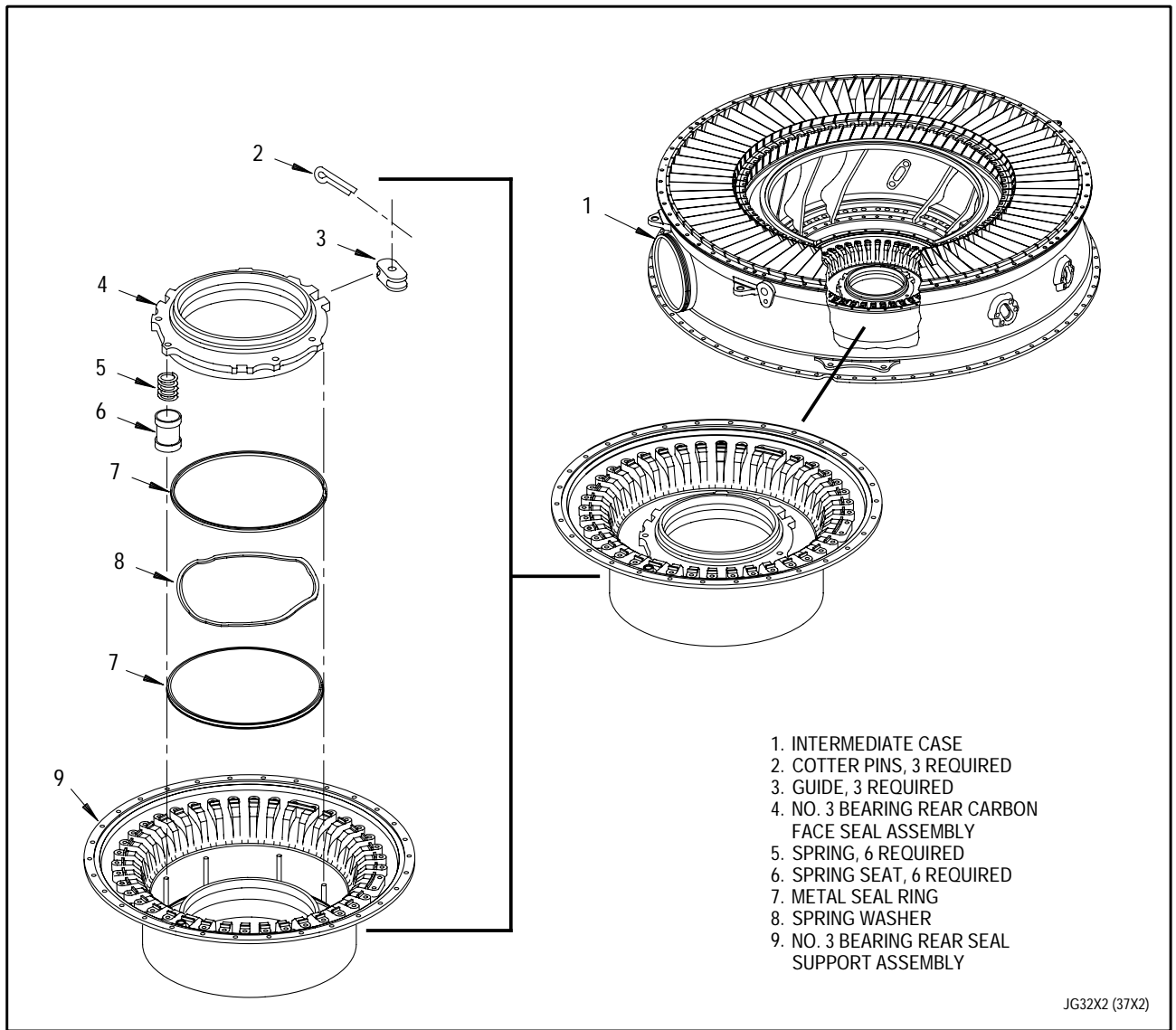


Figure 9. No. 3 Bearing Rear Carbon Face Seal Assembly - Removal

11. BLEED VALVE STRAP AND ACTUATING LINKAGE - REMOVAL.

(See Figure 10.)

- a. Remove nut(11, figure 10), bolt(1), and rollers(2 and 12).
- b. Remove nut(8), bolt(4), and rollers(5 and 7).
- c. Remove connecting links(6 and 13) and rigid connecting link(9) as an assembly.
- d. Remove nut(10) and bolt(3) securing rigid connecting link(9) to connecting links(6 and 13).
- e. Remove lockwire and four bolts(14) that secure guide assembly(16) to rear compressor fourth through ninth stage case.
- f. Remove bleed strap(15) by carefully pulling double lug end of strap and slipping single lug end of strap under strap seats and around case.

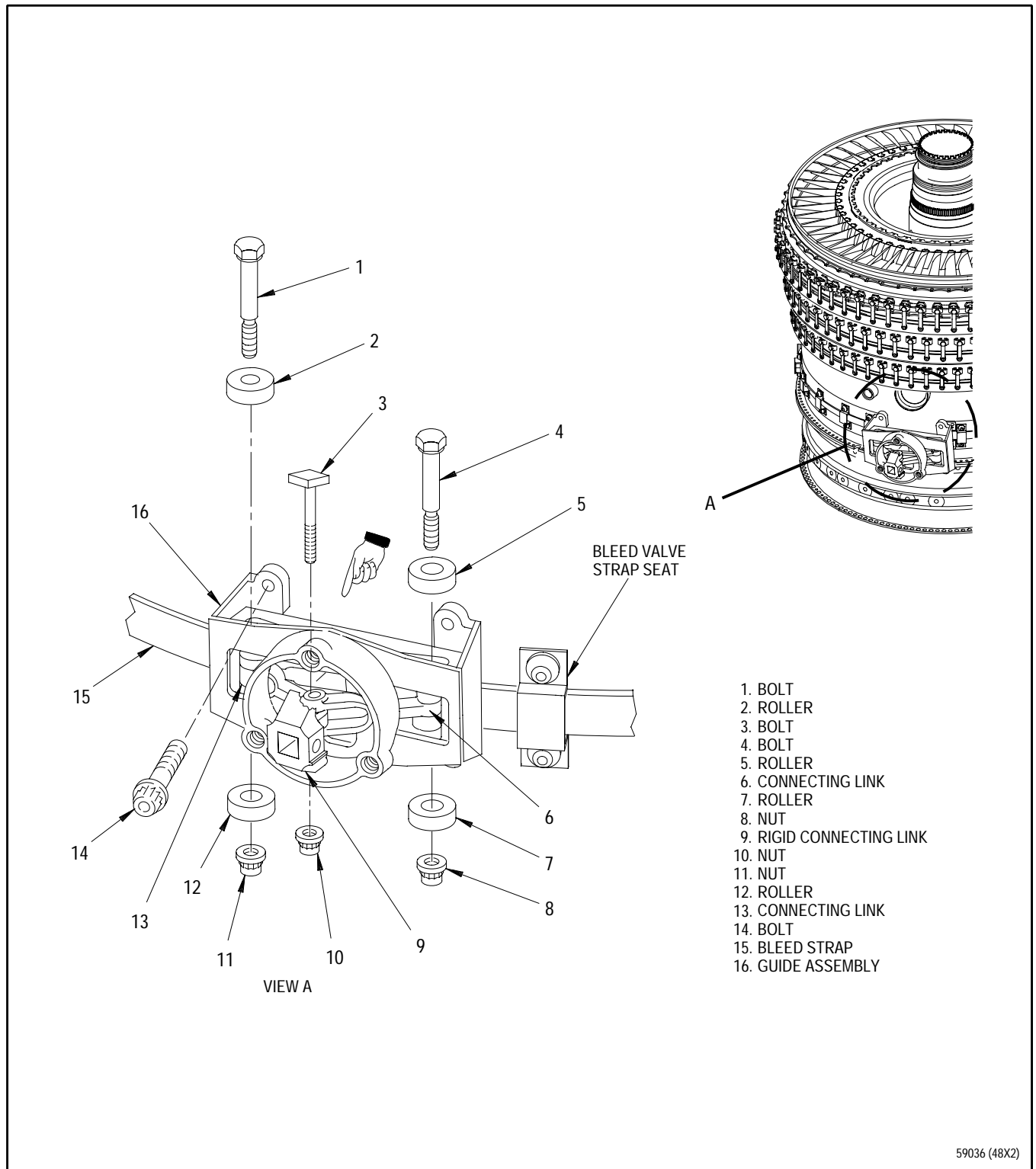


Figure 10. Bleed Valve Strap and Actuating Linkage - Removal

12. VARIABLE VANES (WITH VARIABLE 6TH STAGE VANES) SYNCHRONIZING ARM AND LINKAGE - REMOVAL.

(See Figure 11.)

NOTE

These instructions apply to both sides of module.

- a. Remove cotter pin(34, figure 11), nut(35), and bolt(40) securing connecting link(33) to sixth stage synchronizing ring bracket(36). Discard cotter pin.
- b. Remove cotter pin(42), nut(43) and bolt(45) securing connecting link(37) to fifth stage synchronizing ring bracket(44). Discard cotter pin.
- c. Remove cotter pin(7), nut(8) and bolt(5) securing connecting link(10) to IGV synchronizing ring bracket(6). Discard cotter pin.
- d. Remove cotter pin(3), nut(49) and bolt(2) securing connecting link(46) to fourth stage synchronizing ring bracket(1). Discard cotter pin.
- e. Remove cotter pin(27), nut(28) and bolt(24) securing synchronizing arm(25) to bracket(26). Discard cotter pin.

Legend for figure 11

- | | |
|------------------------|---------------------|
| 1. Bracket | 26. Bracket |
| 2. Bolt | 27. Cotter pin |
| 3. Cotter pin | 28. Nut |
| 4. Bolt | 29. Bolt |
| 5. Bolt | 30. Bolt |
| 6. Bracket | 31. Cotter pin |
| 7. Cotter pin | 32. Nut |
| 8. Nut | 33. Connecting link |
| 9. Bolt | 34. Cotter pin |
| 10. Connecting link | 35. Nut |
| 11. Nut | 36. Bracket |
| 12. Cotter pin | 37. Connecting link |
| 13. Bolt | 38. Nut |
| 14. Connecting link | 39. Cotter pin |
| 15. Bolt | 40. Bolt |
| 16. Stator linkage arm | 41. Bolt |
| 17. Nut | 42. Cotter pin |
| 18. Cotter pin | 43. Nut |
| 19. Bolt | 44. Bracket |
| 20. Cotter pin | 45. Bolt |
| 21. Nut | 46. Connecting link |
| 22. Bolt | 47. Nut |
| 23. Bracket | 48. Cotter pin |
| 24. Bolt | 49. Nut |
| 25. Synchronizing arm | |

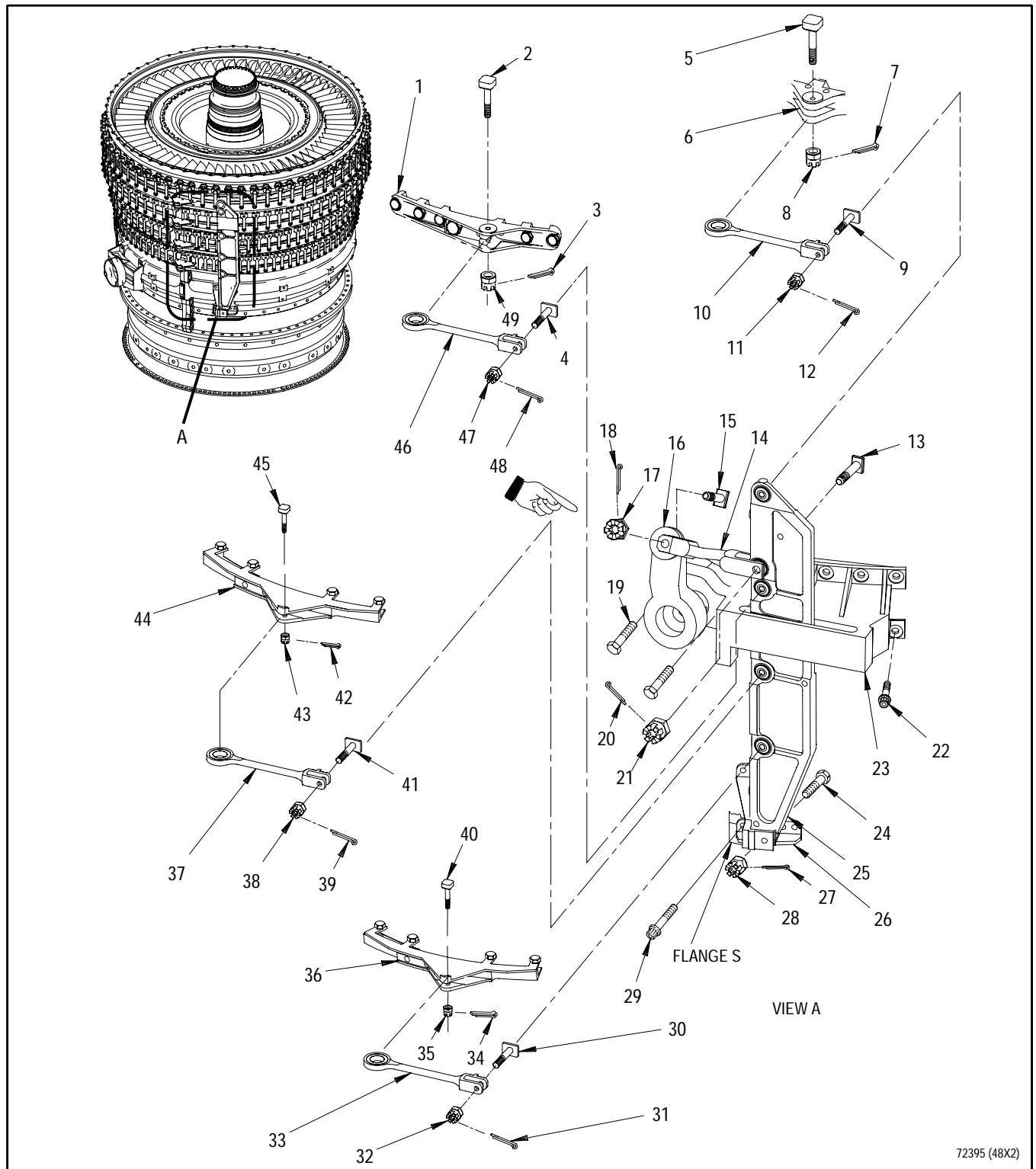


Figure 11. Variable Vanes (With Variable 6th Stage Vanes) Synchronizing Arm and Linkage - Removal

- f. Remove cotter pin(31), nut(32), bolt(30) and connecting link(33). Discard cotter pin.
- g. Remove cotter pin(39), nut(38), bolt(41) and connecting link(37). Discard cotter pin.
- h. Remove cotter pin(12), nut(11), bolt(9) and connecting link(10). Discard cotter pin.
- i. Remove cotter pin(20), nut(21) and bolt(13) securing connecting link(14) to synchronizing arm(25). Discard cotter pin.
- j. Remove bolts(19) and stator linkage arm(16).
- k. Remove cotter pin(18), nut(17) and bolt(15) securing connecting link(14) to stator linkage arm(16). Discard cotter pin.
- l. Remove cotter pin(48), nut(47), bolt(4) and connecting link(46). Discard cotter pin.
- m. Slide synchronizing arm(25) from slot in bracket(23) and remove synchronizing arm.
- n. Remove bolts(29) and bracket(26).
- o. Remove bolts(22) and bracket(23).

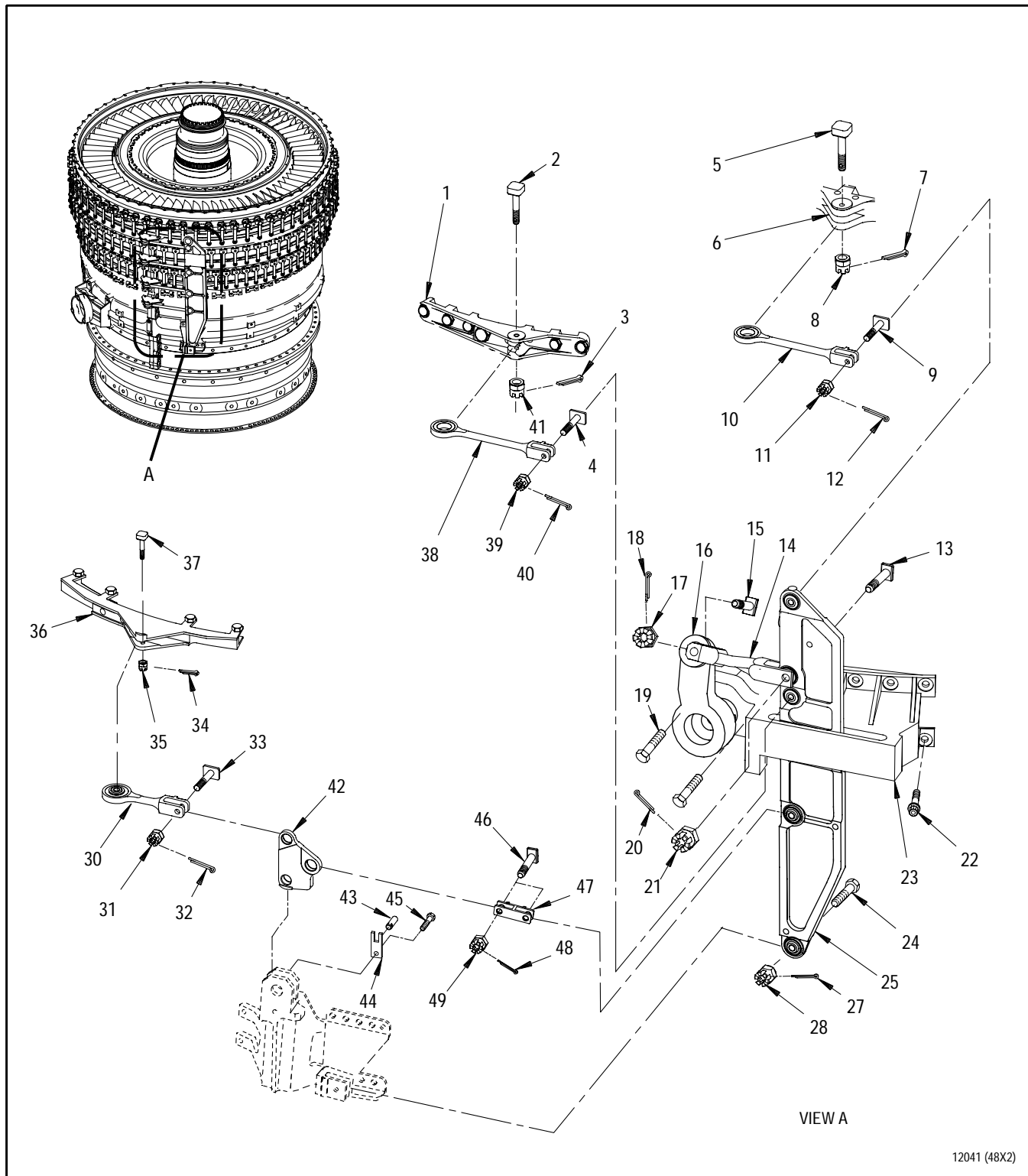
12A. VARIABLE VANES (WITH FIXED 6TH STAGE VANES) SYNCHRONIZING ARM AND LINKAGE - REMOVAL.

(See Figure 11A.)

NOTE

These instructions apply to both sides of module.

- a. Remove cotter pin(34), nut(35) and bolt(37) securing connecting link(30) to fifth stage synchronizing ring bracket(36). Discard cotter pin.
- b. Remove cotter pin(7), nut(8) and bolt(5) securing connecting link(10) to IGV synchronizing ring bracket(6). Discard cotter pin.
- c. Remove cotter pin(3), nut(41) and bolt(2) securing connecting link(38) to fourth stage synchronizing ring bracket(1). Discard cotter pin.
- d. Remove cotter pin(27), nut(28) and bolt(24) securing synchronizing arm(25) to bracket. Discard cotter pin.
- e. Remove cotter pin(32), nut(31), bolt(33) and connecting link(30). Discard cotter pin.
- f. Remove cotter pins(48), nuts(49), bolts(46) securing connecting link(47). Remove connecting link and discard cotter pins.
- g. Remove bolts(45), locks(44), and pins(43) securing bellcrank(42). Remove bellcrank(42).
- h. Remove cotter pin(12), nut(11), bolt(9) and connecting link(10). Discard cotter pin.
- i. Remove cotter pin(20), nut(21) and bolt(13) securing connecting link(14) to synchronizing arm(25). Discard cotter pin.
- j. Remove bolts(19) and stator linkage arm(16).
- k. Remove cotter pin(18), nut(17) and bolt(15) securing connecting link(14) to stator linkage arm(16). Discard cotter pin.
- l. Remove cotter pin(40), nut(39), bolt(4) and connecting link(38). Discard cotter pin.
- m. Slide synchronizing arm(25) from slot in bracket(23) and remove synchronizing arm.
- n. Remove bolts(22) and bracket(23).



12041 (48X2)

Figure 11A. Variable Vanes (With Fixed 6th Stage Vanes) Synchronizing Arm and Linkage - Removal

Legend for figure 11A

1. Bracket	26. Deleted
2. Bolt	27. Cotter pin
3. Cotter pin	28. Nut
4. Bolt	29. Deleted
5. Bolt	30. Connecting link
6. Bracket	31. Nut
7. Cotter pin	32. Cotter pin
8. Nut	33. Bolt
9. Bolt	34. Cotter pin
10. Connecting link	35. Nut
11. Nut	36. Bracket
12. Cotter pin	37. Bolt
13. Bolt	38. Connecting link
14. Connecting link	39. Nut
15. Bolt	40. Cotter pin
16. Stator linkage arm	41. Nut
17. Nut	42. Bellcrank
18. Cotter pin	43. Pin
19. Bolt	44. Lock
20. Cotter pin	45. Bolt
21. Nut	46. Bolt
22. Bolt	47. Connecting link
23. Bracket	48. Pin
24. Bolt	49. Nut
25. Synchronizing arm	

13. FOURTH, FIFTH, AND SIXTH STAGE SYNCHRONIZING RING BRACKETS - REMOVAL.

(See Figure 12.)

NOTE

- These instructions apply to both sides of module.
 - Some engines may have fixed sixth stage vanes and no synchronizing ring brackets.
- a. Remove fourth stage synchronizing ring bracket(3, figure 12) as follows:
 - (1) Remove four bolts(1) and key washers(2) securing bracket(3) to fourth stage vane synchronizing rings(4). Discard key washers.
 - (2) Remove bracket(3).

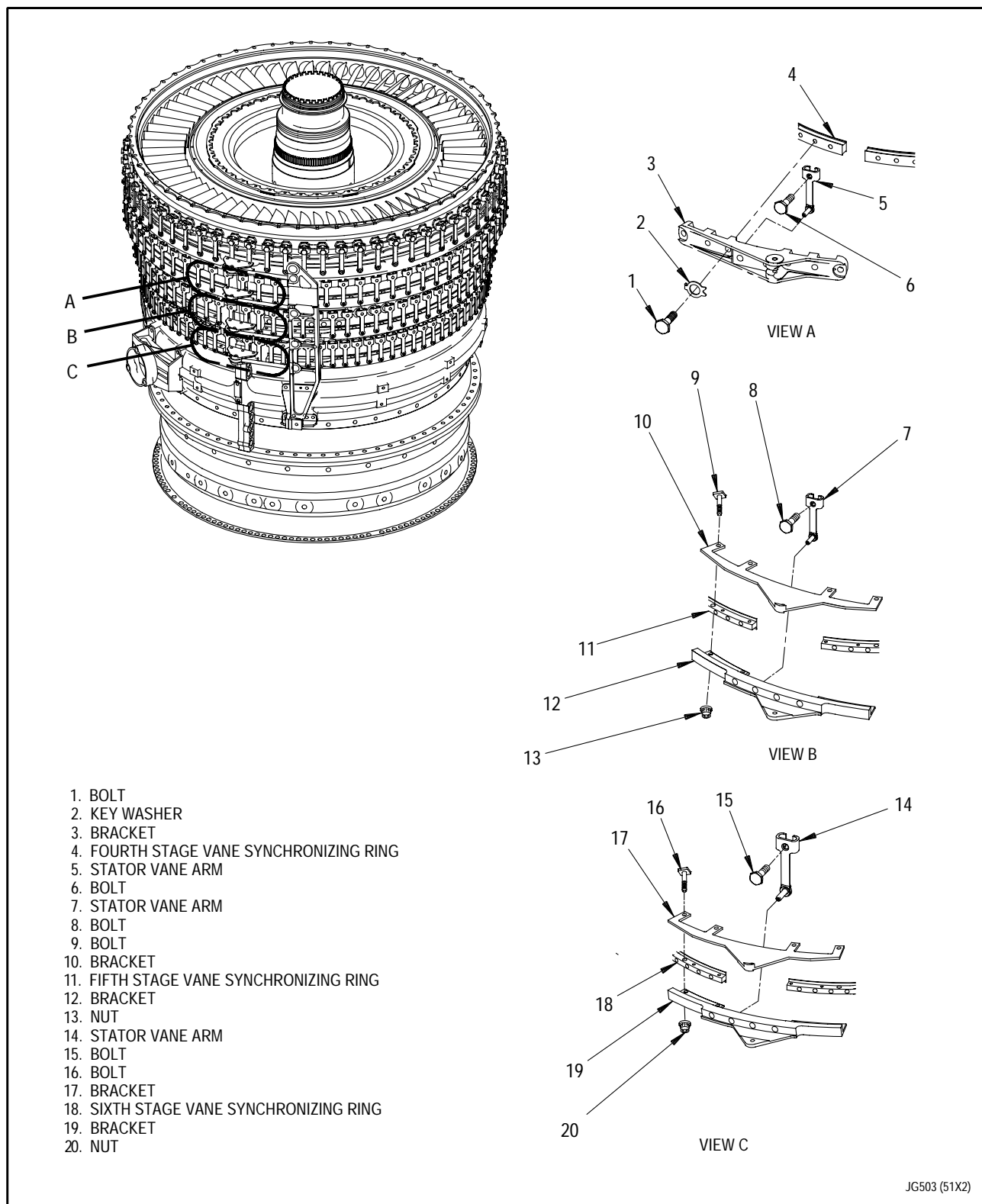


Figure 12. Fourth, Fifth, and Sixth Stage Synchronizing Ring Brackets - Removal

- b. Remove fifth stage synchronizing ring brackets(10 and 12) as follows:

(1) Remove four bolts(9) and nuts(13) securing brackets(10 and 12) to fifth stage vane synchronizing rings(11). Remove bracket(10).

(2) Remove bracket(12).

- c. Remove sixth stage synchronizing ring brackets (17 and 19) as follows:

(1) Remove four bolts(16) and nuts(20) securing brackets(17 and 19) to sixth stage vane synchronizing rings(18). Remove bracket(17).

(2) Remove bracket(19).

14. FOURTH THROUGH NINTH STAGE CASE - REMOVAL.

(See Figure 13.)

- a. Remove eight bolts(7, figure 13) at Flange S securing upper and lower fourth through ninth stage case(3 and 9) to tenth through twelfth stage case(8).

- b. Remove nuts(2) on forward side of Flange P securing upper and lower fourth through ninth stage case(3 and 9) to fourth stage case(1).

- c. Using non-metallic drift and mallet, tap bolts(5) rearward to clear flange of fourth stage case(1).



- Do not turn horizontal split line flange bolts. Loosen nuts only.
 - Do not pry anywhere on fourth through ninth stage case.
- d. Remove nuts(10) and using non-metallic drift and mallet, tap bolts(6) out securing R/H and L/H horizontal split line flanges.

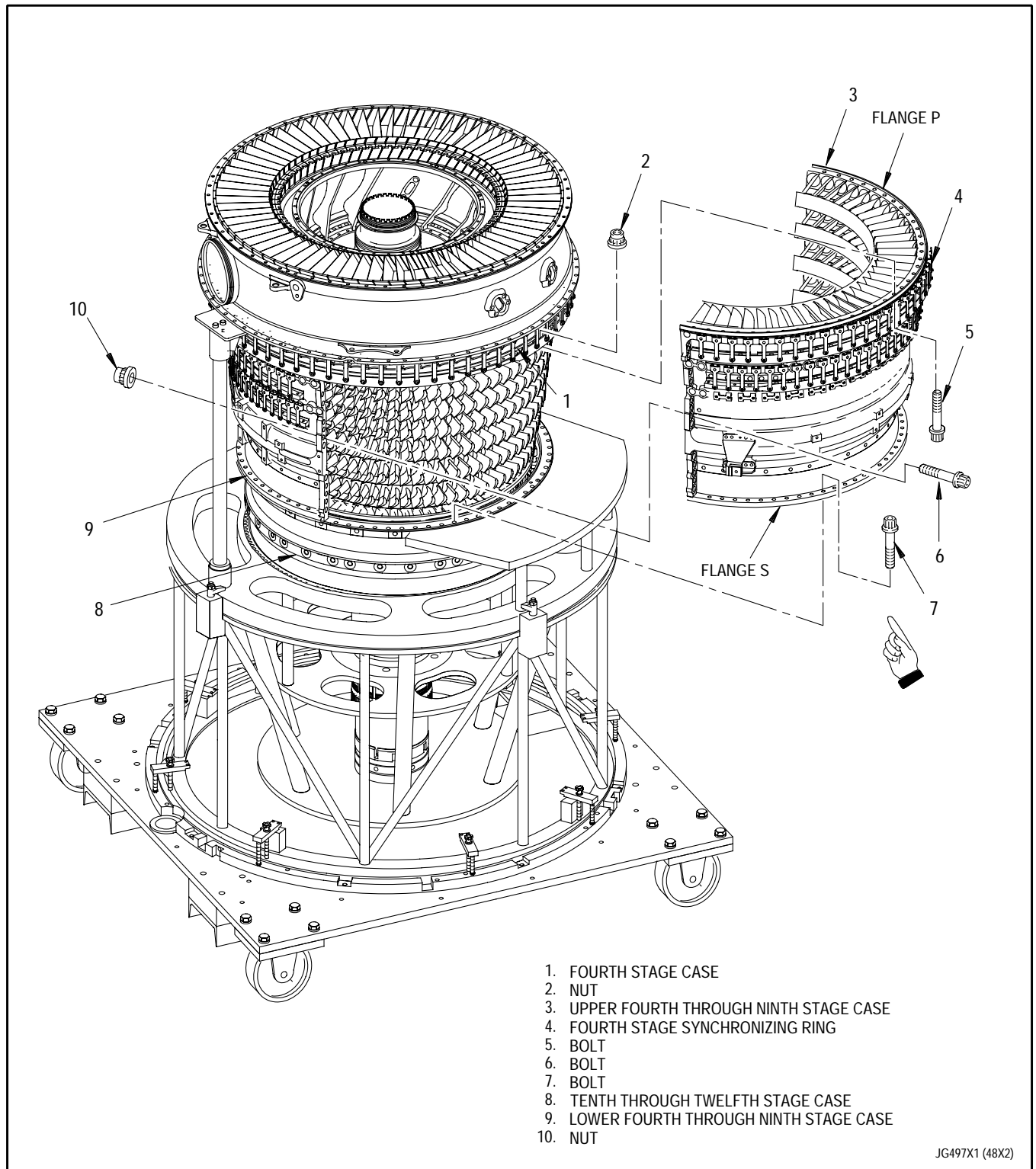


Figure 13. Fourth Through Ninth Stage Case - Removal

- e. Install PWA 57722 build stand, detail-32 support plate assemblies on build stand.
- f. Rotate fourth stage synchronizing ring(4) to position vane arms straight up and down.



Failure to prevent ninth stage stator segments from falling from fourth through ninth stage case as case is removed can result in damage to segments.

- g. Slide upper fourth through ninth stage case(3) out onto PWA 57722 build stand, detail-32 support plate assembly. Ensure ninth stage stator segments do not fall from case. If necessary, use a non-metallic drift and mallet to separate cases, but do not pry anywhere on case.
- h. Attach PWA 14175 lifting sling to upper fourth through ninth stage case(3). Using hoist, remove case from PWA 57722 build stand while holding ninth stage stators. Remove PWA 14175 lifting sling.
- h1. Visually inspect 7th through 9th stage stators for antirotation lug tack weld cracks and protruding lugs per WP 355 00.
- h2. Prod each antirotation lug from rear side of stator using a small instrument. Movement of lug or protrusion from forward side of stator indicates cracked tack welds. No cracks allowed.
- i. Slide lower fourth through ninth stage case(9) out onto PWA 57722 build stand, detail-32 support plate assembly. Ensure ninth stage stator segments do not fall from case. If necessary, use a non-metallic drift and mallet.
- j. Attach PWA 14175 lifting sling to lower fourth through ninth stage case(9). Using hoist, remove case from PWA 57722 build stand while holding ninth stage stators. Remove PWA 14175 lifting sling.
- j1. Visually inspect 7th through 9th stage stators for antirotation lug tack weld cracks and protruding lugs per WP 355 00.
- j2. Prod each antirotation lug from rear side of stator using a small instrument. Movement of lug or protrusion from forward side of stator indicates cracked tack welds. No cracks allowed.
- k. Remove PWA 57722 build stand, detail-32 support plate assemblies from build stand.

15. INTERMEDIATE CASE - REMOVAL.

(See Figure 14.)

NOTE

If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.

- a. Remove fourth stage compressor duct segments(5, figure 14) at 2, 6, and 10 o'clock positions by pulling radially outward and down.
- a1. Remove duct segments(5) at 4, 8, and 12 o'clock positions by pulling radially outward and down.

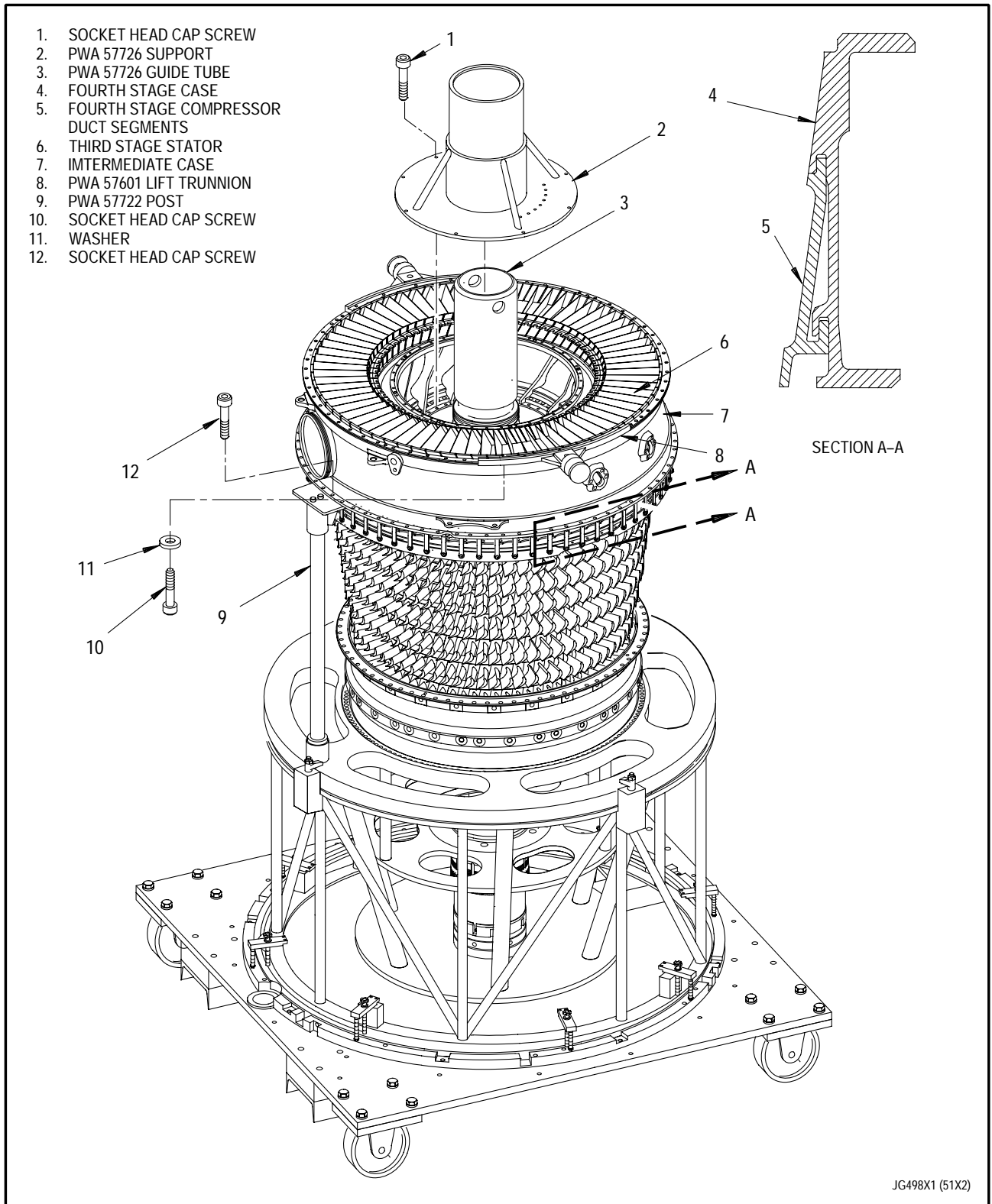


Figure 14. Intermediate Case - Removal

- b. Install PWA 57726 intermediate case guide as follows:
- (1) Thread detail-1 guide tube(3) onto front hub of rear compressor rotor.
 - (2) Slide detail-2 support(2) over detail-1 guide tube(3) and lower onto intermediate case(7) aligning dowel pin in case with dowel pin hole in support.
 - (3) Secure detail-2 support(2) to intermediate case(7) with eight detail socket head cap screws(1).



Be careful not to damage No. 3 bearing air seal when removing intermediate case. Knife edges of air seal are easily damaged.

NOTE

Two technicians, 180 degrees apart, can remove intermediate case by hand, otherwise lift tooling must be used.

- c. Install intermediate case lift tooling as follows:
- (1) Position PWA 57601 lift trunnions(8) on front side of third stage stator(6). Secure with 10 detail washers(11) and socket head cap screws(10) through intermediate case(7) and third stage stator(6).

- (2) Install PWA 26147 adapters on PWA 57601 trunnions(8).
- (3) Attach PWA 56336 sling to hoist with PWA 2388 hook.
- (4) Attach PWA 56336 sling to PWA 26147 adapters and take up slack in sling cables.

- d. Remove detail socket head cap screws(12) securing posts(9) of PWA 57722 build stand, to rear flange of intermediate case(7).
- e. Raise intermediate case(7) until PWA 57726 intermediate case guide, detail-2 support(2) clears detail-1 guide tube(3) and remove intermediate case(7).
- f. Remove PWA 57601 lift trunnions and PWA 57726 intermediate case guide.

16. NO. 3 BEARING REAR AIR SEAL - REMOVAL.

(See Figure 15.)



Be careful when removing air seal. Knife-edges are easily damaged.

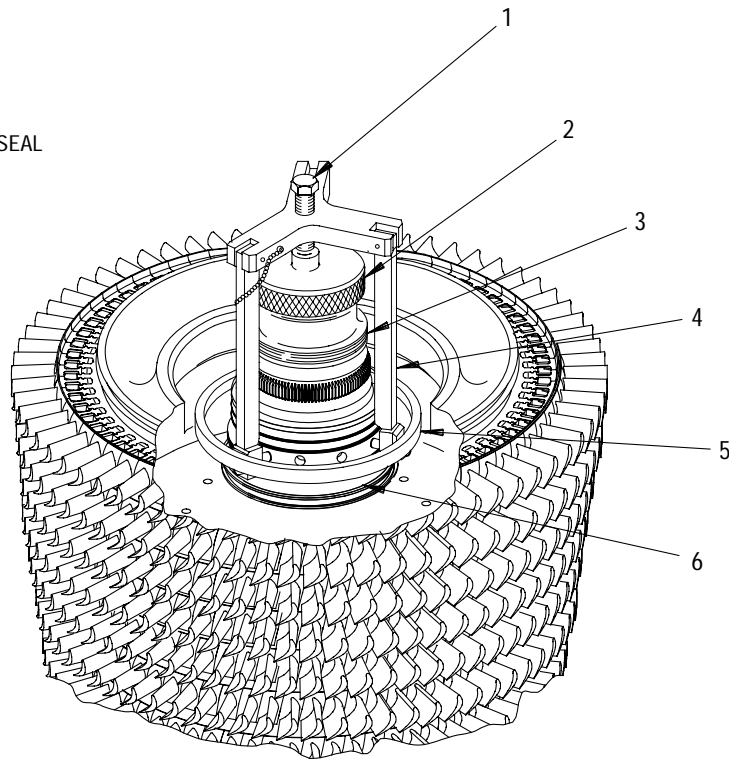
- a. Install PWA 51678 puller, detail-5 adapter(2, figure 15) on rear compressor rotor assembly front hub(3).

b. Engage detail-8 arms(4) with holes in No. 3 bearing rear air seal(6).

d. Tighten detail-2 cap screw(1) to remove air seal(6).

c. Slide detail-4 ring(5) down to hold detail-8 arms(4).

- 1. CAP SCREW
- 2. ADAPTER
- 3. FRONT HUB
- 4. ARM
- 5. RING
- 6. NO. 3 BEARING REAR AIR SEAL



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Figure 15. No. 3 Bearing Rear Air Seal - Removal

**17. TENTH THROUGH TWELFTH STAGE
CASE AND STATOR SEGMENTS - REMOVAL.**

(See Figures 16 through 19.)

- a. Bend tabs of key washers(6, figure 16) away from heads of bolts(7). Loosen bolts, but do not remove at this time.
- b. Bend tabs of key washers(11) away from heads of bolts(10). Remove bolts and key washers. Discard key washers.
- c. Secure PWA 57722 build stand, detail-25 bracket assemblies(9) to Flange S of tenth through twelfth stage case(8) with detail socket head cap screws(2).
- d. Apply lubricating oil to compressor stator support ring segments(1).
- e. Tap ring segments(1) with a drift and hammer to ensure ring segments are loose.

NOTE

To prevent ring segments from hanging on hooks of stators, ring segments must be secure against case prior to raising tenth through twelfth stage case.

- f. Tighten bolts(7) to secure ring segments(1) to tenth through twelfth stage case(8).
- g. Install six jackscrews in Flange T of tenth through twelfth stage case(8). Tighten jackscrews evenly to break snap fit of tenth through twelfth stage case to compressor stator support. Remove jackscrews.
- h. Loosen bolts(7).
- i. Raise tenth through twelfth stage case(8) by lifting PWA 57722 build stand, detail-25 bracket assemblies(9) and secure in middle position with detail ball lock pins(3).
- j. Remove bolts(7), key washers(6), and compressor stator support ring segments(1). Discard key washers.

- k. Remove PWA 57722 build stand, detail ball lock pins(3) and raise detail-25 bracket assemblies(9) to upmost position and secure with detail ball lock pins.
- l. Using silver pencil, mark tenth through twelfth stage stator segments(1, figure 17) 1 to 12 in a clockwise direction as viewed from rear with stator segment No. 1 located at 12 o'clock position.
- m. Deleted.
- n. Deleted.
- o. Deleted.
- p. Remove bolts(2) securing stator segments(1) to compressor stator support(4).
- q. Remove stator segments(1) from compressor stator support.
- r. Deleted.
- r1. Visually inspect stator segments for antirotation lug tack weld cracks and protruding lugs per WP 352 00.
- r2. Prod each antirotation lug from rear side of stator segment using a small instrument. Movement of lug or protrusion from forward side of stator segment indicates cracked tack welds. No cracks allowed.
- s. Remove seals(3) from between stator segments(1). Discard seals.
- t. If required, install stator segments, typical PN 4077920 into PWA 57739 fixture for removal of shrouds and damper springs as follows:
 - (1) Place PWA 57739 fixture on flat work surface with detail-13 plate(3, figure 18A) down.
 - (2) Remove three detail-14 knobs(5) and detail-15 clamps(6).
 - (3) Loosen three detail-12 knobs(2) and rotate stator segment under detail-5(1) and -6 clamps(7).

(4) Insert pin(8) into stop in aft flange of stator segment.

(5) Hand tighten detail-12 knobs(2).

WARNING

Leather gloves should be worn when handling ID tip shrouds to avoid injury to hands.

CAUTION

- If tip shroud binds during removal, force shall not be used. Lightly tap shroud back on and begin removal again. Excessive force can cause damage to engine hardware.
 - Avoid contact between drift and honeycomb portion of tip shroud. Contact can cause damage to engine hardware.
- (6) Forward looking aft, remove tip shrouds left to right. See figure 18A.
- (7) Apply lubricating oil NSN 9150-00-905-1387 (Aero Kroil) to mating surfaces of 10th stage shroud and stator segment.
- (8) Using leather gloves, remove 10th stage tip shroud by pressing on shroud to compress damping spring then sliding shroud out of slots in stator segment. If shroud cannot be removed, tap shroud lightly with nonmetallic drift and hammer until shroud can be removed by hand.
- (9) Remove and discard damping spring.

(10) Repeat steps 7 and 8 for 11th and 12th stage tip shrouds.

(11) Remove stator segment from fixture.

- u. Deleted.
- v. Remove detail ball lock pins(3, figure 16) and lower 10th through 12th stage case(8) down onto compressor stator support(5).
- w. Remove PWA 57722 stand, detail socket head cap screws(2) securing detail-25 bracket assemblies(9) to Flange S of 10th through 12th stage case(8). Lower case.
- x. Remove stand posts.
- y. Install PWA 57938 fixture(2, figure 19) on front hub(3) of rear compressor rotor assembly(4).
- z. Attach PWA 26584 arm(1) to hoist.
- aa. Attach PWA 26584 arm(1) to PWA 57938 fixture(2). Lift rear compressor rotor assembly(4) from PWA 57722 stand(7).
- ab. Remove 10th through 12th stage case(5) and compressor stator support(6) from PWA 57722 stand(7).
- ac. Lower rear compressor rotor assembly(4) into PWA 57722 stand(7). Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate.

ad. Remove PWA 26584 arm(1) and
PWA 57938 fixture(2).

ae. Apply penetrating oil to
bladlock setscrews in
8th through 13th stage of
compressor rotor.

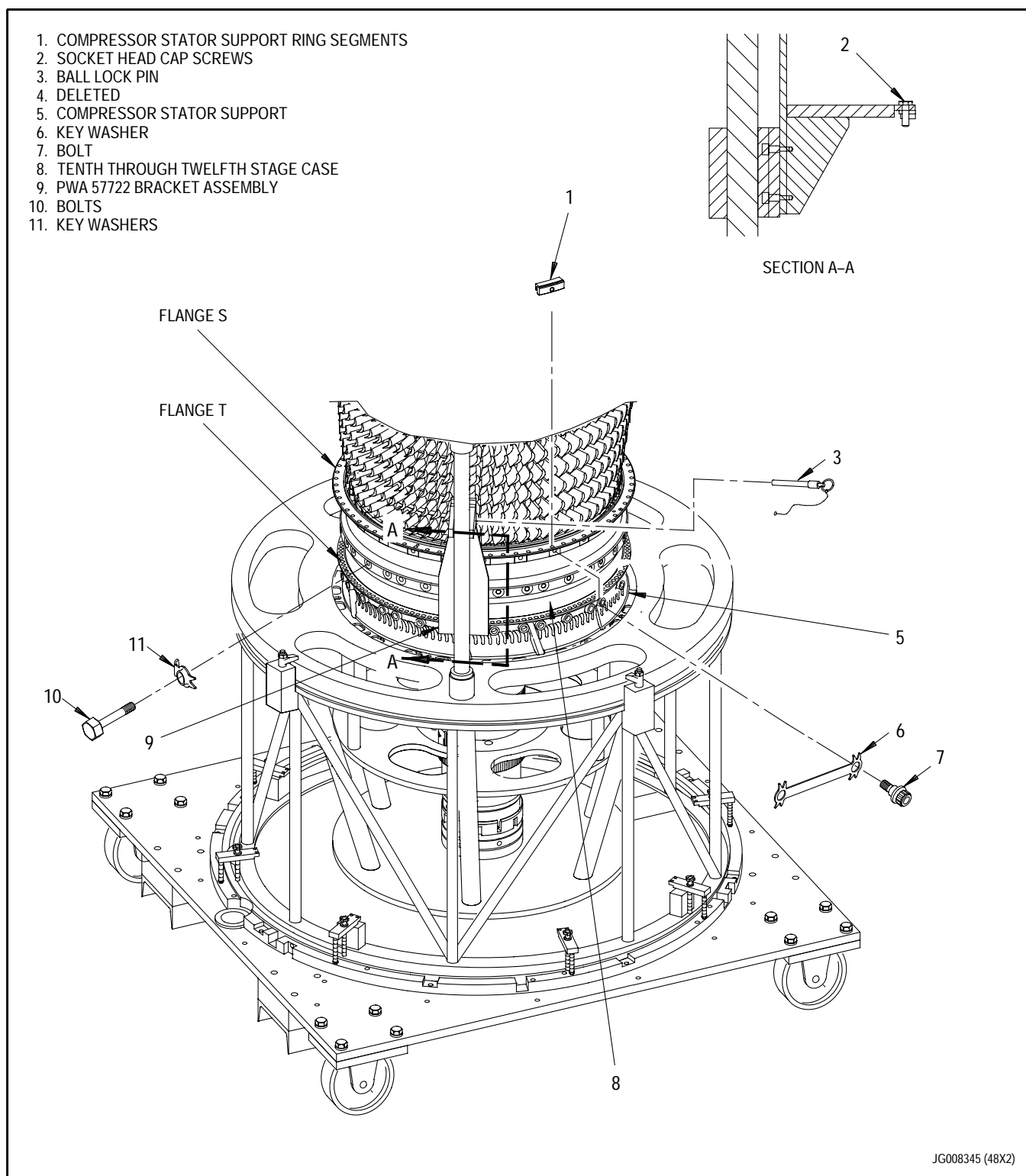


Figure 16. Tenth Through Twelfth Stage Case - Removal

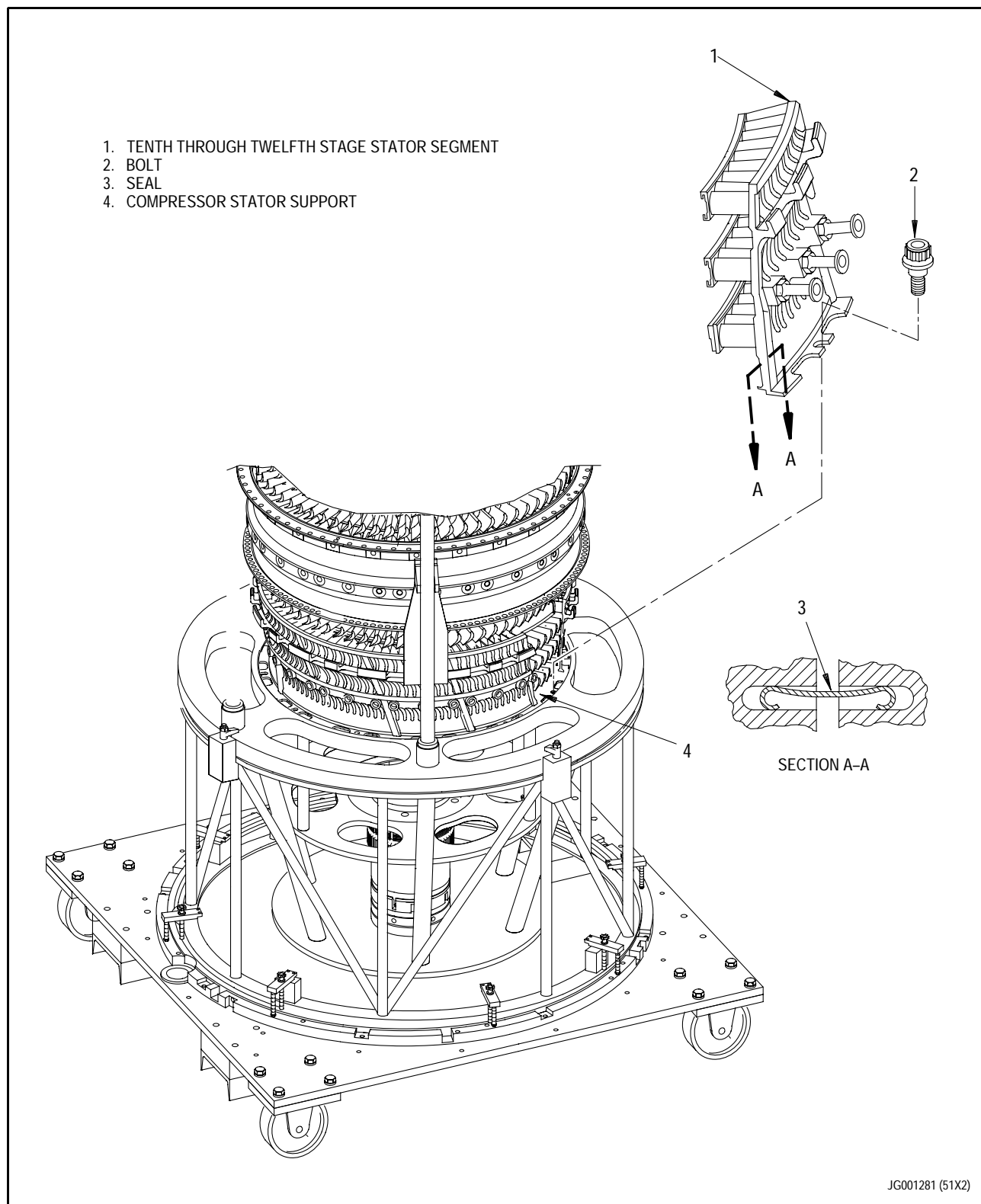


Figure 17. Tenth Through Twelfth Stage Stator Segments - Removal

Figure 18. Deleted.

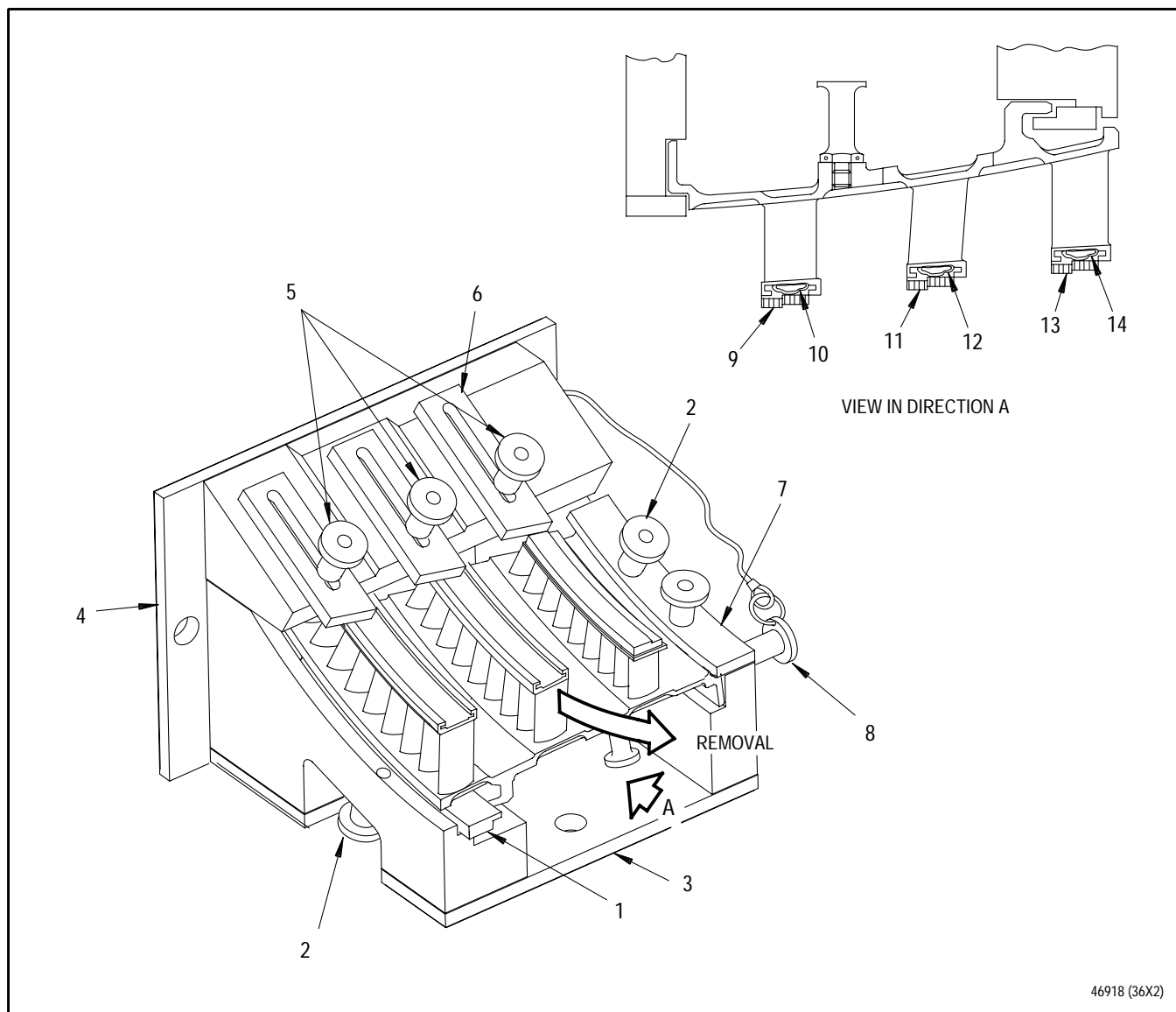


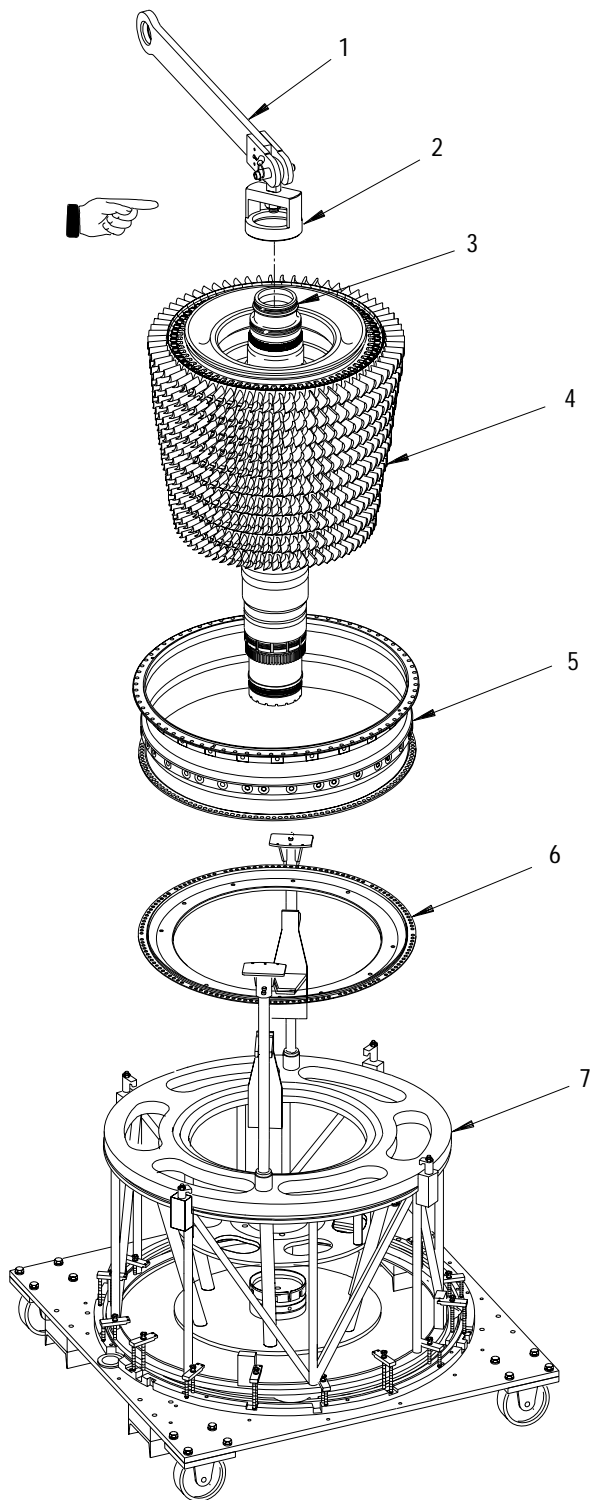
Figure 18A. Tenth Through Twelfth Stage Stator Segments -
Damper and Shroud Removal Using PWA 57739 Fixture

Legend for figure 18A.

1. Detail-5 clamp
2. Knurl knob
3. Detail-13 plate
4. Detail-1 base
5. Detail-14 knurl knob
6. Detail-15 clamp
7. Detail-6 clamp
8. Quick release pin
9. 12th stage shroud
10. 12th stage damping spring
11. 11th stage shroud
12. 11th stage damping spring
13. 10th stage shroud
14. 10th stage damping spring

Legend for figure 19

1. PWA 26584 arm
2. PWA 57938 fixture
3. Front hub
4. Rear compressor rotor assembly
5. 10th through 12th stage case
6. Compressor stator support
7. PWA 57722 stand



109781 (48X2)

Figure 19. Tenth Through Twelfth Stage Case and Compressor Stator Support - Removal from PWA 57722 Stand

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

DISASSEMBLY OF SUBASSEMBLIES

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2		23			

1. INTRODUCTION.

- a. This work package introduces the 020 00 through 199 00 series of work packages for disassembling core engine module subassemblies. The following work packages are included in this series:

WP/SWP No.	Title
021 00	Seal and Support Assembly, No. 2 Bearing - Disassembly
022 00	Housing, Assembly of, No. 2 Bearing - Disassembly
023 00	Seal Assembly, No. 2 and 3 Bearing - Disassembly
024 00	Bearing and Coupling, No. 2 - Disassembly
025 00	Gearshaft Assembly, Gearbox Drive Bevel - Disassembly
026 00	No. 3 Bearing, No. 3 Bearing Support and Gearbox Drive Bevel Gear (No. 3 Bearing Package) - Disassembly
027 00	Seal Assembly, No. 3 Bearing Rear - Disassembly
028 00	Case Assembly, Compressor Intermediate - Disassembly
029 00	Case Assembly, Diffuser - Disassembly
030 00	Seal Assembly, No. 4 Bearing Front (and Air Sealing Ring) - Disassembly
031 00	Housing, No. 4 Bearing and Race, Outer - Disassembly
032 00	Seal Assembly, No. 4 Bearing Rear - Disassembly
033 00	Chamber - Combustion, Vanes and Support, First Stage Turbine Stator - Disassembly
033 01	Chamber - Combustion; Vanes and Support, First Stage Turbine Stator; and Front Turbine Case - Disassembly
034 00	Case and Stator Assembly, Rear Compressor Fourth through Ninth Stage - Disassembly
035 00	Rotor Assembly, Rear Compressor - Disassembly
036 00	Open
through 199 00	

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL AND SUPPORT ASSEMBLY, NO. 2 BEARING -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 2 bearing seal and support assembly.

2. NO. 2 BEARING SEAL AND SUPPORT ASSEMBLY - DISASSEMBLY.

(See Figure 1.)

- a. Place No. 2 bearing seal and support assembly(7, figure 1) on bench with carbon seal facing up.
- b. Carefully depress face seal assembly(1) and remove cotter pins(3).
- c. Remove face seal assembly(1) and guides(2).
- d. Remove spring washer(5) and metal seal ring(6) from groove in face seal assembly(1).
- e. Remove springs(4) from support assembly(7).
- f. For local (in-house) handling, protect face seal assembly by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place face seal assembly in a cardboard box.
- g. For shipping, protect face seal assembly with a cardboard collar. Refer to T.O. 2-1-111.

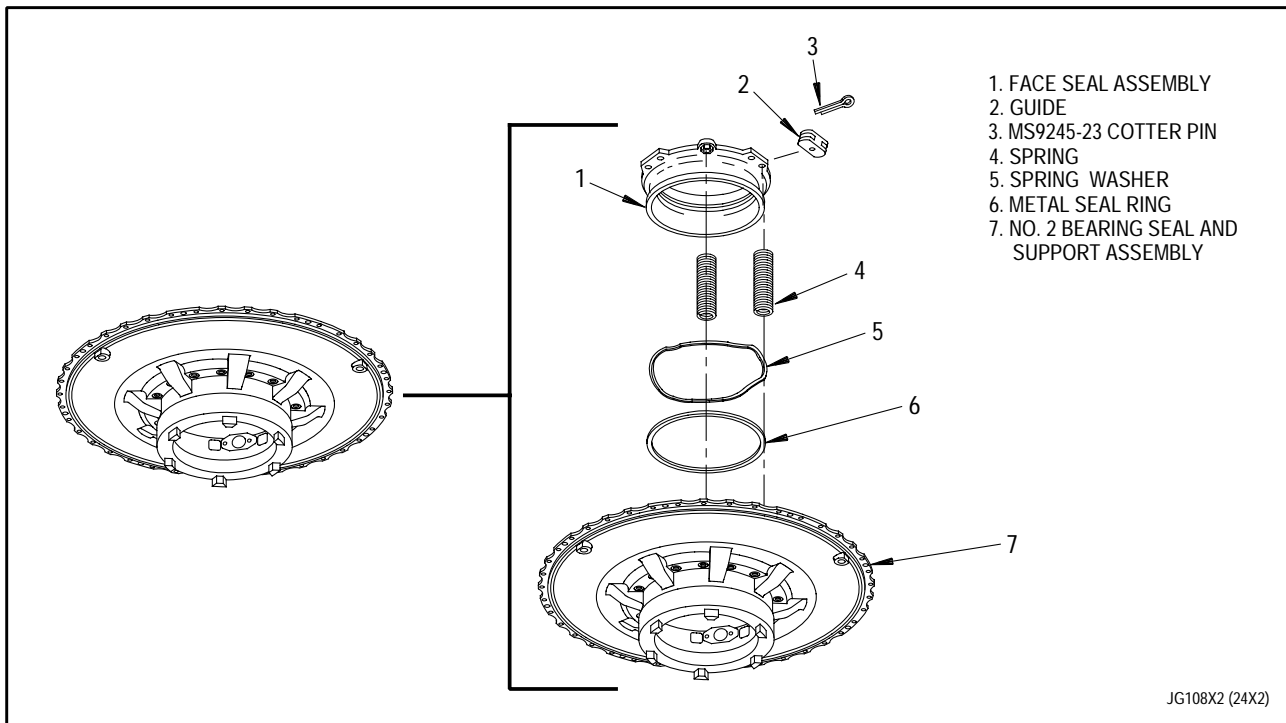


Figure 1. No. 2 Bearing Front Seal Assembly - Disassembly

3. NO. 2 BEARING NOZZLE - REMOVAL.

(See Figure 2.)

- a. Remove No. 2 bearing nozzle(2, figure 2) as follows:

(1) Remove two bolts(5) and washers(4) securing nozzle(2) to support assembly(1).

(2) Remove nozzle(2) from support assembly(1).

(3) Remove and discard packing(3) from nozzle(2).

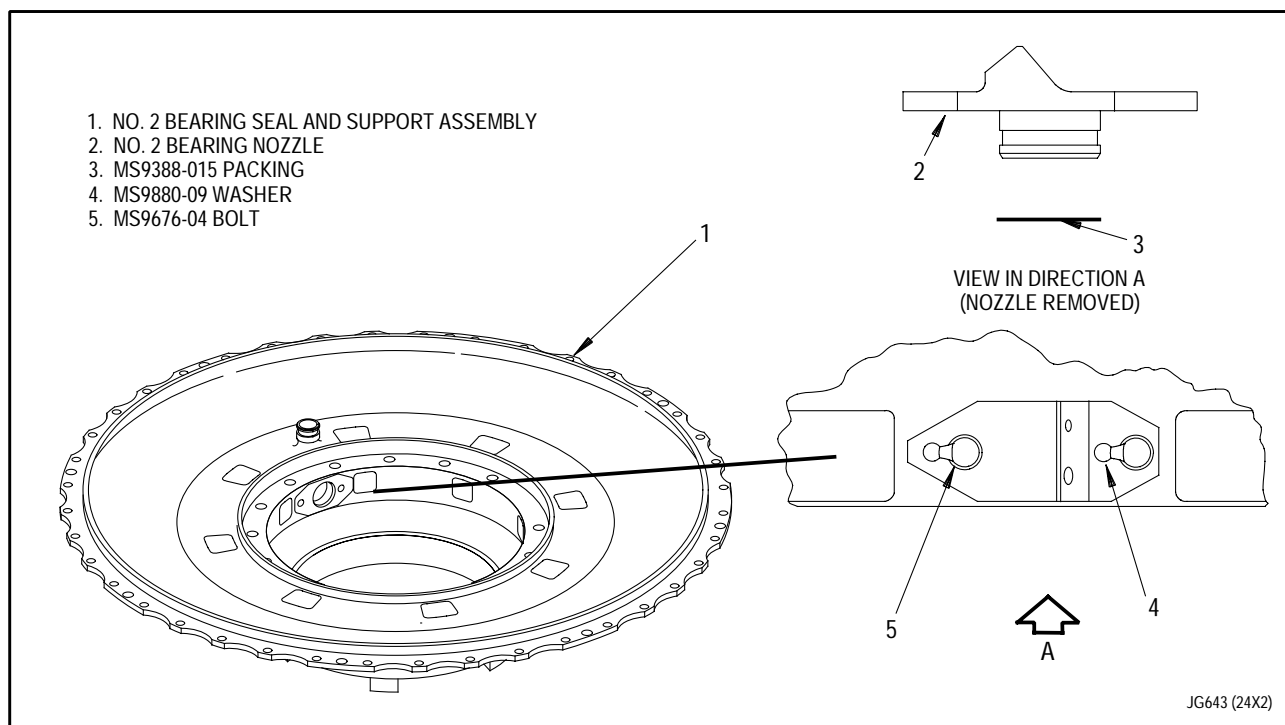


Figure 2. No. 2 Bearing Nozzle - Removal

WORK PACKAGE

TECHNICAL PROCEDURES

**HOUSING ASSEMBLY, NO. 2 BEARING -
DISASSEMBLY**

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1		1			
2 - 7		0			
8		1			
9 - 10		0			

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

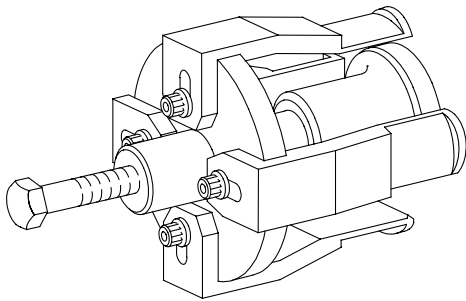
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

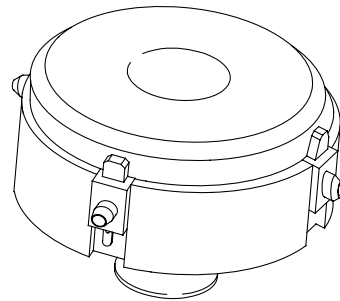
Paragraph	Function - Tool Nomenclature	Tool Number
3	No. 2 Bearing and Coupling - Removal	
	Support, No. 2 Bearing - - - - -	PWA 50862
	Drift, No. 2 Bearing Outer Race - - - - -	PWA 50863
4	Gearbox Drive Bevel Gearshaft Assembly - Removal	
	Puller, Gearshaft Bearing Outer Race - - - - -	PWA 50681
	Wrench, Gearshaft Outer Race Retaining Nut -	PWA 50682
	Puller, Gearbox Drive Bearing Housing - - - - -	PWA 50701
	Fixture, No. 2 Bearing Housing - - - - -	PWA 51823

ILLUSTRATED SUPPORT EQUIPMENT



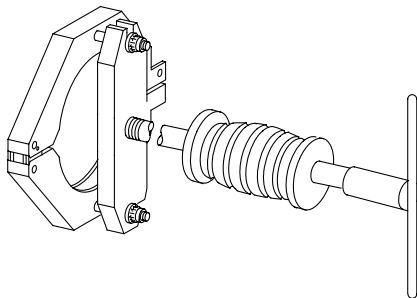
PWA 50681

Figure T1. PWA 50681 Puller



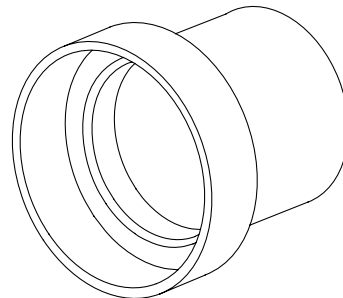
PWA 50682 -C

Figure T2. PWA 50682 Wrench



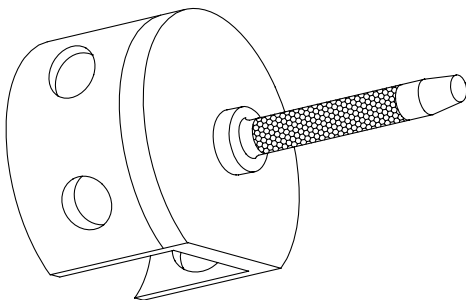
PWA 50701 -C

Figure T3. PWA 50701 Puller



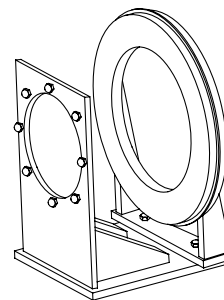
PWA 50862 -C

Figure T4. PWA 50862 Support



PWA 50863 -C

Figure T5. PWA 50863 Drift



PWA 51823 -C

Figure T6. PWA 51823 Fixture

1. INTRODUCTION.

a. This work package contains instructions for disassembling the No. 2 bearing housing assembly (No. 2 bearing package). The following parts are removed:

- No. 2 and 3 bearing seal assembly
- No. 2 bearing and coupling
- Gearbox drive bevel gearshaft assembly

2. NO. 2 AND 3 BEARING SEAL ASSEMBLY - REMOVAL.

(See Figure 1.)

- a. Place the No. 2 bearing housing (No. 2 bearing package) on bench so that carbon seal is accessible.
- b. Remove bolts(7, figure 1) securing No. 2 and 3 bearing seal assembly.
- c. Remove seal assembly; then place it in a protective container.
- d. For local (in-house) handling protect the seal by placing it between two pieces of styrofoam wrapped in plastic. Tape around the open ends and place seal assembly in a cardboard box.
- e. For shipping, protect seal with a cardboard collar. Refer to T.O. 2-1-111.

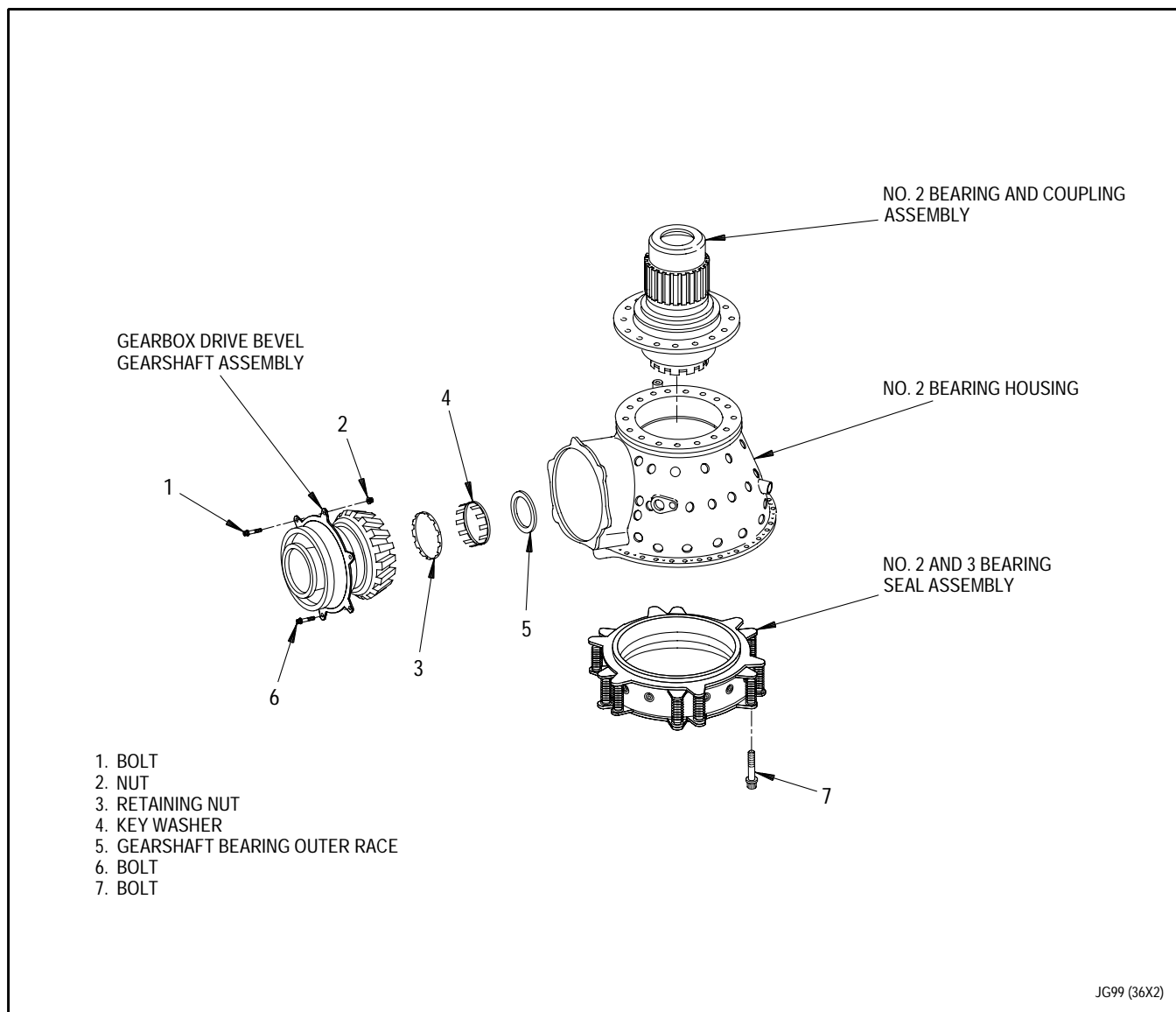


Figure 1. No. 2 Bearing Package - Disassembly

**3. NO. 2 BEARING AND COUPLING -
REMOVAL.**

(See figure 1 and Figure 2.)

NOTE

Sometimes the No. 2 bearing and coupling can be removed by hand. If the No. 2 bearing and coupling cannot be removed by hand use the procedure in this paragraph.

- a. Remove workbolts (previously installed during core engine module disassembly) securing No. 2 bearing and coupling (figure 1) to No. 2 bearing housing.

- b. Install bearing housing(2, figure 2) with coupling(5) down in PWA 50862 support(4).
- c. Install PWA 50863 drift(1) so center pilots into ID of turbine shaft coupling.
- d. Tap assembly out with a mallet.

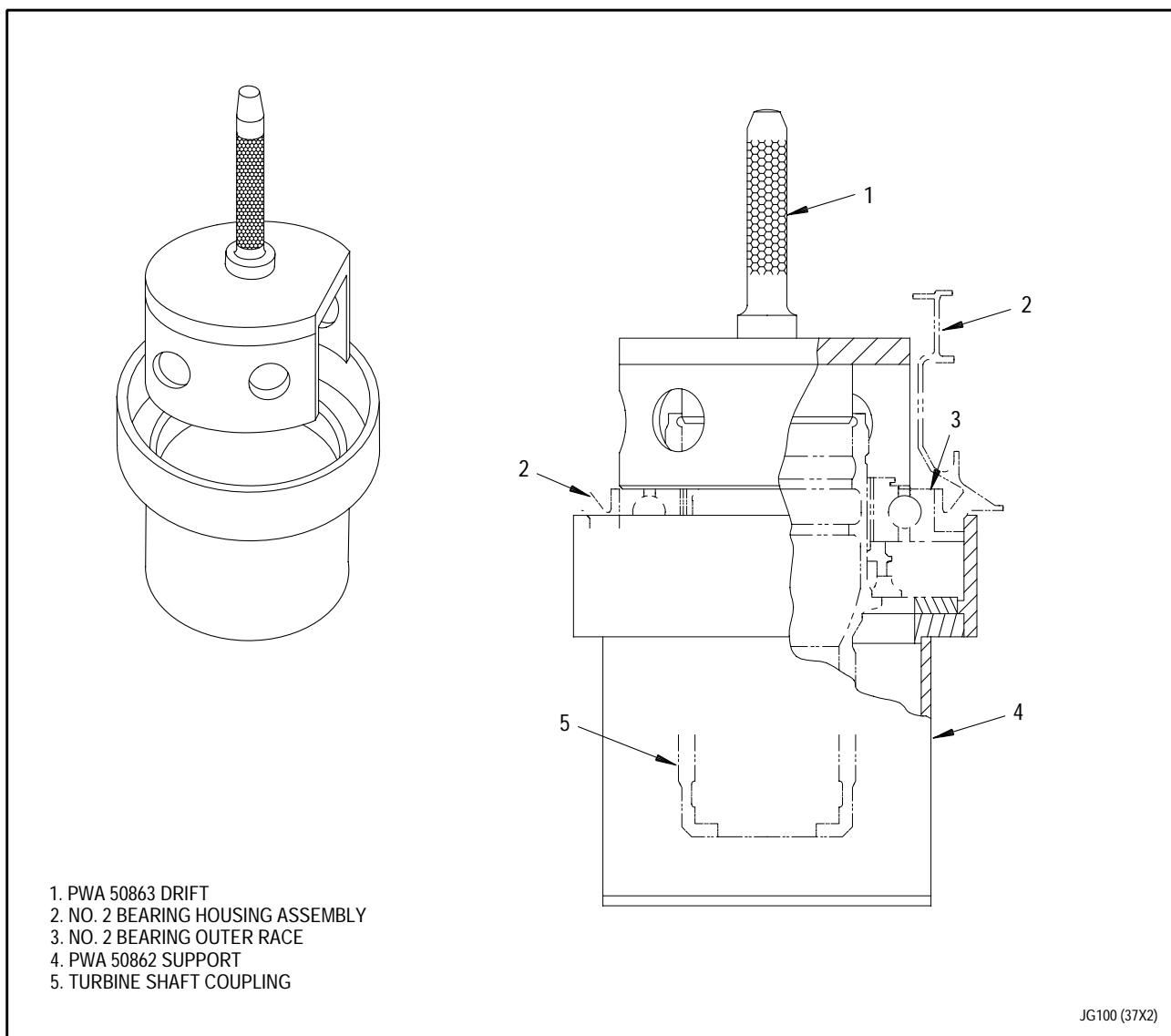


Figure 2. No. 2 Bearing and Coupling - Removal Tooling

4. GEARBOX DRIVE BEVEL GEARSHAFT ASSEMBLY - REMOVAL.

(See figure 1, Figure 3 and Figure 4.)

- a. Install No. 2 bearing housing(4, figure 3) in PWA 51823 fixture so tower shaft boss is up. Install fixture bolts to secure housing. Tighten two bolts at slots on base of fixture ring.
- b. Remove safety wire and bolts(6, figure 1).
- c. Remove bolts(1 and 6, figure 1) and nuts(2) securing bevel gearshaft assembly.
- d. Install split ring(5, figure 3) of PWA 50701 puller around gearbox drive bearing housing(7). Secure with bolt(3) and nut(10).
- e. Install slidehammer(1) and plate(2). Secure with nut(8) and washer(9).
- f. Work slidehammer of PWA 50701 puller to remove gearbox drive bevel gearshaft assembly using care to prevent bearings from falling inside gear. Remove tool.
- g. Wrap an elastic band around gearshaft bearing rollers inside gear to keep them in place.
- h. Bend open tabs of key washer(4, figure 1) securing retaining nut(3).
- i. Install PWA 50682 wrench so teeth engage slots of nut(3). Remove nut(3), turning clockwise, and discard key washer(4).
- j. Install PWA 50681 puller as follows:
 - (1) Loosen socket screws(2, figure 4); slide jaws(3) toward center of puller.
 - (2) Install puller into ID of bearing outer race(4).
 - (3) Slide jaw details outward so they engage outer race(4). Tighten socket screws(2) to secure jaws.
- k. Tighten hex-head bolt(1) to remove outer race(4).
- l. Tag outer race so it will remain matched with roller bearing.

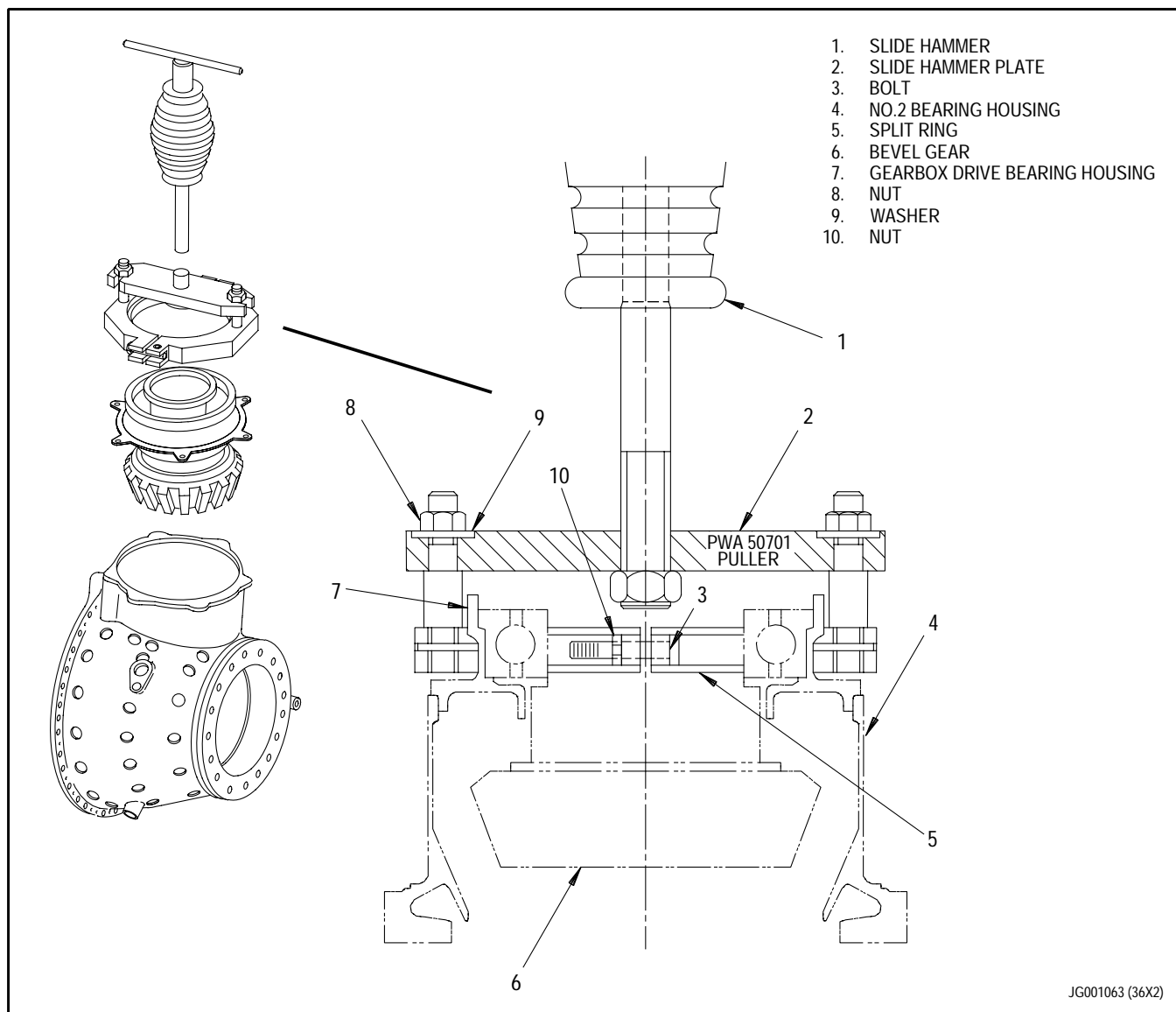


Figure 3. Gearbox Bevel Drivegear Assembly - Removal with PWA 50701 Puller

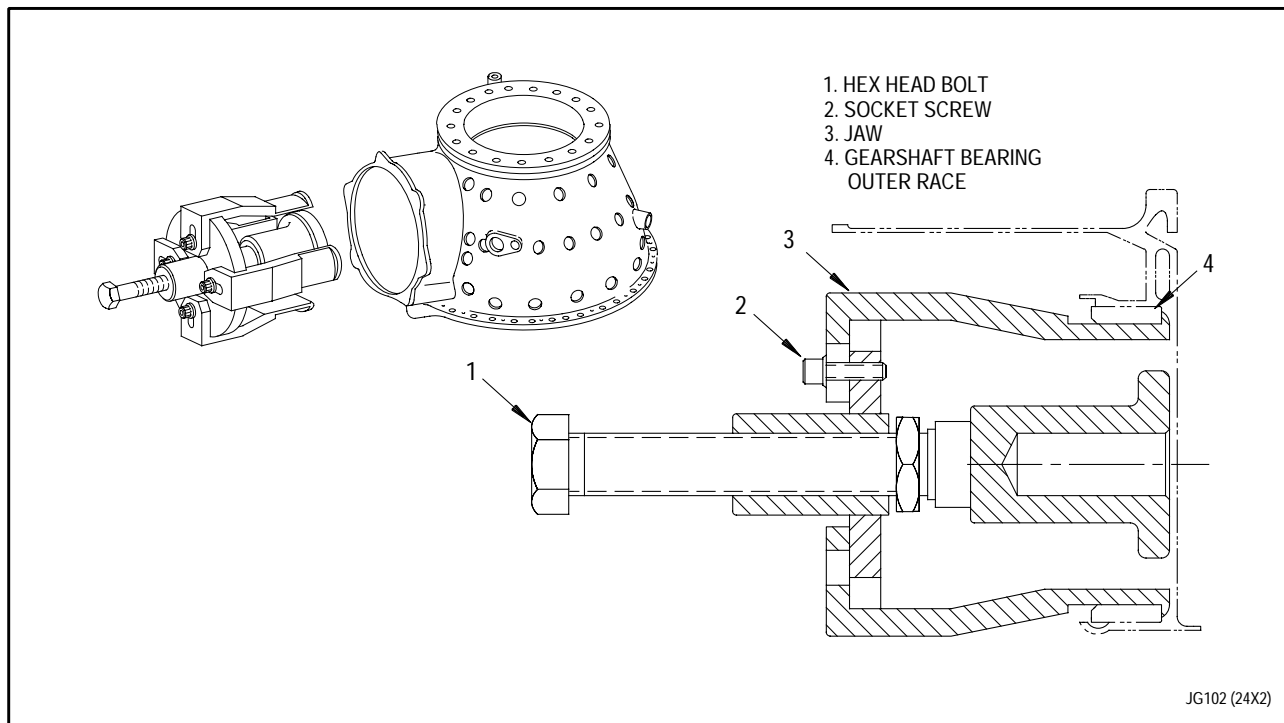


Figure 4. Gearshaft Bearing Outer Race - Removal With PWA 50681 Puller

WORK PACKAGE**TECHNICAL PROCEDURES****SEAL ASSEMBLY, NO. 2 AND 3 BEARING -****DISASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5					
6 Blank					

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 2 and 3 bearing seal assembly.

**2. NO. 2 AND 3 BEARING SEAL ASSEMBLY -
DISASSEMBLY.**

(See Figure 1.)

- a. Place seal assembly on bench with No 2 bearing seal(1, figure 1) up.
- b. Carefully depress seal(1); remove cotter pins(2).
- c. Remove guides(3); remove seal(1) and springs(4).
- d. For local (in-house) handling, protect seal by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal assembly in a cardboard box.
- e. For shipping, protect seal with a cardboard collar. Refer to T.O. 2-1-111.
- f. Place parts in protective containers.
- g. Turn assembly over so that No. 3 bearing seal(7) is up.
- h. Carefully depress seal(7); remove cotter pins(2).
- i. Remove guides(3); remove seal(7) and springs(4).
- j. Remove metal seal ring(6) from groove in No. 3 bearing seal(7).
- k. Place parts in protective containers.

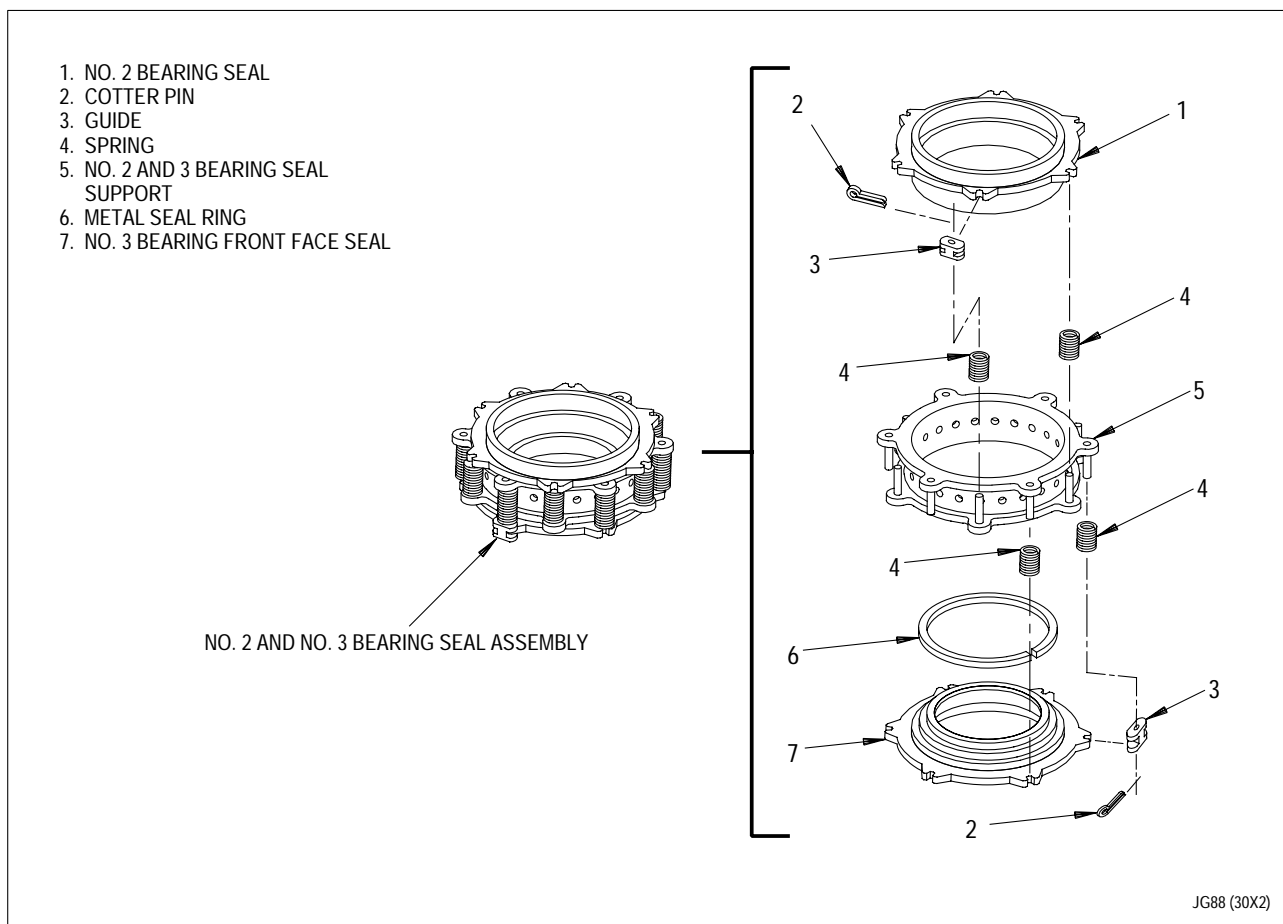


Figure 1. No. 2 and 3 Bearing Seal Assembly - Disassembly

WORK PACKAGE

TECHNICAL PROCEDURES

BEARING AND COUPLING, NO. 2 -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 16

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	26	7 - 8	26	9 - 15	0
6	0			16 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
GLOVES, LINT-FREE	-
OIL, LUBRICATING	MIL-L-7808

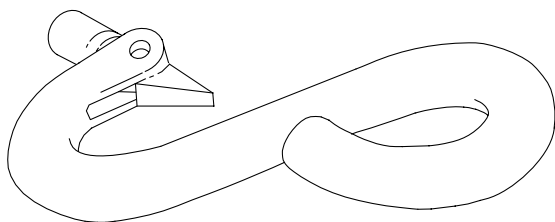
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

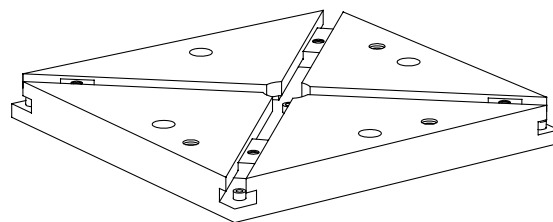
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 2 BEARING RETAINING NUT - REMOVAL	
	BASE, NO.2 BEARING COUPLING - - - - -	PWA 51230
	ADAPTER, HOLDING - - - - -	PWA 21500
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
		OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	WRENCH, NO.2 BEARING INNER RACE RETAINING NUT - - - -	PWA 50604
	ADAPTER, NO.2 BEARING INNER RACE RETAINING NUT - - -	PWA 50603
3	NO. 2 BEARING REAR SEAL SEAT - REMOVAL	
	PULLER, NO.2 BEARING SEAL REAR - - - - -	PWA 50605
4	NO. 2 BEARING - REMOVAL	
	PULLER, NO.2 BEARING SPLIT INNER RACE - - - - -	PWA 50606
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
5	NO. 2 BEARING REAR SCOOP, FRONT SCOOP AND FRONT SEAL - REMOVAL	
	PULLER, NO. 2 BEARING SCOOP, REAR - - - - -	PWA 50607
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380

ILLUSTRATED SUPPORT EQUIPMENT



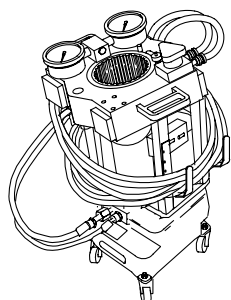
PWA 2388 -C

Figure T1. PWA 2388 HOOK



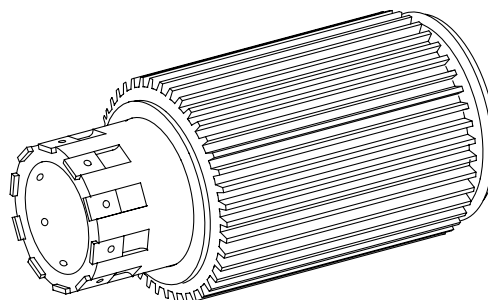
PWA 21500 -C

Figure T2. PWA 21500 ADAPTER



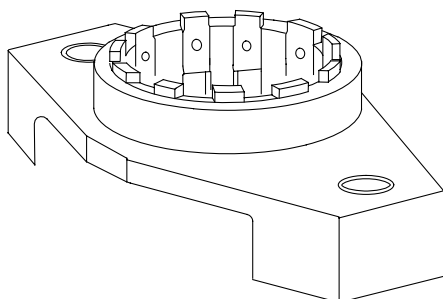
PWA 50308 -C

Figure T3. PWA 50308 WRENCH



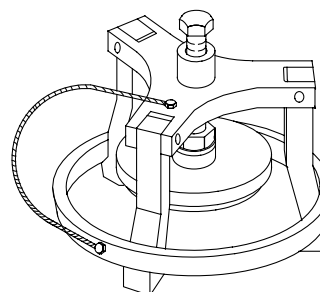
PWA 50603 -C

Figure T4. PWA 50603 ADAPTER



PWA 50604 -C

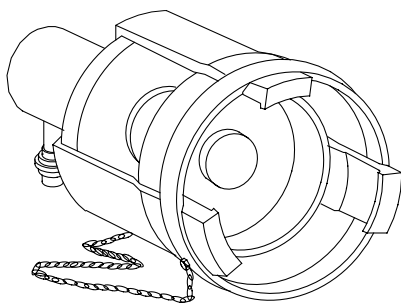
Figure T5. PWA 50604 WRENCH



PWA 50605 -C

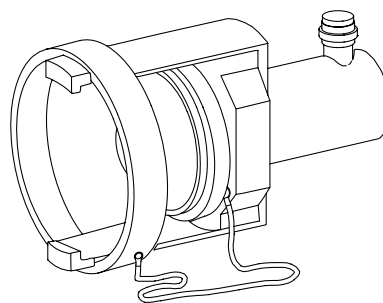
Figure T6. PWA 50605 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



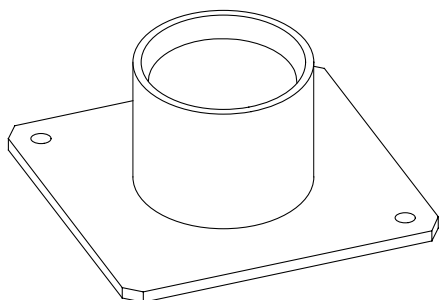
PWA 50606

Figure T7. PWA 50606 PULLER



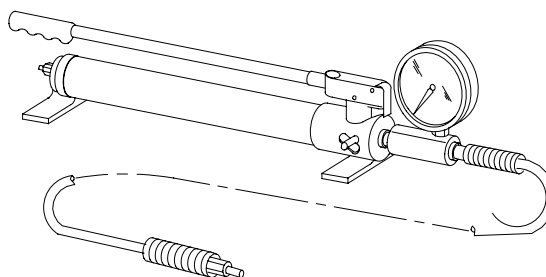
PWA 50607 -C

Figure T8. PWA 50607 PULLER



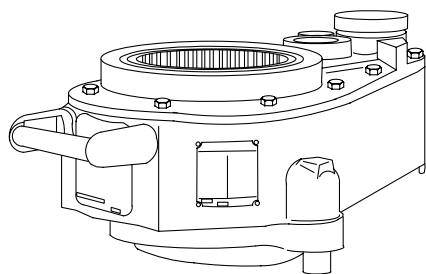
PWA 51230

Figure T9. PWA 51230 BASE



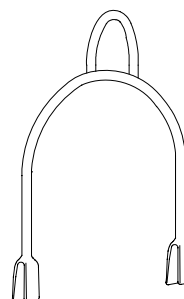
PWA 55380 -C

Figure T10. PWA 55380 PUMP



SWE 8200 -C

Figure T11. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T12. SWE 81001/81002 SLING

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 2 bearing and coupling assembly.

2. NO. 2 BEARING RETAINING NUT - REMOVAL.

(See Figures 1 and 2.)

- a. Install PWA 51230 base onto PWA 21500 adapter.
- b. Install No. 2 bearing and coupling, splined end down, into PWA 51230 base.
- c. Remove retaining ring(11, figure 1) and key washer(10) from retaining nut(9) and coupling(1).
- c1. If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling onto torque multiplier.
- c2. Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 hydraulic wrench or connect PWA 2388 hook to SWE 81001/81002 sling.
- d. Install PWA 50604 wrench, PWA 50603 adapter. Install PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier. Attach ratchet adapter and work handle if SWE 8100/8200 torque multiplier is used. See figure 2.

- e. Ensure indicator tab on wrench is centered before loosening nut. (See figure 2.)



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.

NOTE

- Body of hydraulic wrench or torque multiplier moves to loosen nut. Splines at center of wrench or torque multiplier do not turn. See figure 2.
- Retaining nut has left-hand threads. Turn nut clockwise (right-hand) to loosen it.
- f. Actuate PWA 50308 wrench or SWE 8100/8200 torque multiplier to loosen nut. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
- g. Remove wrench or torque multiplier using hoist with nylon strap or sling respectively. Remove tooling; remove retaining nut.

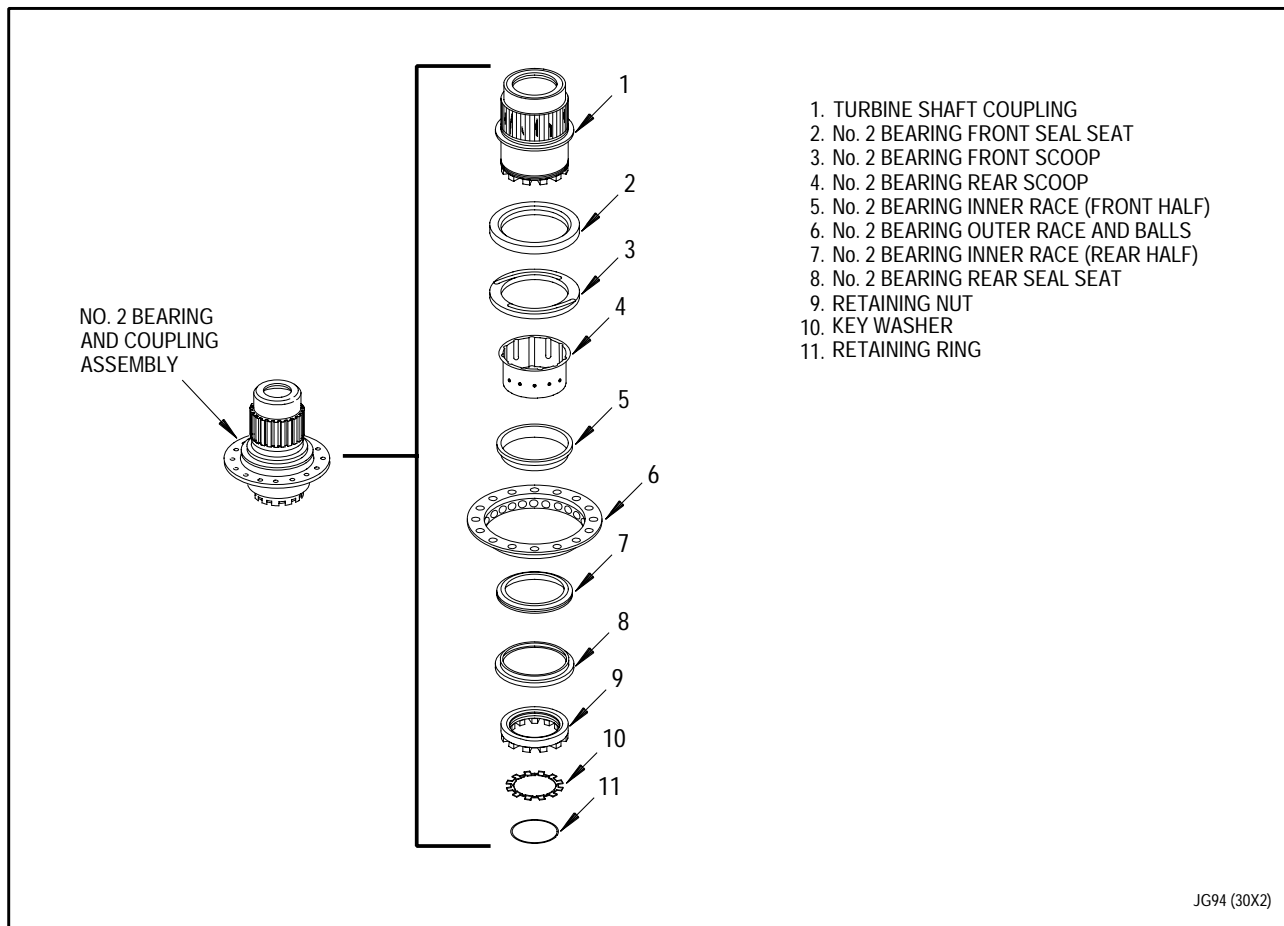


Figure 1. No. 2 Bearing and Coupling Assembly - Disassembly

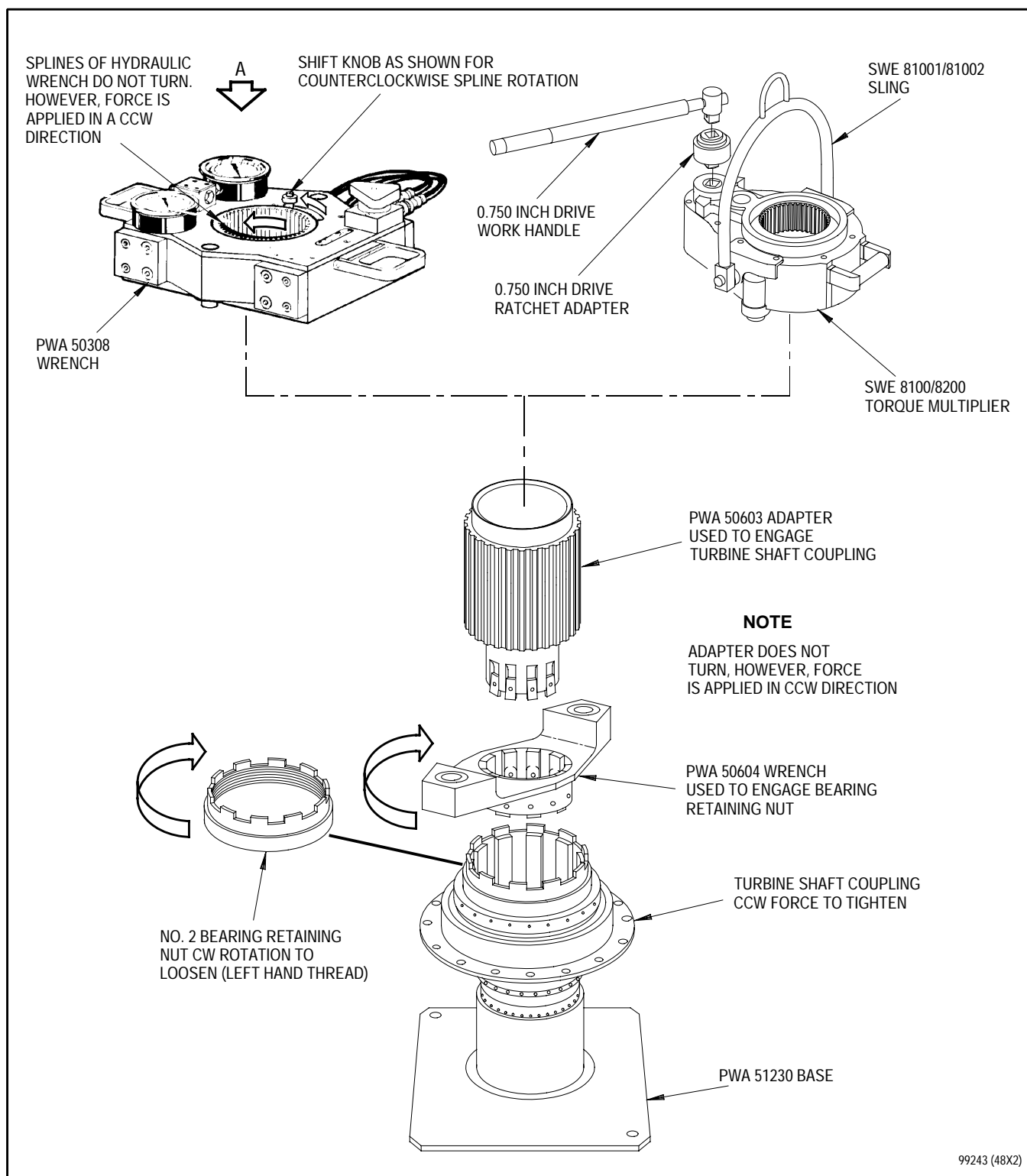


Figure 2. No. 2 Bearing Retaining Nut - Removal (Sheet 1 of 2)

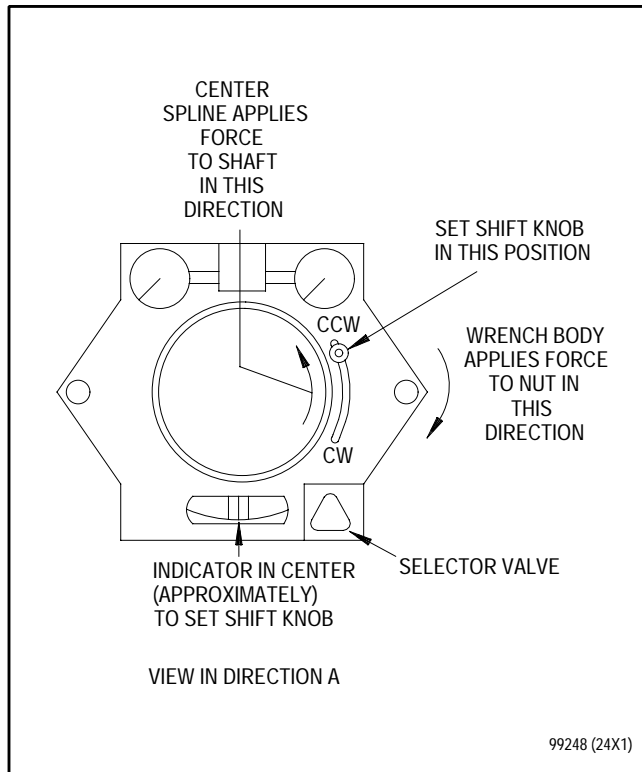


Figure 2. No. 2 Bearing Retaining Nut - Removal
(Sheet 2 of 2)

3. NO. 2 BEARING REAR SEAL SEAT - REMOVAL.

(See figure 1 and Figure 3.)



Rear seal seat(8, figure 1) has a smooth micro finish which is easily damaged. Be careful not to damage it during removal.

NOTE

Usually the seal seat(8) can be removed by hand. If any difficulty is encountered, remove seat with PWA 50605 puller as described below.

- Install PWA 50605 puller so puck(6, figure 3) fits inside turbine shaft coupling(3).
- Engage jaws(2) with seal seat(4). Slide ring(5) down to hold jaws in position.
- Tighten jackscrew(1) to remove seal seat.
- Place seal seat in a protective container.

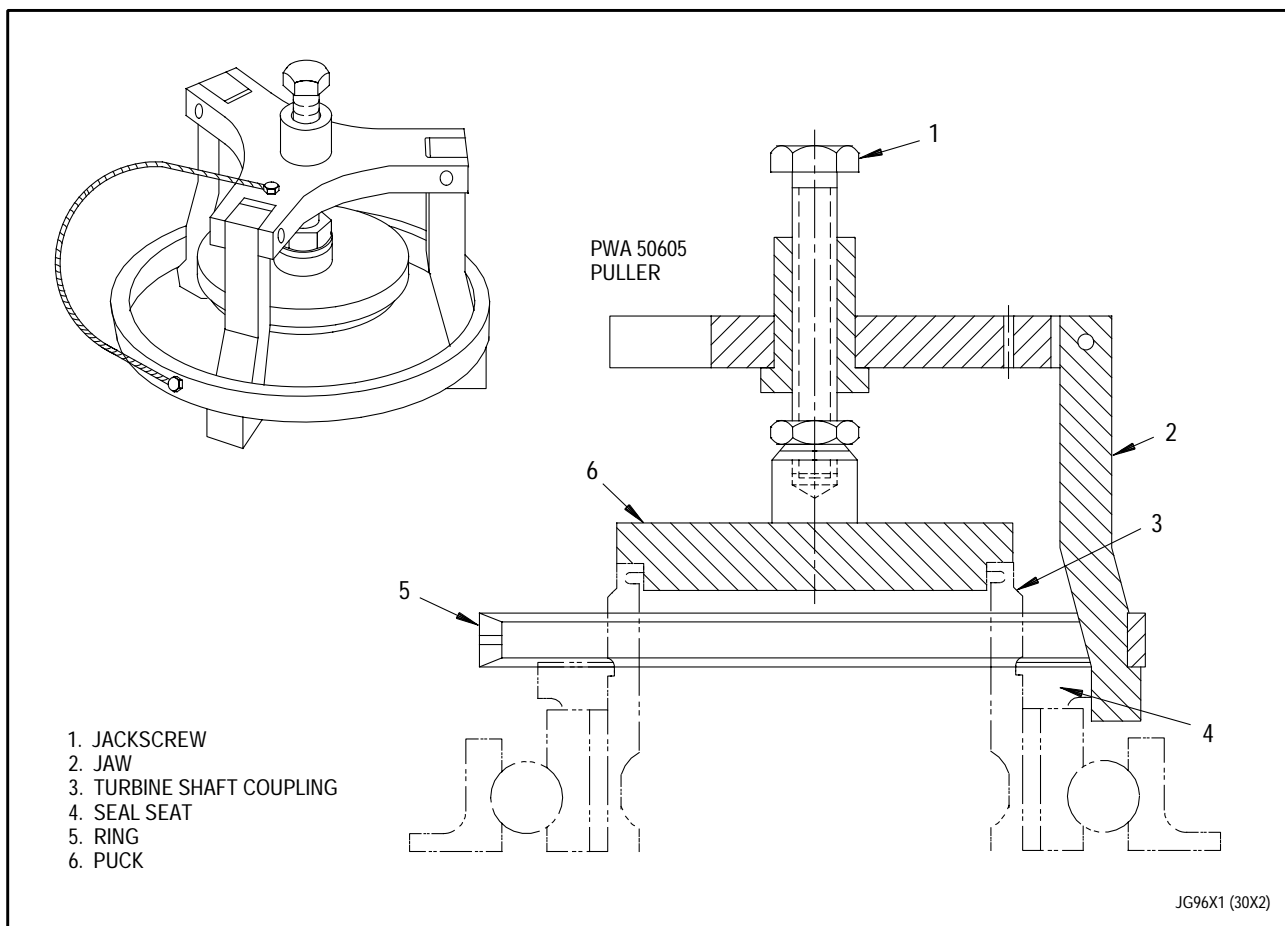


Figure 3. No. 2 Bearing Seal Seat - Removal with PWA 50605 Puller

4. NO. 2 BEARING - REMOVAL.

(See Figures 4 and 5.)

- a. Install puck(3, figure 4) of PWA 50606 puller over turbine shaft coupling.
- b. Engage jaws(7) with puller groove in inner race rear half(6).
- c. Slide ring(8) down over jaws and tighten socket screws(9) to secure.
- d. Connect PWA 55380 hand pump to hydraulic cylinder(1) of puller.
- e. Work pump handle to remove inner race rear half(6).
- f. Remove outer race and balls(4).

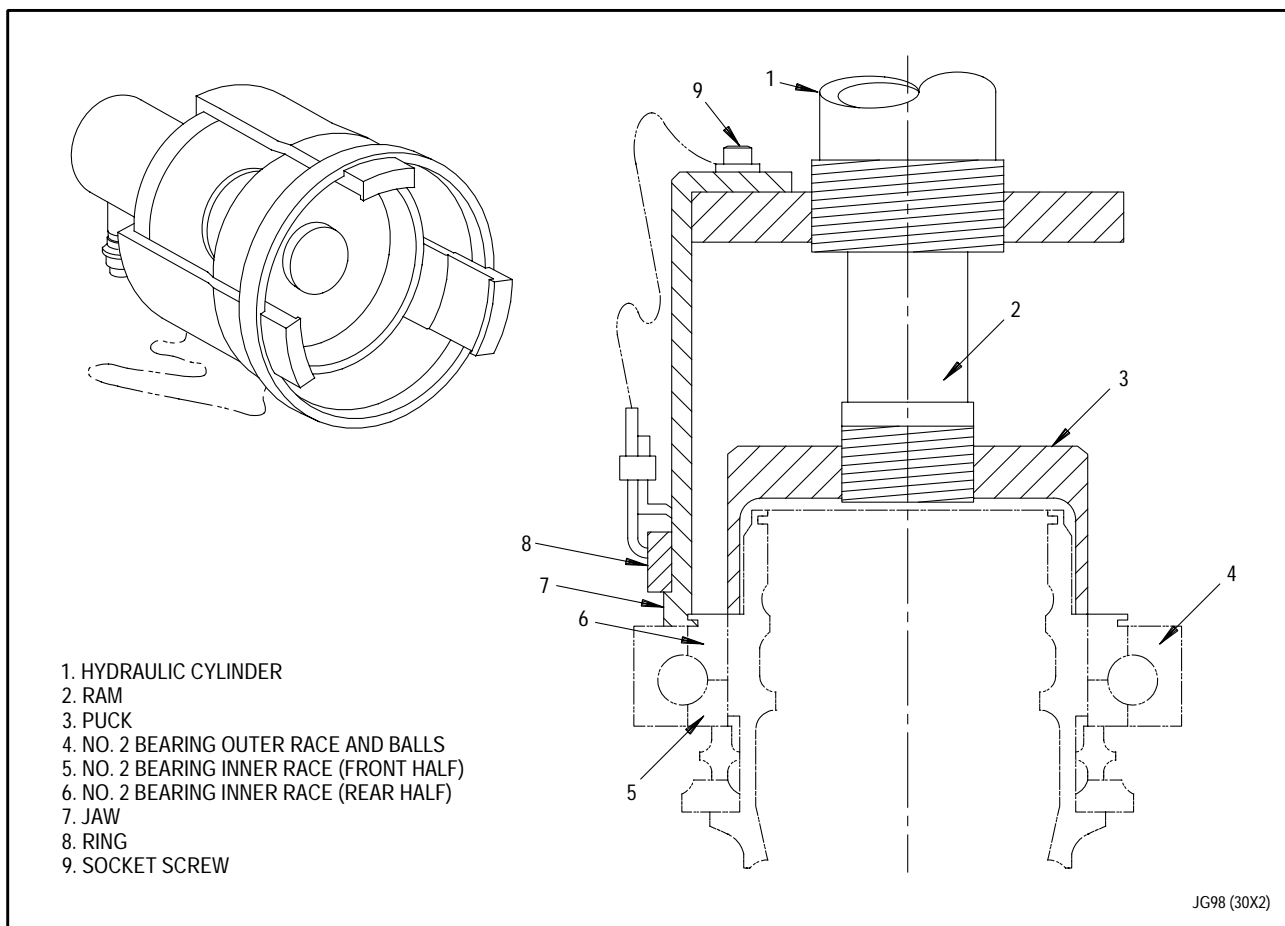


Figure 4. No. 2 Bearing Inner Race (Rear Half) - Removal With PWA 50606 Puller

T.O. 2J-F100-53-7

WP 024 00

- g. Install PWA 50606 puller over turbine shaft coupling. Engage jaws at front face of No. 2 bearing inner race front half. (See figure 5.)
- h. Work PWA 55380 pump handle to remove inner race front half.
- i. Check serial numbers of bearing details to ensure they match.
- j. Coat bearing details with lubricating oil.
- k. Store all bearing details together as a matched set in a protective, labeled container.

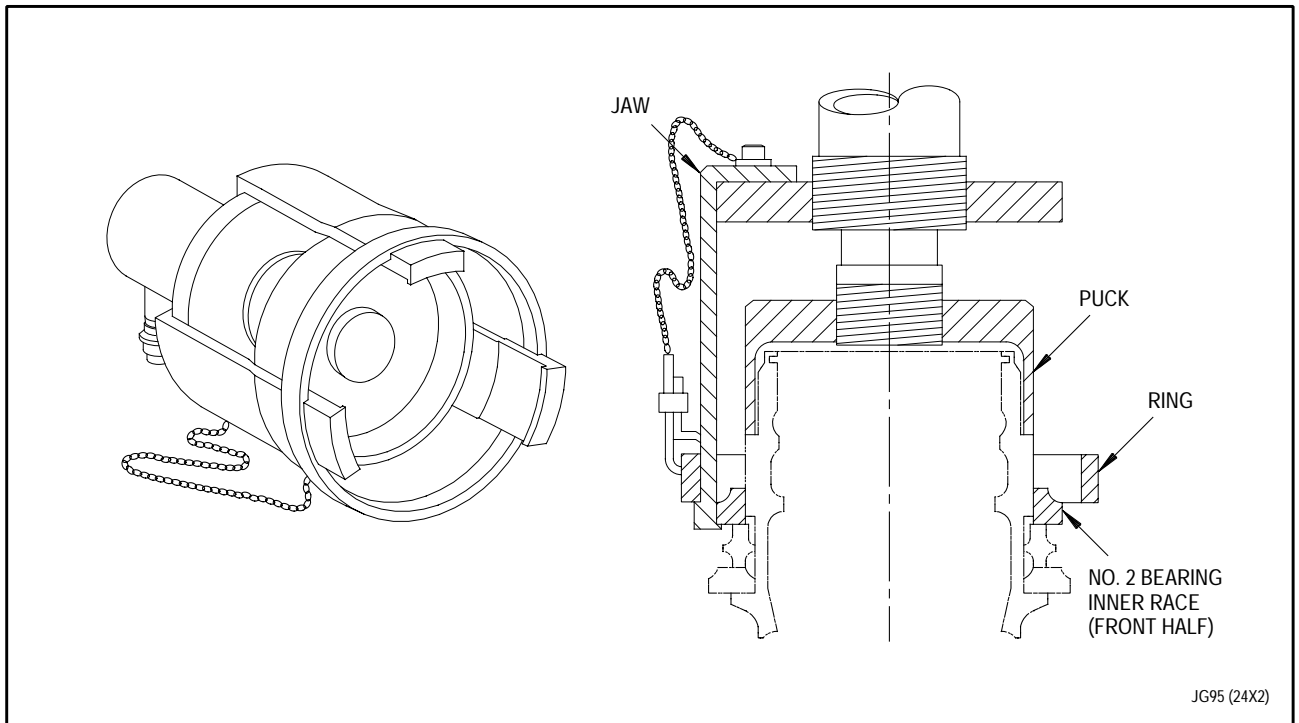


Figure 5. No. 2 Bearing Inner Race (Front Half) - Removal With PWA 50606 Puller

5. NO. 2 BEARING REAR SCOOP, FRONT SCOOP AND FRONT SEAL - REMOVAL.

(See figure 1 and Figure 6.)

- a. Remove rear scoop(4, figure 1) as follows:

- (1) Install PWA 50607 puller so puck(4, figure 6) fits into coupling(7).
- (2) Fit jaws(3) so they grab rear scoop(5). There are two slots in front scoop(6) where jaws can grab rear scoop.
- (3) Slide ring(8) down and tighten capscrews(2) to secure jaws.
- (4) Connect PWA 55380 hand pump to puller ram(1).

- (5) Work PWA 55380 pump handle to remove rear scoop.

- (6) Remove tooling.

- b. Remove front scoop(3, figure 1) by hand.



Front seal seat(2) has a smooth micro finish which is easily damaged. Be careful not to damage it during removal.

- c. Remove front seal seat(2) by hand.

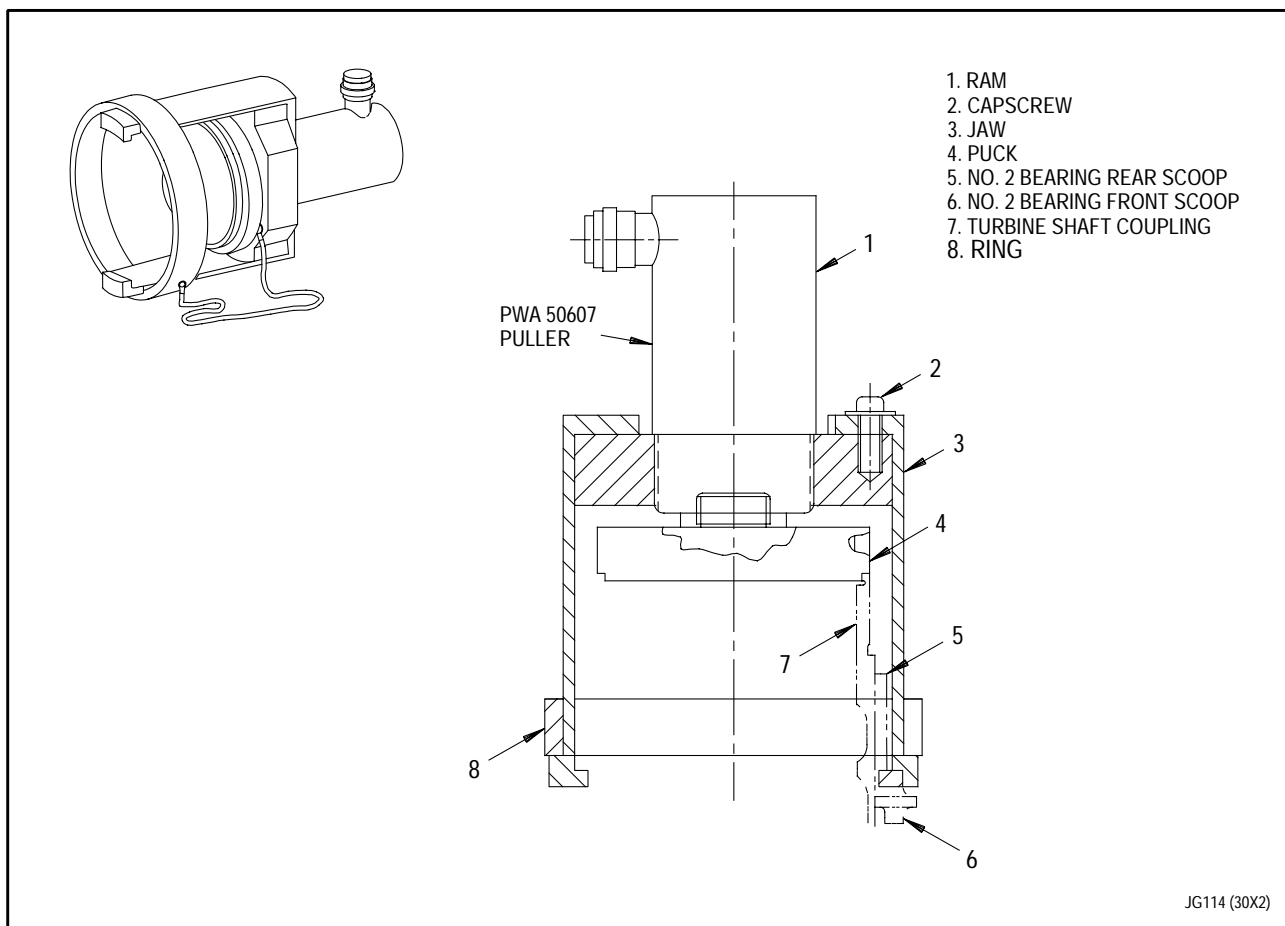


Figure 6. No. 2 Bearing Front Scoop and Rear Scoop - Removal

WORK PACKAGE

TECHNICAL PROCEDURES

GEARSHAFT ASSEMBLY, GEARBOX DRIVE BEVEL -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	8	4	0	8	8
2	0	5	8	9	0
3	8	6 - 7	0	10	1

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Gloves, lint-free	-
Oil, lubricating	MIL-L-7808

EXPENDABLE ITEMS

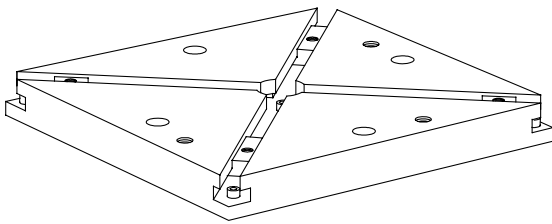
None

APPLICABLE SUPPORT EQUIPMENT

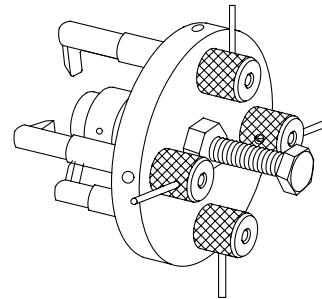
Paragraph	Function - Tool Nomenclature	Tool Number
2	Coupling, Ball Bearing Inner Races, and Sleeve - Removal	
	Adapter, Holding - - - - -	PWA 21500
	Support, Gearbox drive bevel gearshaft ball bearing inner sleeve - - - - -	PWA 50689
	Drift, Gearbox drive bevel gearshaft ball bearing inner race - - - - -	PWA 50690
	Puller, Gearbox drive bevel gearshaft ball bearing sleeve - - - - -	PWA 50698
	Wrench, Gearbox drive bevel gearshaft inner race retaining nut - - - - -	PWA 50699
	Base, Gearbox drive bevel gearshaft bearings - - - - -	PWA 51818

APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
3	Ball Bearing - Removal From Housing	
	Drift, Gearbox bevel gearshaft ball bearing	
	outer race - - - - -	PWA 50693
	Support, No. 2 bearing housing - - - - -	PWA 57490
	or	PWA 50694
	Holder, No. 2 bearing housing - - - - -	PWA 50695
	Wrench, Gearbox drive bevel gearshaft ball	
	bearing outer race retaining nut - - - - -	PWA 50696
4	Bearing Inner Race, Rollers and Gearshaft - Disassembly	
	Adapter, Holding - - - - -	PWA 21500
	Puller, Gearbox drive bevel gearshaft roller	
	bearing inner race - - - - -	PWA 50685
	Wrench, Gearbox drive bevel gearshaft roller	
	bearing inner race retaining nut - - - - -	PWA 50686
	Base, Gearbox drive bevel gearshaft	
	bearings - - - - -	PWA 51818

ILLUSTRATED SUPPORT EQUIPMENT

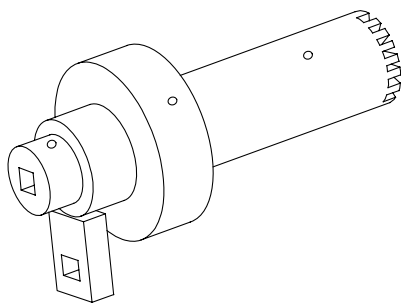
PWA 21500 -C

Figure T1. PWA 21500 Adapter

PWA 50685 -C

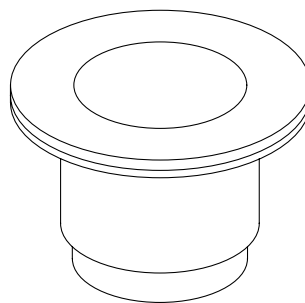
Figure T2. PWA 50685 Puller

ILLUSTRATED SUPPORT EQUIPMENT (continued)



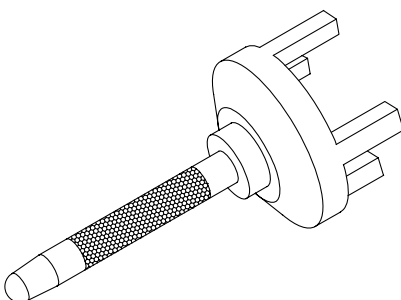
PWA 50686 -C

Figure T3. PWA 50686 Wrench



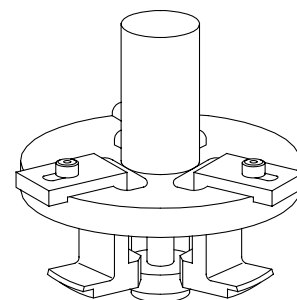
PWA 50689 -C

Figure T4. PWA 50689 Support



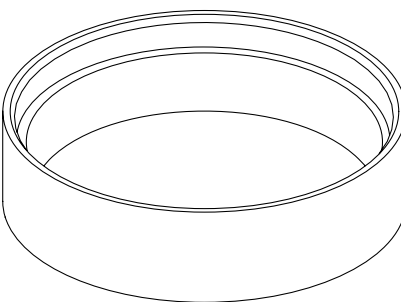
PWA 50690 -C

Figure T5. PWA 50690 Drift



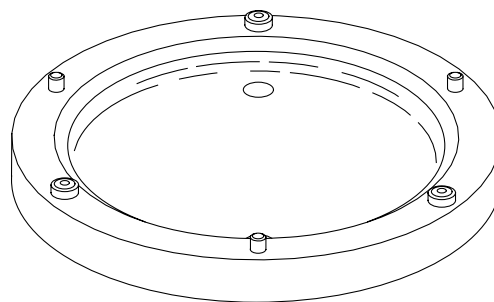
PWA 50693 -C

Figure T6. PWA 50693 Drift



PWA 50694 -C

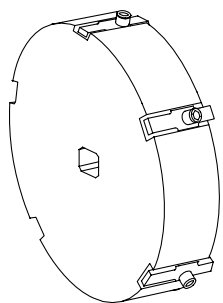
Figure T7. PWA 50694 Support



PWA 50695 -C

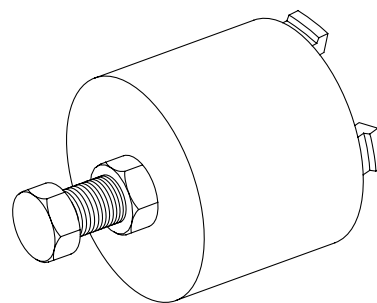
Figure T8. PWA 50695 Holder

ILLUSTRATED SUPPORT EQUIPMENT (continued)



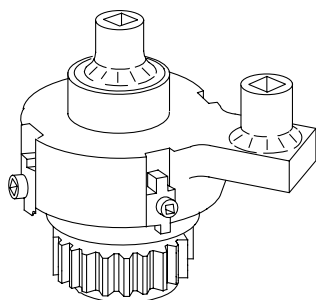
PWA 50696 -C

Figure T9. PWA 50696 Wrench



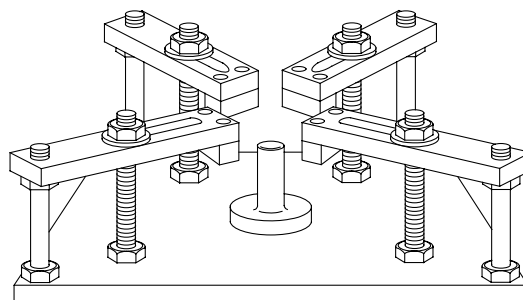
PWA 50698 -C

Figure T10. PWA 50698 Puller



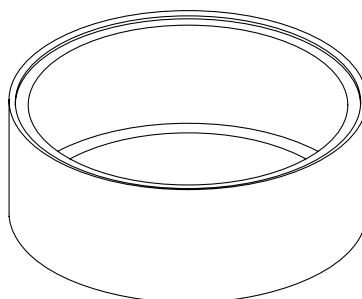
PWA 50699 -C

Figure T11. PWA 50699 Wrench



PWA 51818 -C

Figure T12. PWA 51818 Base



PWA 57490 -C

Figure T13. PWA 57490 Support

1. INTRODUCTION.

- a. This work package contains instructions for disassembly of the gearbox drive bevel gearshaft assembly.

2. COUPLING, BEARING BALLS AND CAGE, INNER RACES, AND SLEEVE - REMOVAL.

(See Figure 1.)

- a. Install PWA 51818 base onto PWA 21500 adapter.
- b. Install gearbox drive bevel gearshaft(14, figure 1) onto PWA 51818 base with gear teeth down. Tighten strap clamps to secure gearshaft.
- c. Remove retaining ring(1); then remove coupling(2).
- d. Remove retaining nut(5) as follows:
 - (1) Bend back tabs of key washer(6).
 - (2) Engage inner part of PWA 50699 wrench with splines in ID of gearshaft(14).

(3) Engage outer part of PWA 50699 wrench so wrench teeth engage slots of retaining nut(5).

(4) Loosen nut(5) using inner part of PWA 50699 wrench for counterforce.

(5) Remove nut(5) and key washer(6). Discard key washer.

e. Remove ball bearing(9), inner races(8 and 10) and sleeve(7) as an assembly, as follows:

(1) Install PWA 50698 puller into ID of gearshaft(14). Line up four arms of puller with slots in sleeve(7) and adjust puller so feet will fit into puller groove on sleeve.

(2) Tighten bolt at center of PWA 50698 puller to remove sleeve and bearing details as an assembly.

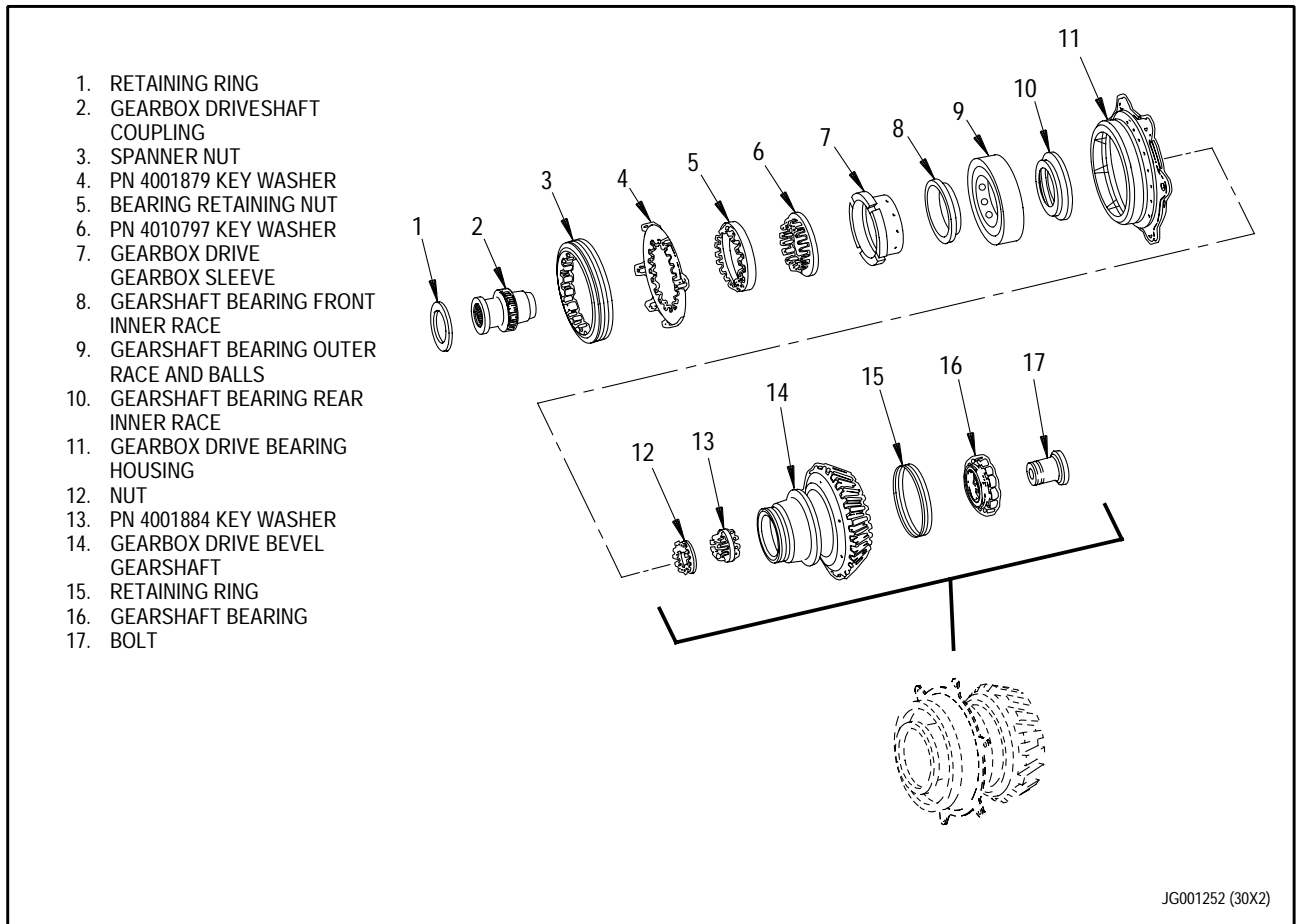


Figure 1. Gearbox Drive Bevel Gearshaft - Disassembly

f. Disassemble sleeve and bearing details, as follows:

- (1) Install assembled sleeve(7), bearing(9), and inner races(8 and 10) on PWA 50689 support. Place flanged end of sleeve up and flanged end of bearing housing(11) down.

- (2) Install PWA 50690 drift so tabs on base of drift fit in four slots on flange of sleeve(7).

- (3) Press housing(11) and bearing(9) off sleeve(7) with a standard arbor press. Inner races(8 and 10) will separate when sleeve is removed.

- (4) Place sleeve(7) and inner races(8 and 10) in protective container.

- (5) Remove bearing(9) balls and cage.

- g. Coat bearing details with lubricating oil and store together in protective labeled containers.

3. BALL BEARING OUTER RACE - REMOVAL FROM HOUSING.

(See figure 1.)

- a. Install housing(11, figure 1) with ball bearing(9) in PWA 50695 holder with flanged end down. Install pins and screws provided with PWA 50695 holder to secure housing in place.

- b. Remove spanner nut(3), as follows:

- (1) Bend back tabs of key washer(4).



Spanner nut(3) has a left-hand thread. Turn clockwise to loosen.

- (2) Turn nut(3) clockwise to loosen using PWA 50696 wrench.

- (3) Remove and discard key washer(4).

- c. Remove bearing(9) outer race, as follows:

- (1) Install housing(11) and bearing(9), onto PWA 57490 support.

- (2) Retract center post of PWA 50693 drift and slide jaws inward.

- (3) Insert PWA 50693 drift into bearing housing. Slide jaws outward so they are on top of bearing race.

- (4) Slide centerpost of PWA 50693 down. Secure jaw detail by tightening hex head cap screws on tool.

- (5) Press bearing outer race out with a standard arbor press.

- d. Coat bearing details with lubricating oil and store together in protective labeled containers.

4. BEARING INNER RACE, ROLLERS, AND GEARSHAFT - DISASSEMBLY.

(See figure 1.)

- a. Install PWA 51818 base on PWA 21500 adapter.
- b. Install gearshaft(14, figure 1) on PWA 51818 base so gear teeth are down.
- c. Remove nut(12) and bolt(17), as follows:
 - (1) Bend back tabs of key washer(13).
 - (2) Install PWA 50686 wrench so inner detail engages slots in retaining bolt(17). Engage teeth on outer detail with slots in retaining nut(12).

- (3) While holding inner detail, rotate outer detail counterclockwise to loosen nut(12).

- (4) Remove nut(12).

- (5) Remove and discard key washer(13).

- (6) Remove gearshaft from PWA 51818 base and remove bolt(17).

- d. Remove gearshaft bearing(16):

- (1) Place gearshaft(14) on bench with gear teeth up.

- (2) Install PWA 50685 puller into ID of gearshaft. Rotate four jaws of puller so they fit under lip of gearshaft bearing(16) and into cutouts of gearshaft(14).

- (3) Tighten PWA 50685 puller to remove gearshaft bearing(16) using care to prevent rollers and cage from separating from inner race.
- e. Coat bearing details with lubricating oil and store together in protective labeled containers.
- f. Store inner race and rollers in protective container.
- g. Remove retaining ring(15).

WORK PACKAGE

TECHNICAL PROCEDURES

**NO. 3 BEARING, NO. 3 BEARING SUPPORT AND GEARBOX DRIVE
BEVEL GEAR (NO. 3 BEARING PACKAGE) -**

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3				5	
4 - 10				0	

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Gloves, lint-free	-
Oil, lubricating	MIL-L-7808

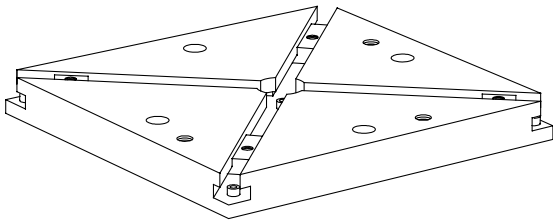
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

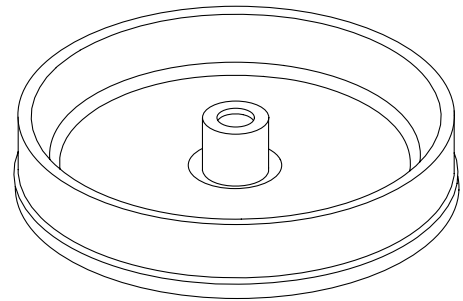
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing, No. 3 Bearing Support and Gearbox Drive Bevel Gear - Disassembly	
	Adapter, Holding - - - - -	PWA 21500
	Base, No. 3 bearing support - - - - -	PWA 50608
	Drift, No. 3 bearing outer race - - - - -	PWA 50609
	Base, No. 3 bearing support - - - - -	PWA 50612
	Puller, No. 3 bearing inner race - - - - -	PWA 50614
	Pump, Hydraulic - - - - -	PWA 55380

ILLUSTRATED SUPPORT EQUIPMENT



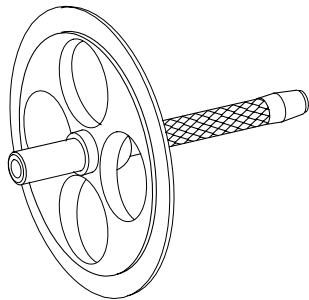
PWA 21500 -C

Figure T1. PWA 21500 Adapter



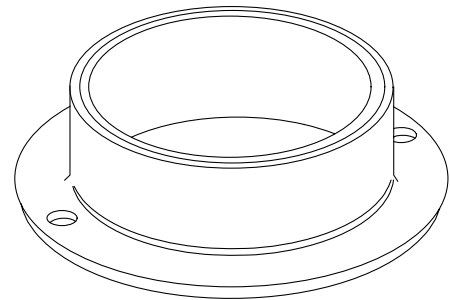
PWA 50608 -C

Figure T2. PWA 50608 Base



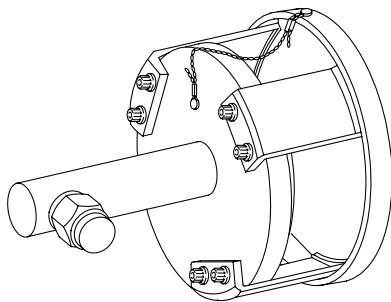
PWA 50609 -C

Figure T3. PWA 50609 Drift



PWA 50612 -C

Figure T4. PWA 50612 Base

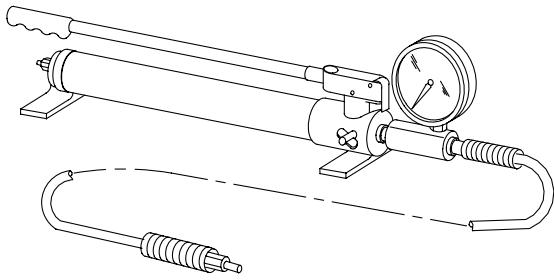


PWA 50614 -C

Figure T5. PWA 50614 Puller

Figure T6. Deleted.

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 55380 -C

Figure T7. PWA 55380 Pump

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 3 bearing, No. 3 bearing support and gearbox drive bevel gear (No. 3 bearing package).

**2. NO. 3 BEARING, NO. 3 BEARING SUPPORT
AND GEARBOX DRIVE BEVEL GEAR -
DISASSEMBLY.**

(See Figures 1 and Figure 2.)

- a. Remove gearbox drive bevel gear(1, figure 1) from No. 3 bearing support(5) as follows:
 - (1) Install PWA 50612 base(7, figure 2) into PWA 21500 adapter.
 - (2) Position No. 3 bearing package onto PWA 50612 base(7) with gear end of bevel drive gear(8) on base.
 - (3) Install PWA 50614 puller so puck(4) fits into shaft of bevel drive gear(8).
 - (4) Slide jaws(3) inward so they grab puller groove in rear half of No. 3 bearing inner race(5).

- (5) Slide ring(9) down and tighten cap screws(2) to secure jaws in position.
- (6) Connect PWA 55380 hand pump to ram(1).
- (7) Work PWA 55380 pump handle to break snapfit of bearing inner race(5). Remove rear half of No. 3 bearing inner race with PWA 50614 puller attached.
- (8) Remove rear half of No. 3 bearing inner race from PWA 50614 puller.
- (9) Check serial number of inner race.
- (10) Coat inner race with lubricating oil and store in protective, labeled container.

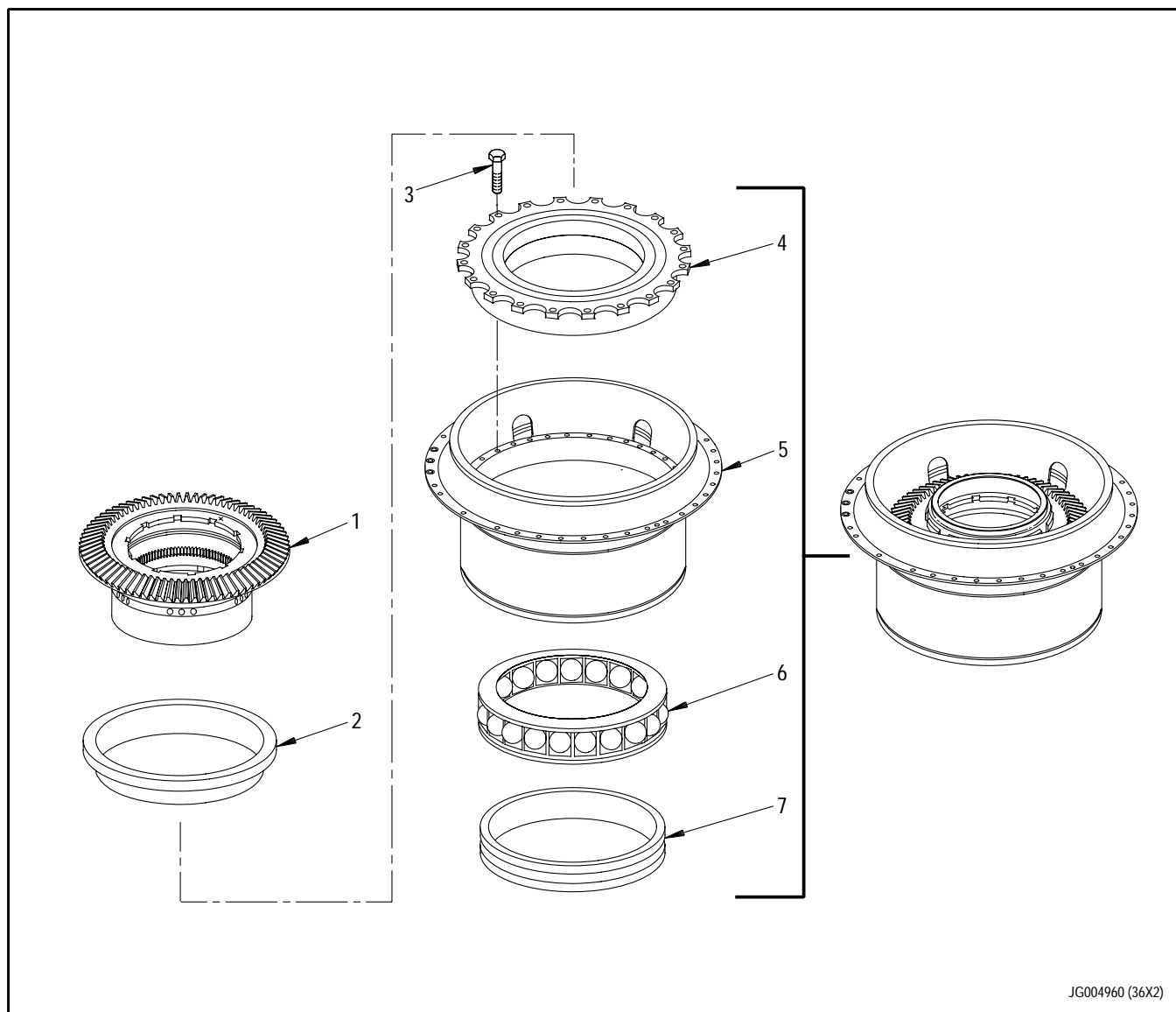
- b. Remove cage and balls(6, figure 1). Check serial number of cage. Coat cage and balls with lubricating oil and store in container with inner race.
- c. Remove bearing support(5) with bearing outer race(4) and bolts(3), from bevel gear(1).
- d. Remove inner race front half(2) as follows:
 - (1) Install PWA 50614 puller so puck(4, figure 2) fits into shaft of bevel drive gear(8).
 - (2) Slide jaws(3) inward so they grab inner race front half(6)
 - (3) Slide ring(9) down and tighten cap screws(2) to secure jaws in position.
 - (4) Connect PWA 55380 hand pump.
 - (5) Work pump handle to remove inner race front half(6).
 - (6) Remove tools.
 - (7) Check serial number of inner race.
 - (8) Coat inner race with lubricating oil and store in container with other No. 3 bearing details.
- e. Remove bevel gear(1, figure 1) and place in protective container.

dpgbrKa

f. Remove outer race(4) from bearing support(5) as follows:

- (1) Place bearing support(5) with bolts(3) up.
- (2) Remove lockwire and bolts(3).
- (3) If outer race(4) is loose, remove by hand and place in same protective container as inner races(2 and 7) and cage and balls(6). If race(4) is tight proceed to step(4).
- (4) Position PWA 50608 base onto standard arbor press.
- (5) Position bearing support(5) and outer race(4) assembly into PWA 50608 base with race flange down.

- (6) Position PWA 50609 drift onto outer race(4). Using arbor press remove outer race.
- (7) Remove bearing support(5) from base and place in suitable container.
- (8) Remove outer race(4).
- (9) Check serial number of outer race.
- (10) Coat outer race with lubricating oil and store in container with other No. 3 bearing details.



1. Gearbox drive bevel gear
2. No. 3 bearing inner race (front half)
3. Bolt
4. No. 3 bearing outer race
5. No. 3 bearing support
6. No. 3 bearing cage and balls
7. No. 3 bearing inner race (rear half)

**Figure 1. No. 3 Bearing Support and Gearbox Drive Bevel Gear
(No. 3 Bearing Package) - Disassembly**

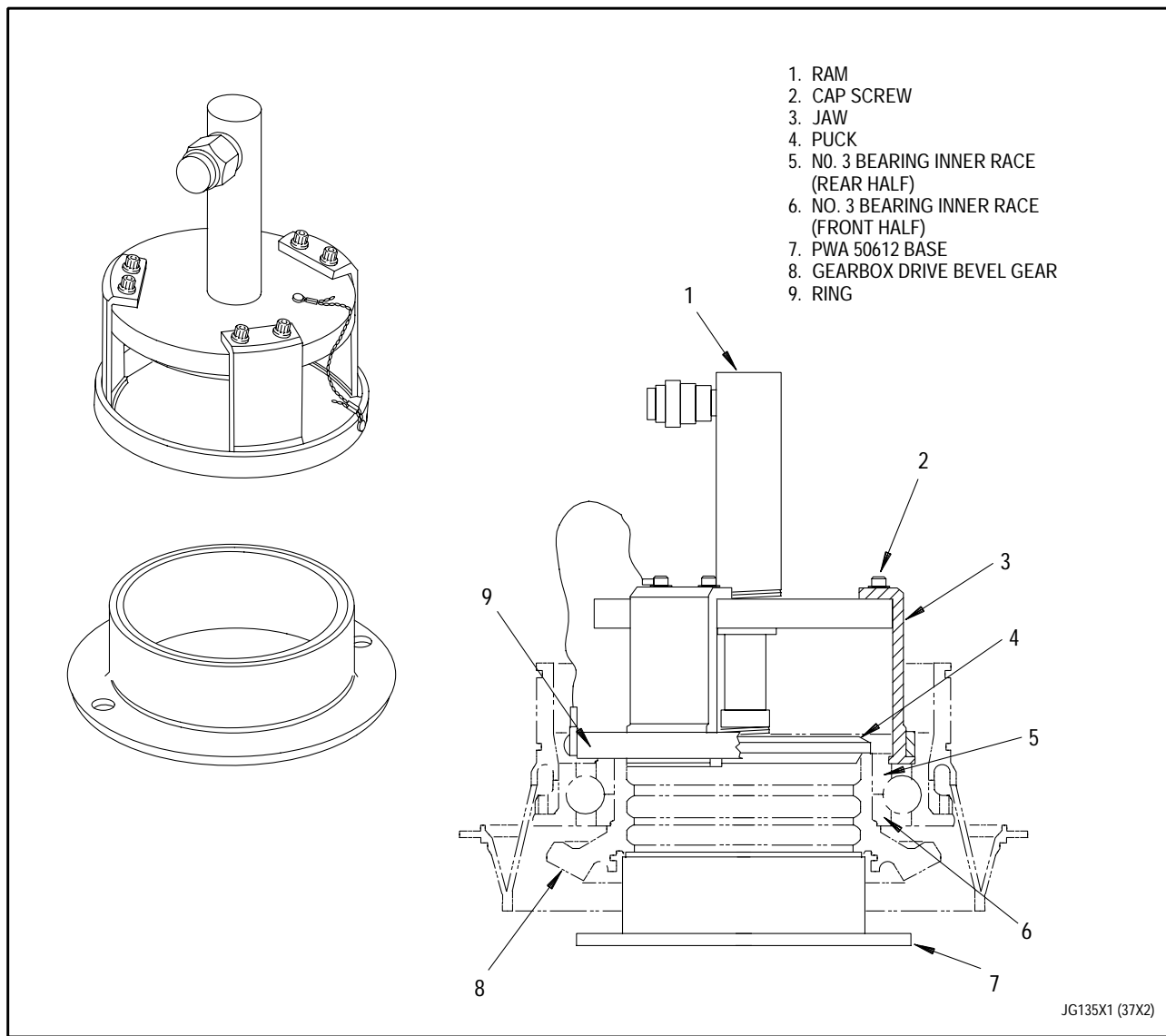


Figure 2. No. 3 Bearing Inner Race (Rear Half and Front Half) - Removal with PWA 50614 Puller

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 3 BEARING REAR -
DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	16	5	8	7	8
3	0	6	4	8 Blank Added	8
4	15				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 July 1995	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

None

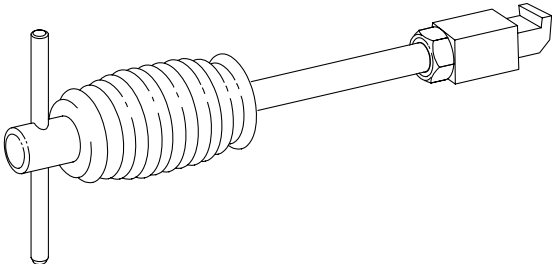
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	No. 3 Bearing Rear Seal Assembly (PN 4075036-01) - Disassembly	
	Puller - - - - -	PWA 51503

ILLUSTRATED SUPPORT EQUIPMENT



PWA 51503 -C

Figure T1. PWA 51503 Puller

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 3 bearing rear seal assembly.

**2. NO. 3 BEARING REAR SEAL ASSEMBLY
(PN 4075036-01) - DISASSEMBLY.**

(See Figure 1.)

- a. Place No. 3 bearing seal support assembly(8, figure 1) on bench with seal assembly(3) facing up.
- b. Press down on metal edge of seal assembly(3), remove and discard three cotter pins(1).
- c. Remove three No. 3 bearing seal guides(2) and seal assembly(3).
- d. For local (in-house) handling, protect seal assembly(3) by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal assembly in a cardboard box.
- e. For shipping, protect seal assembly(3) with a cardboard collar. Refer to T.O. 2-1-111.
- f. Remove springs(4), compression spring seats(5), metal seal rings(6), and spring washer(7) from No. 3 bearing seal support assembly(8).
- g. Place No. 3 bearing seal support assembly(8) on bench with large OD flange facing down.
- h. Remove six nuts(13) and key washers(12).
- i. Discard key washers.
- j. Remove No. 3 bearing heat shield(14). PWA 51503 puller or equivalent may be used if required.
- k. Remove six spacers(11) and No. 3 bearing baffle(10).

Legend for figure 1

- | | |
|------------------------------|--|
| 1. Cotter pin | 8. No. 3 bearing seal support assembly |
| 2. No. 3 bearing seal guides | 9. Pin |
| 3. Seal assembly | 10. No. 3 bearing baffle |
| 4. Spring | 11. Spacer |
| 5. Compression spring seat | 12. Key washer |
| 6. Metal seal ring | 13. Nut |
| 7. Spring washer | 14. No. 3 bearing heat shield |

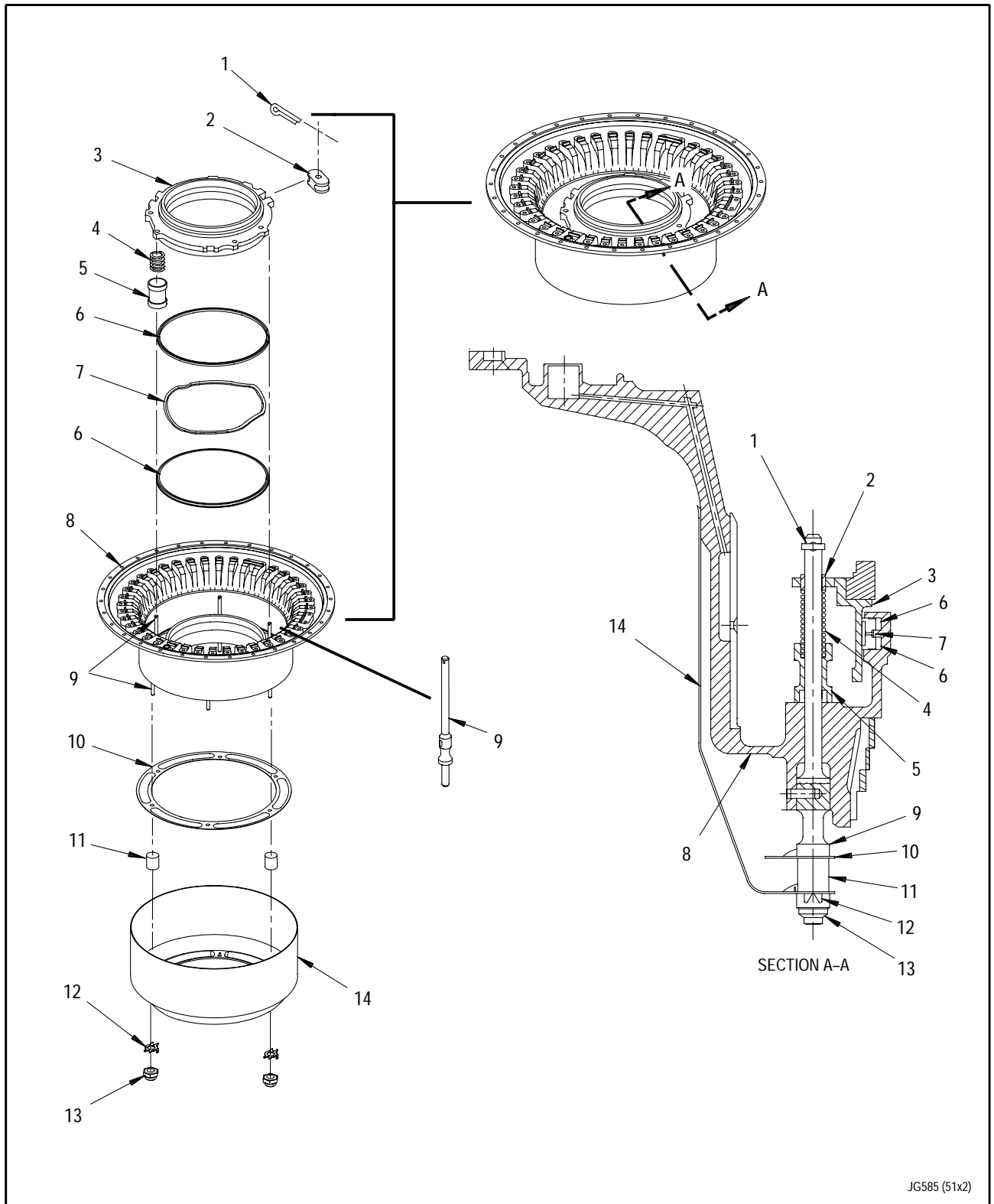
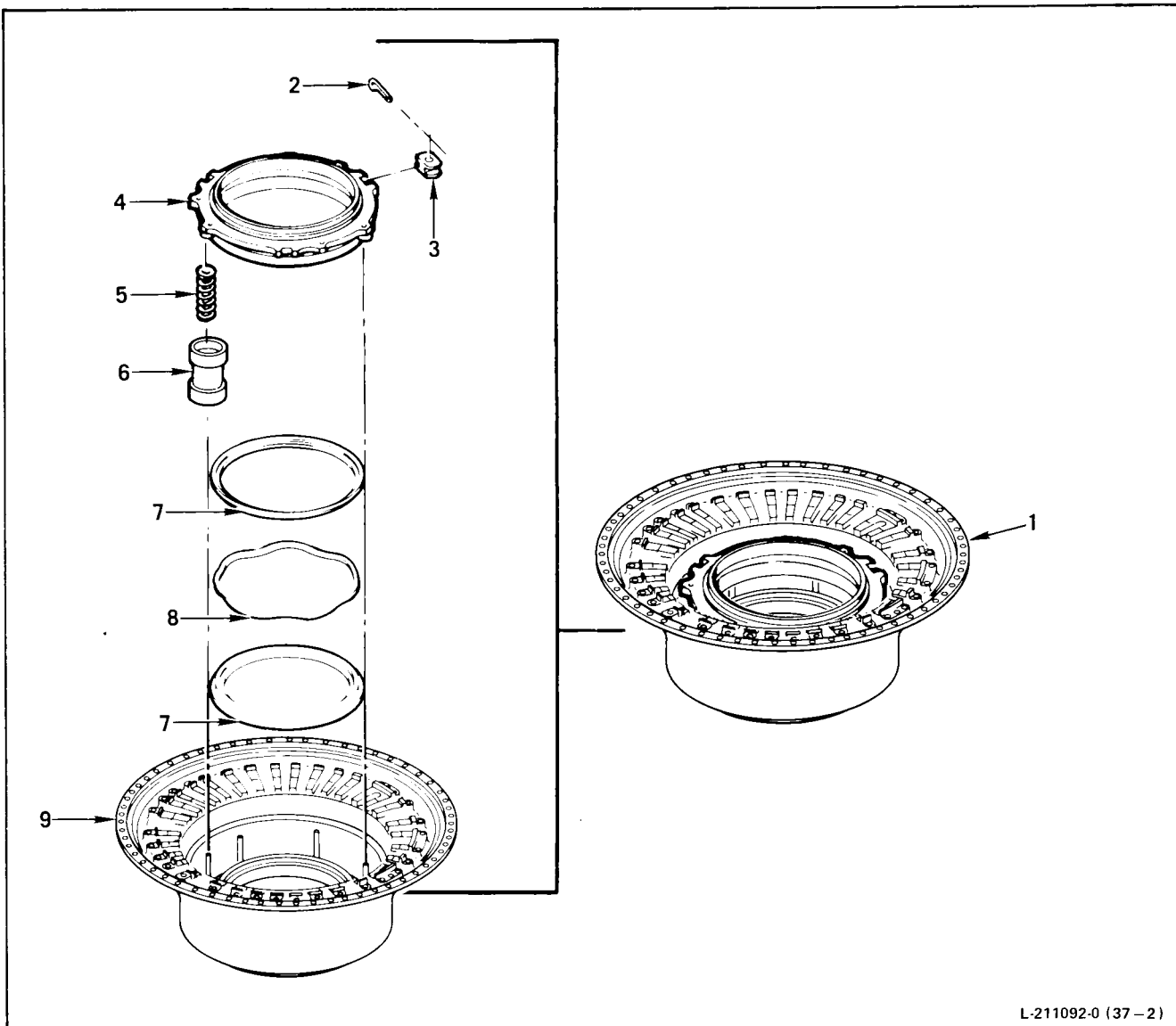


Figure 1. No. 3 Bearing Rear Seal Assembly (PN 4075036-01) -Disassembly

**3. NO. 3 BEARING REAR SEAL ASSEMBLY
(PN 4068215)- DISASSEMBLY.**

(See Figure 2.)

- a. Place No. 3 bearing rear seal assembly on bench with carbon face seal assembly(4) facing up.
- b. Press down on metal edge of carbon face seal assembly(4), then remove three cotter pins(2).
- c. Remove three guides(3) and carbon face seal assembly(4).
- d. For local (in-house) handling, protect seal by placing between two pieces of styrofoam. Tape around open ends and place seal assembly in cardboard box.
- e. For shipping, protect seal with cardboard collar. Refer to T.O. 2-1-111.
- f. Remove springs(5), spring seats(6), metal seal rings(7), and spring washer(8).



L-211092-0 (37-2)

1. No. 3 bearing rear seal assembly
2. Cotter pin
3. Guide
4. Carbon face seal assembly
5. Spring
6. Spring seat
7. Metal seal ring
8. Spring washer
9. No. 3 bearing seal support assembly

Figure 2. No. 3 Bearing Rear Seal Assembly (PN 4068215) - Disassembly

WORK PACKAGE

TECHNICAL PROCEDURES

CASE ASSEMBLY, COMPRESSOR INTERMEDIATE -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	7	28	11	30
3 - 6	0	8 - 10	0	12 - 14	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

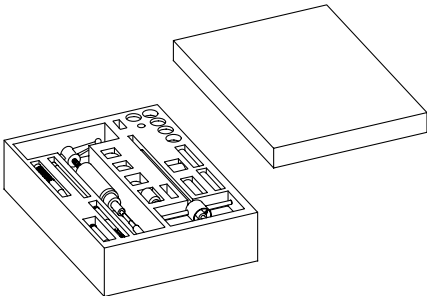
EXPENDABLE ITEMS

None

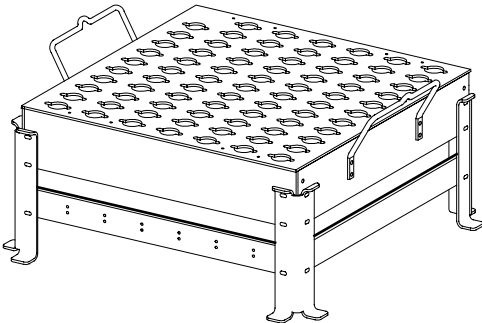
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
6	INLET GUIDE VANES AND SYNCHRONIZING RINGS - REMOVAL FIXTURE, HOLDING, REAR COMPRESSOR VARIABLE INLET VANE - - - - -	PWA 71470
7	INLET GUIDE VANE OUTER BUSHINGS - REMOVAL PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57790 -C



PWA 71470 -C

Figure T1. PWA 57790 PUSHER/PULLER

Figure T2. PWA 71470 FIXTURE

1. INTRODUCTION.

a. This work package contains instructions for disassembling the compressor intermediate case. The following major components/sections are removed:

- No. 3 bearing rear seal support
- Internal pressure tube
- Borescope plug
- 4th stage compressor case, fan exit stator, and 3rd stage compressor stator
- Inlet guide vanes and synchronizing rings
- Inlet guide vane outer bushings
- Data plate

2. NO. 3 BEARING REAR SEAL SUPPORT - REMOVAL.

(See Figure 1.)

NOTE

If not previously accomplished, place intermediate case on work bench, front side down.

- a. Remove lockwire and bolts(2, figure 1) securing No. 3 bearing rear seal support(1) to intermediate case(4).

- b. Remove No. 3 bearing rear seal support(1). If required, lift up and tap with mallet from underside.

- c. Remove and discard gasket(3).

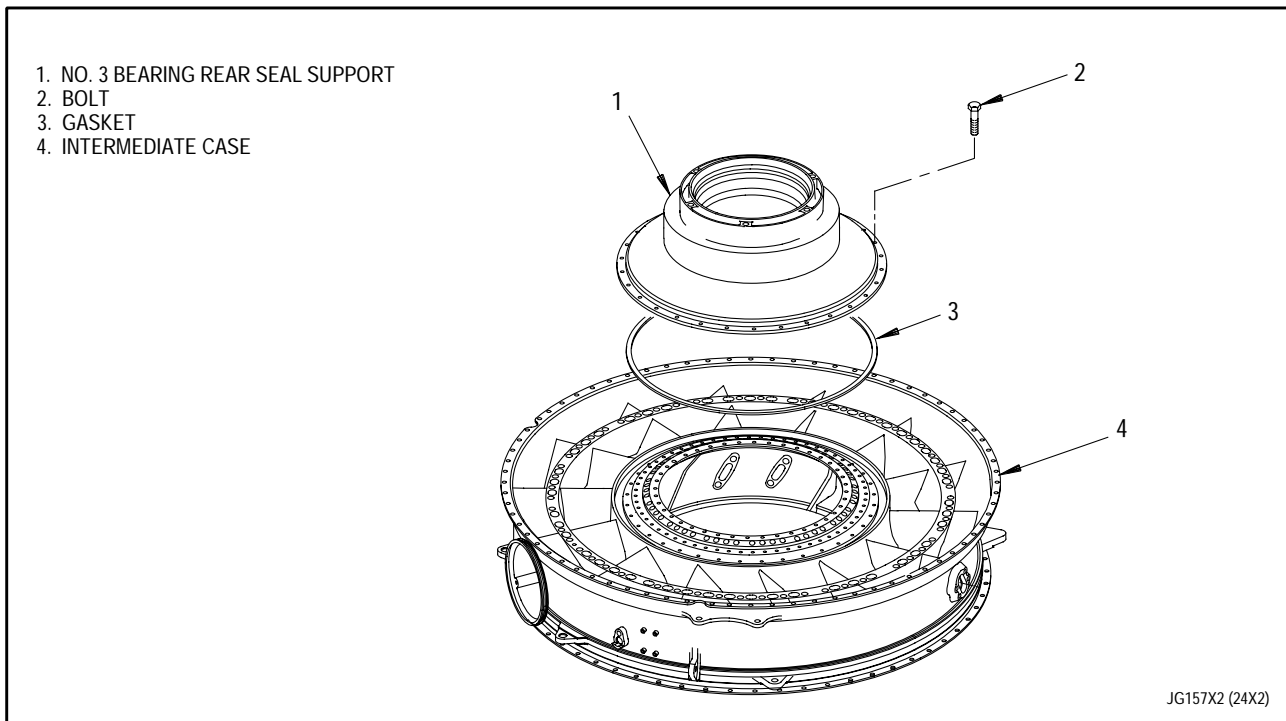
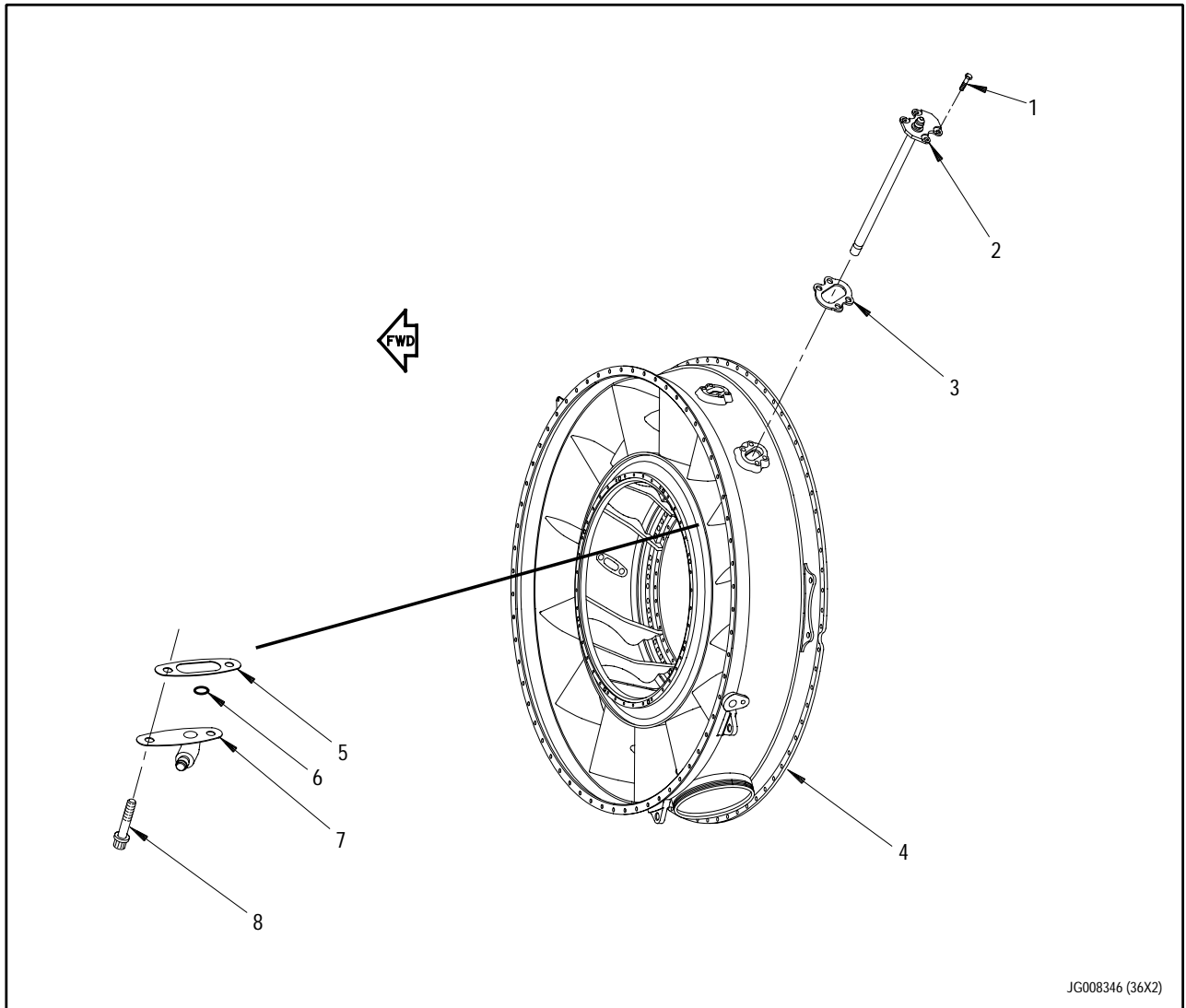


Figure 1. No. 3 Bearing Rear Seal Support and Internal Pressure Tube - Removal

3. NO. 2 AND 3 BEARING INTERNAL PRESSURE TUBE - REMOVAL.

(See Figure 2.)

- a. Remove four bolts(1, figure 2) securing No. 2 and 3 bearing internal pressure tube(2) to intermediate case(4).
- b. Remove tube(2) from intermediate case(4) and discard gasket(3).
- c. Remove two bolts(8) securing elbow(7) to inside of intermediate case(4).
- d. Remove elbow(7) and discard gasket(5) and packing(6).



- | | |
|---|------------|
| 1. Bolt | 5. Gasket |
| 2. No. 2 and 3 bearing internal pressure tube | 6. Packing |
| 3. Gasket | 7. Elbow |
| 4. Intermediate case | 8. Bolt |

Figure 2. No. 2 and 3 Bearing Internal Pressure Tube - Removal

4. BORESCOPE PLUG - REMOVAL.

(See Figure 3.)

- a. Remove borescope plug(2,
figure 3) as follows:

(1) Remove bolt(1).

(2) Remove borescope plug(2).

(3) Remove and discard
packing(3).

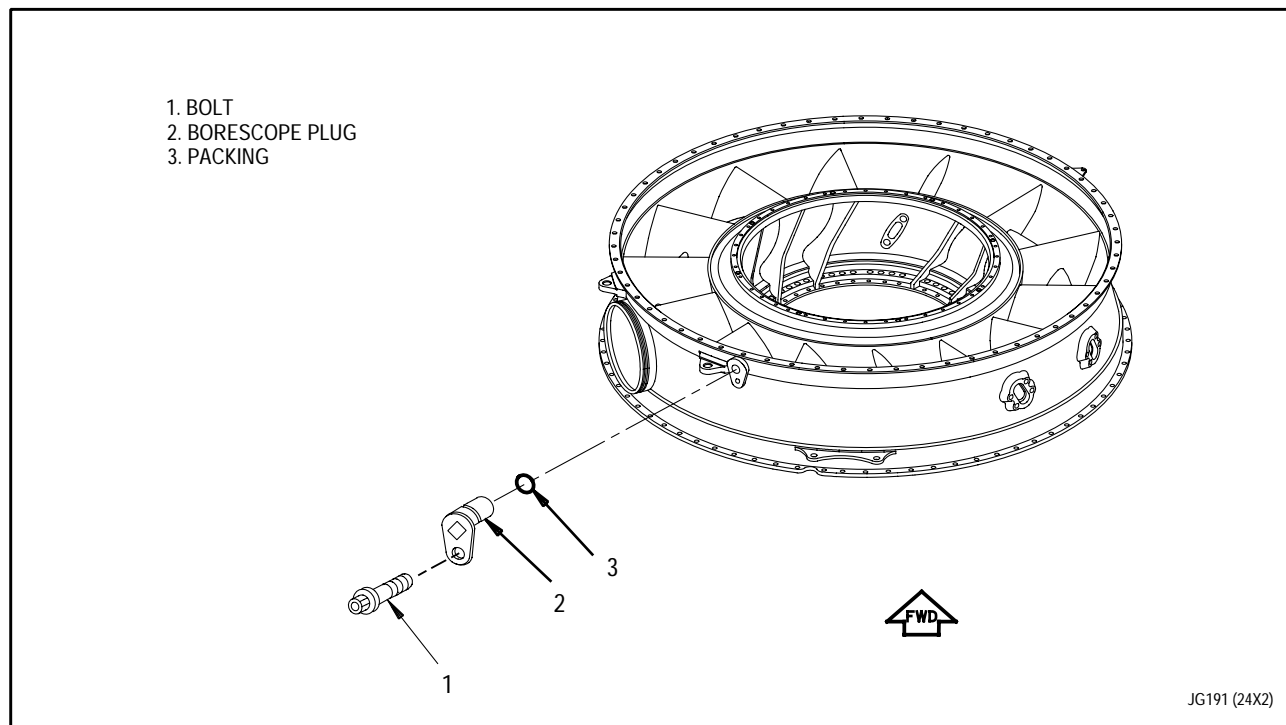


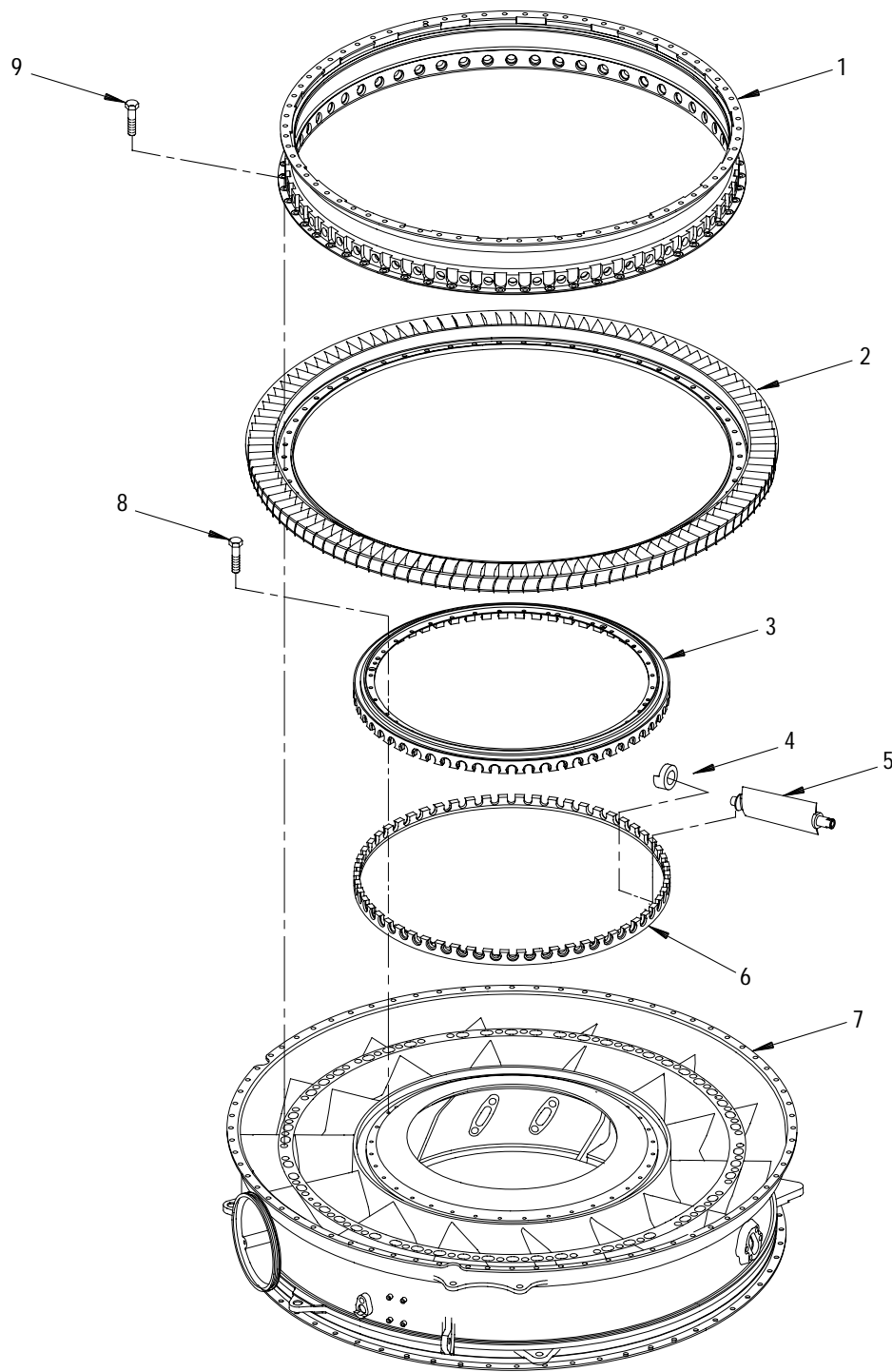
Figure 3. Borescope Plug - Removal

5. FOURTH STAGE COMPRESSOR CASE, FAN EXIT STATOR, AND THIRD STAGE COMPRESSOR STATOR - REMOVAL.

(See Figures 4 through 6.)

a. Remove 4th stage compressor case as follows:

- (1) Remove lockwire and bolts(8, figure 4) and remove stator inlet shroud (inner rear)(3) using jackscrews.
- (2) Remove four bolts(10, figure 5) and key washers(9) securing bracket(8) to synchronizing ring halves(5 and 14) on left and right sides.
- (3) Remove bolts(9, figure 4) and remove 4th stage compressor case(1) using jackscrews.
- (4) Remove bearings(4) from inner end of inlet guide vanes(5) by hand. Discard bearings.



JG008347 (48X2)

Figure 4. Fourth Stage Compressor Case - Removal

Legend for figure 4

- | | |
|-------------------------------------|--------------------------------------|
| 1. Fourth stage compressor case | 6. Stator inlet shroud (inner front) |
| 2. Fan exit stator | 7. Intermediate case |
| 3. Stator inlet shroud (inner rear) | 8. Bolt |
| 4. Bearing | 9. Bolt |
| 5. Inlet guide vane | |

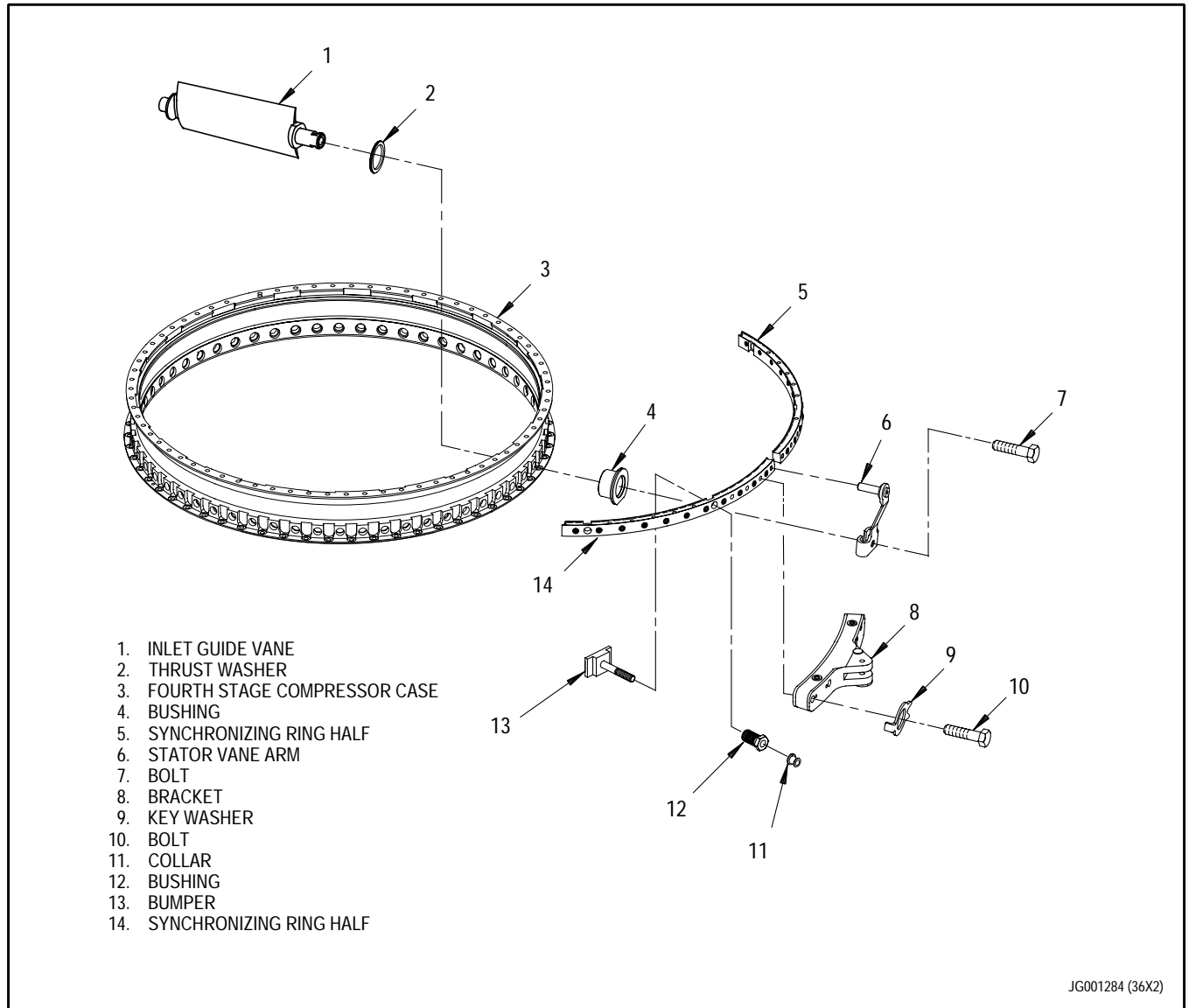
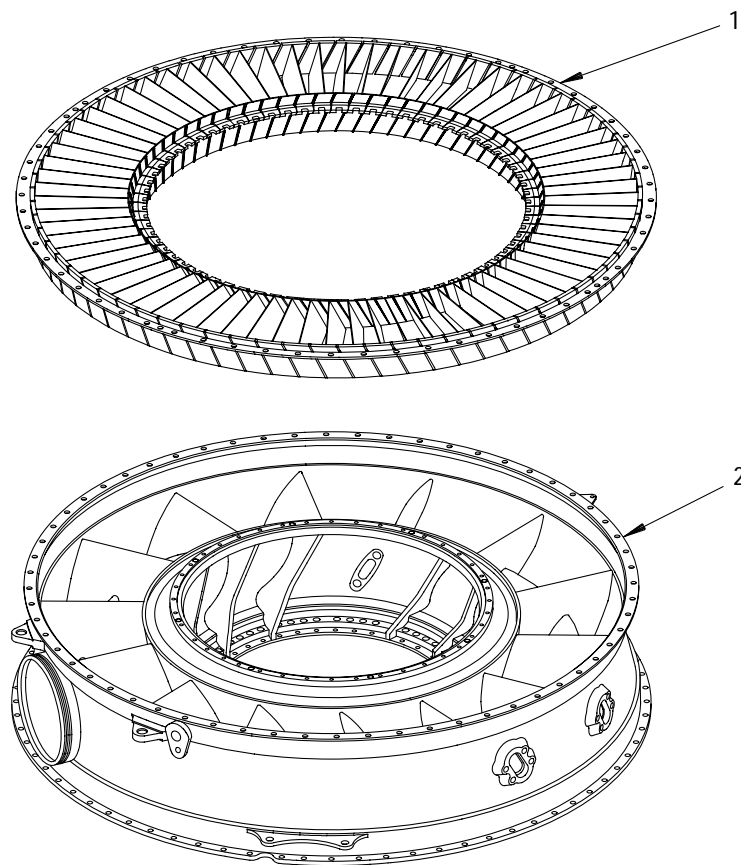


Figure 5. Inlet Guide Vanes and Synchronizing Rings - Removal

- b. Remove compressor stator inlet shroud (inner front)(6).
- c. Remove fan exit stator(2) using jackscrews.
- d. Position intermediate case(7) on work bench forward side up.
- e. Using jackscrews, remove 3rd stage compressor stator(1, figure 6).

- 1. 3RD STAGE COMPRESSOR STATOR
- 2. INTERMEDIATE CASE



JG203X1 (37X2)

Figure 6. Third Stage Stator - Removal

6. INLET GUIDE VANES AND SYNCHRONIZING RINGS - REMOVAL.

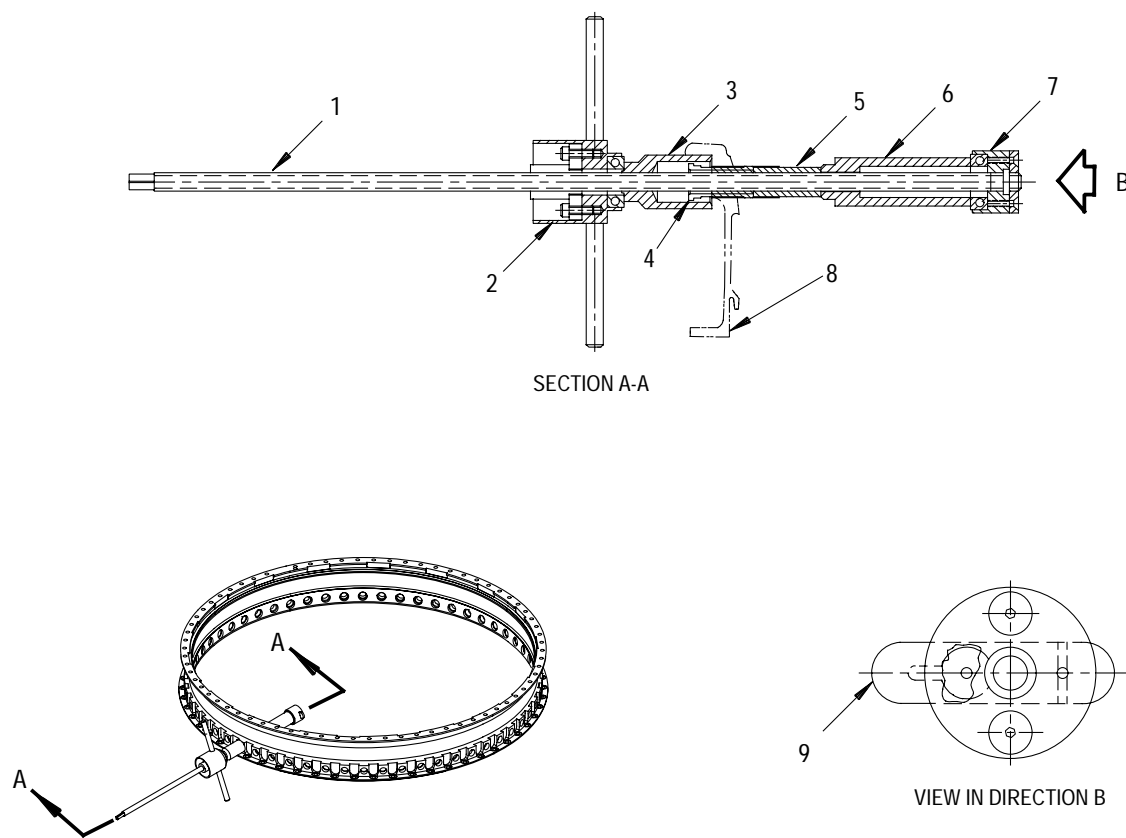
(See figure 5.)

- a. Remove bolts(7, figure 5) securing stator vane arms(6) to stems of inlet guide vanes(1).
- b. Remove synchronizing ring halves(5 and 14) by tapping stator vane arms(6) with nonmetallic drift and mallet, clear of vane(1) stems.
- c. Remove vane arms(6) from synchronizing ring halves(5 and 14).
- d. Remove vanes(1) and thrust washers(2) from fourth stage compressor case(3) by sliding vanes inward. Place vanes, long stem up, in PWA 71470 fixture.
- e. Remove bumpers(13) from synchronizing ring halves(5 and 14) as follows:
 - (1) Remove collars(11) securing bumpers(13) by twisting off.
 - (2) Remove bumpers(13) from synchronizing ring halves(5 and 14).
 - (3) Remove bushings(12) from synchronizing ring halves(5 and 14).

7. INLET GUIDE VANE OUTER BUSHINGS - REMOVAL.

(See figure 5 and Figure 7.)

- a. Remove and discard all inlet guide vane outer bushings(4, figure 5) by hand or use PWA 57790 pusher/puller as follows:
 - (1) Thread PWA 57790 pusher/puller detail-1 ball screw(1, figure 7) into detail-4 cover assembly(2).
 - (2) Install detail-28 spacer(3) on ball screw(1).
 - (3) Insert ball screw(1) through bushing(4) in fourth stage case(8).
 - (4) Install detail-21 sleeve(5) and detail-9 spacer(6) on ball screw(1).
 - (5) Install detail-17 end cap assembly(7) on end of ball screw(1) and slide detail-18 slider(9) to engage groove in end of ball screw(1).
 - (6) Hold ball screw(1) and turn cover assembly(2) handle clockwise to push bushing(4) out of case(8).



JG004958 (36X2)

1. Ball screw
2. Cover assembly
3. Spacer
4. Bushing
5. Sleeve
6. Spacer
7. End cap assembly
8. Fourth stage case
9. Slider

Figure 7. Inlet Guide Vane Outer Bushings - Removal

8. DATA PLATE - REMOVAL.

(See Figure 8.)

- a. Remove lockwire and four screws(3, figure 8) securing data plate(2) to intermediate case(1).
- b. Remove data plate(2).

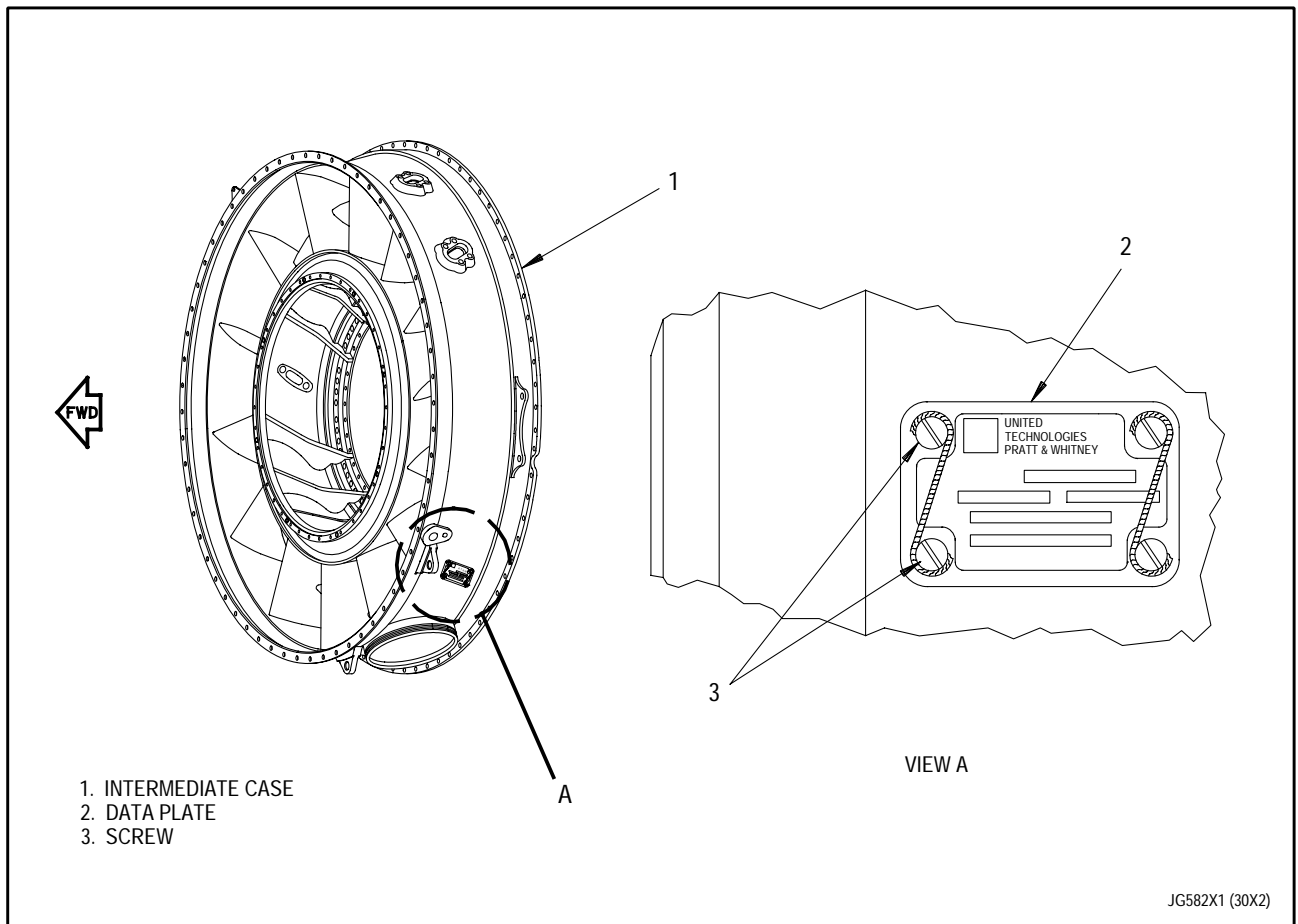
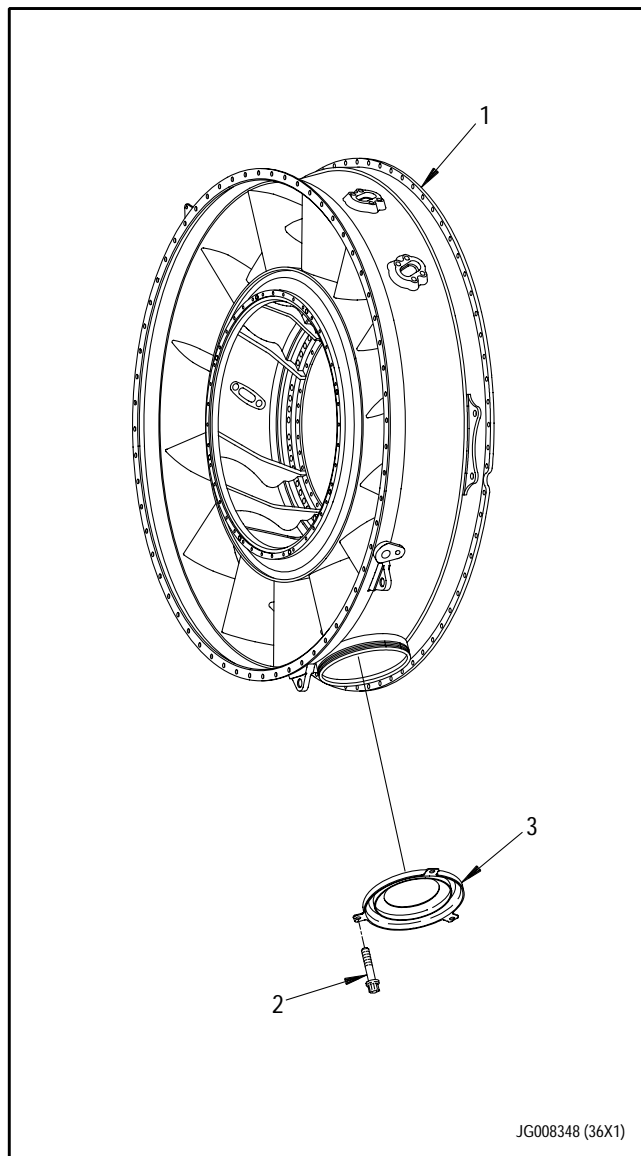


Figure 8. Data Plate Removal

9. BAFFLE ASSEMBLY - REMOVAL.

(See Figure 9.)

- a. Remove lockwire and three bolts(2, figure 9) securing baffle assembly(3) to intermediate case(1).
- b. Remove baffle assembly(3).



1. Intermediate case
2. Bolt
3. Baffle assembly

Figure 9. Baffle Assembly - Removal

WORK PACKAGE

TECHNICAL PROCEDURES

CASE ASSEMBLY, DIFFUSER -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 20

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	14	9	0	17	1
4	3	10	9	18	0
5 - 6	14	11 - 16	0	19	1
7 - 8	1			20	4

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

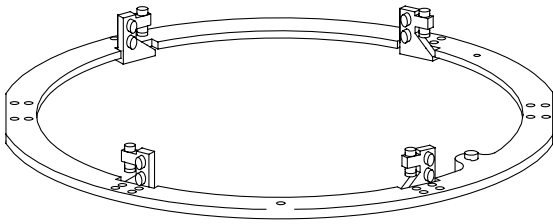
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

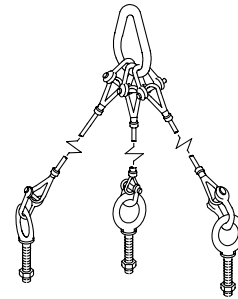
Paragraph	Function - Tool Nomenclature	Tool Number
2	Compressor Exit Stator, Igniter Plug Insert and Igniter Plug Spacer Ring - Removal	
	Adapter - - - - -	PWA 10356
	Sling, Three cable - - - - -	PWA 14175
	Stand, Assembly and transport - - - - -	PWA 56593
		or
		PWA 16868
	Wrench, Diffuser case igniter plug insert - - - - -	PWA 51704
	Adapter, ring - - - - -	PWA 57714
5	No. 4 Bearing Front Seal Assembly, No. 4 Bearing Front Air Sealing Ring Flange and No. 4 Bearing Air Vent Tube - Removal	
	Wrench, No. 4 bearing oil pressure nut	PWA 51944
	Puller, No. 4 bearing front carbon seal	PWA 52478
	Torque Adapter, No. 4 bearing oilpressure tube - - - - -	PWA 57542
	Torque Adapter, No. 4 bearing oilscavenge tube ring - - - - -	PWA 57734
6	No. 4 Bearing Internal Pressure Tube - Removal	
	Extractor - - - - -	PWA 55325

ILLUSTRATED SUPPORT EQUIPMENT



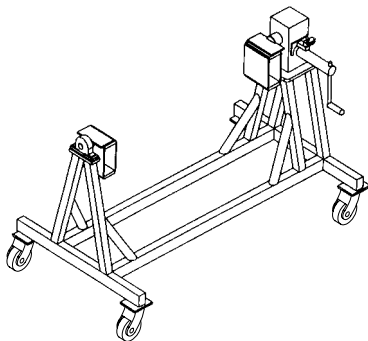
PWA 10356-C

Figure T1. PWA 10356 Adapter



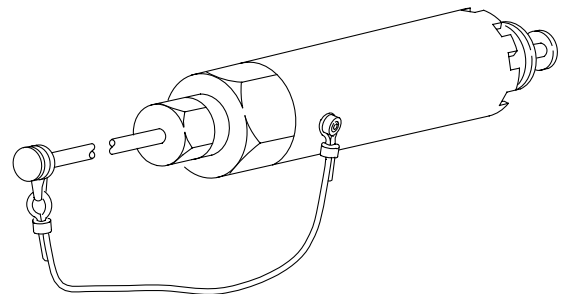
PWA14175-C

Figure T2. PWA 14175 Sling



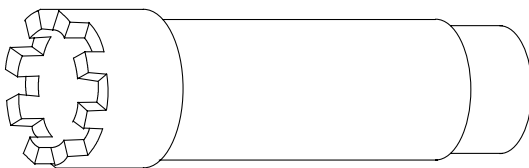
PWA 56593 -C

Figure T3. PWA 56593 Stand



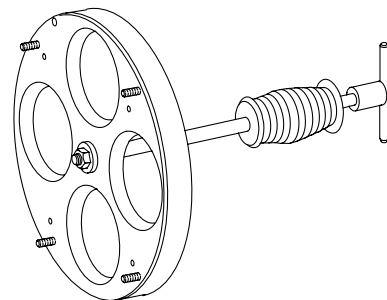
PWA 51704 -C

Figure T4. PWA 51704 Wrench



PWA 51944 -C

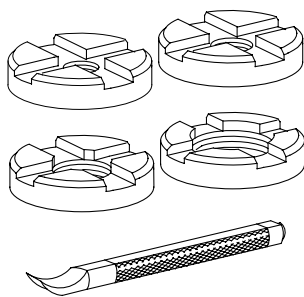
Figure T5. PWA 51944 Wrench



PWA 52478 -C

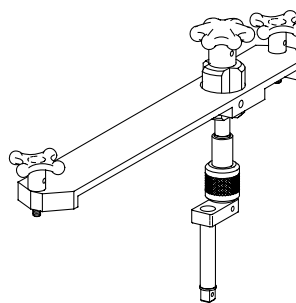
Figure T6. PWA 52478 Puller

ILLUSTRATED SUPPORT EQUIPMENT (continued)



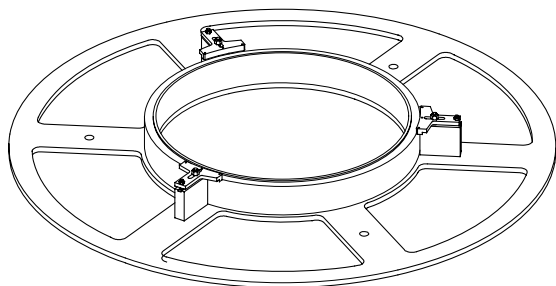
PWA 55325 -C

Figure T6A. PWA 55325 Extractor



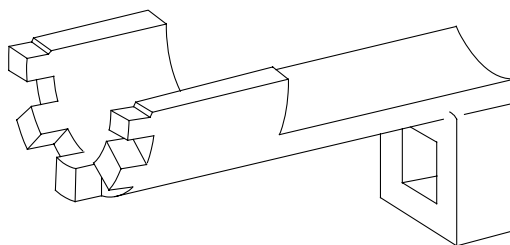
PWA 57542 -C

Figure T7. PWA 57542 Torque Adapter



PWA 57714 -C

Figure T8. PWA 57714 Adapter



PWA 57734 -C

Figure T9. PWA 57734 Torque Adapter

1. INTRODUCTION.

- a. This work package contains instructions for diffuser case disassembly.

2. COMPRESSOR EXIT STATOR, IGNITER PLUG INSERT AND IGNITER PLUG SPACER RING - REMOVAL.

(See Figures 1 through 3.)

- a. Install diffuser case into PWA 56593 stand per figure 1, and as follows:

- (1) Attach two standard lifting straps, 180 degrees apart, to PWA 10356 adapter ring.
- (2) Connect lifting straps to hoist.
- (3) Position PWA 10356 adapter on PWA 56593 stand and secure with detail bolts and nuts.
- (4) Install PWA 14175 three-cable sling equally

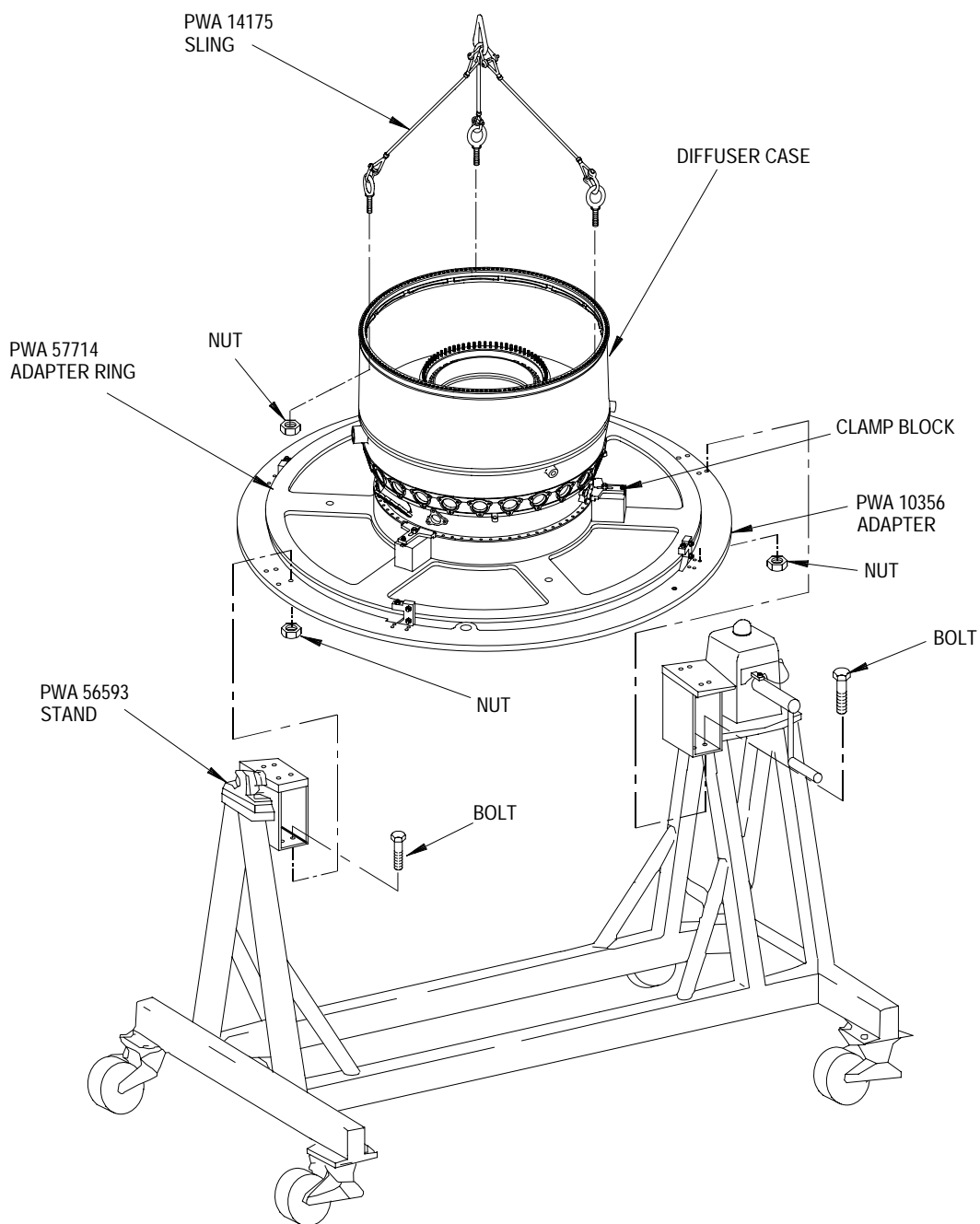
spaced to rear flange of diffuser case. Secure with detail nuts.

- (5) Position diffuser case on PWA 57714 adapter ring.
- (6) Secure diffuser case front flange to PWA 57714 adapter ring using three detail-8 clamps.
- (7) Position PWA 57714 adapter ring with diffuser case on PWA 10356 and secure with detail nuts and bolts.
- (8) Remove PWA 14175 three-cable sling.

- b. Place diffuser case in a front end up position.

- c. Remove bolts(7, figure 2) securing bushings(8) and compressor exit stator assembly(9).

- d. Remove stator(9) and bushings(8).



64071 (48X2)

Figure 1. Diffuser Case Installation Into PWA 56593 Stand

e. Remove igniter plug insert and spacer ring as follows:

- (1) Thread inner detail of PWA 51704 wrench(4, figure 3) handtight into right hand igniter plug insert(3).
- (2) Engage teeth on outer detail of PWA 51704 wrench(4) with slots in igniter plug insert(3).
- (3) Use standard wrench on hex of outer detail of wrench, to remove insert(3) from diffuser case(1).
- (4) Remove spacer ring(2).
- (5) Repeat procedure for left hand igniter plug.

3. No. 4 BEARING FRONT AIR SEALING RING - REMOVAL.

(See figure 2.)

a. Remove No. 4 bearing front air sealing ring as follows:

- (1) Remove bolts and nuts securing front and rear flanges of No. 4 bearing front air sealing ring(10, figure 2).
- (2) Install jackscrews, evenly spaced, in No. 4 bearing front air sealing ring(10) rear flange.
- (3) Tighten jackscrews evenly to break snap fit.
- (4) Remove No. 4 bearing front air sealing ring(10) using care not to damage honeycomb seals.

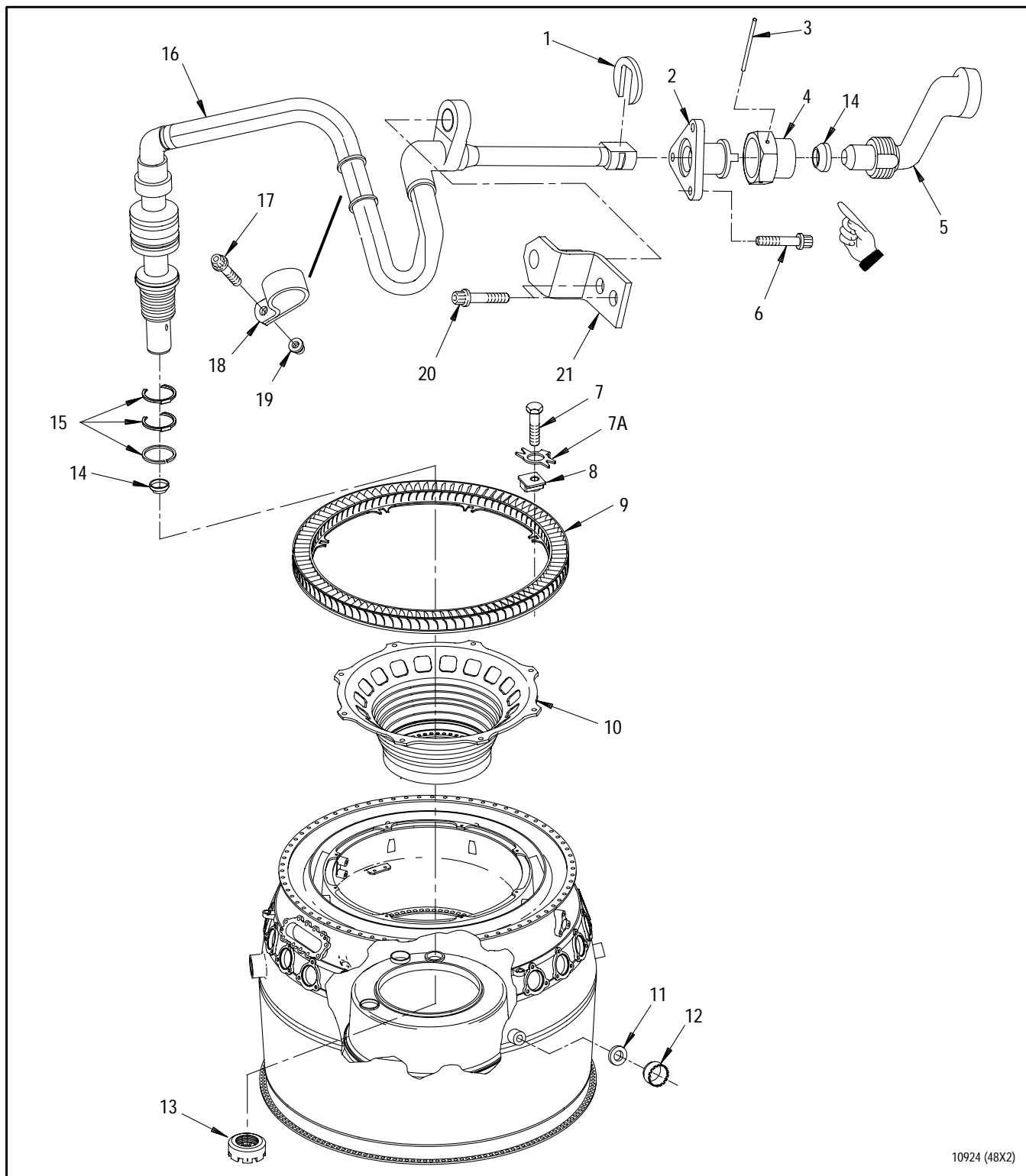


Figure 2. No. 4 Bearing Internal Pressure Tube, Compressor Exit Stator and No. 4 Bearing Internal Pressure Manifold - Removal

Legend for figure 2

1. Tube retaining plate
2. Diffuser case adapter
3. Pin
4. Tube coupling nut
5. No. 4 bearing pressure tube
6. Bolt
7. Bolt
- 7A. Washer
8. Bushing
9. Compressor exit stator assembly
10. No. 4 bearing air sealing ring
11. Spacer ring
12. Insert
13. Nut
14. Gasket
15. Seal rings
16. No. 4 bearing internal pressure tube
17. Bolt
18. Clamp
19. Nut
20. Bolt
21. Bracket

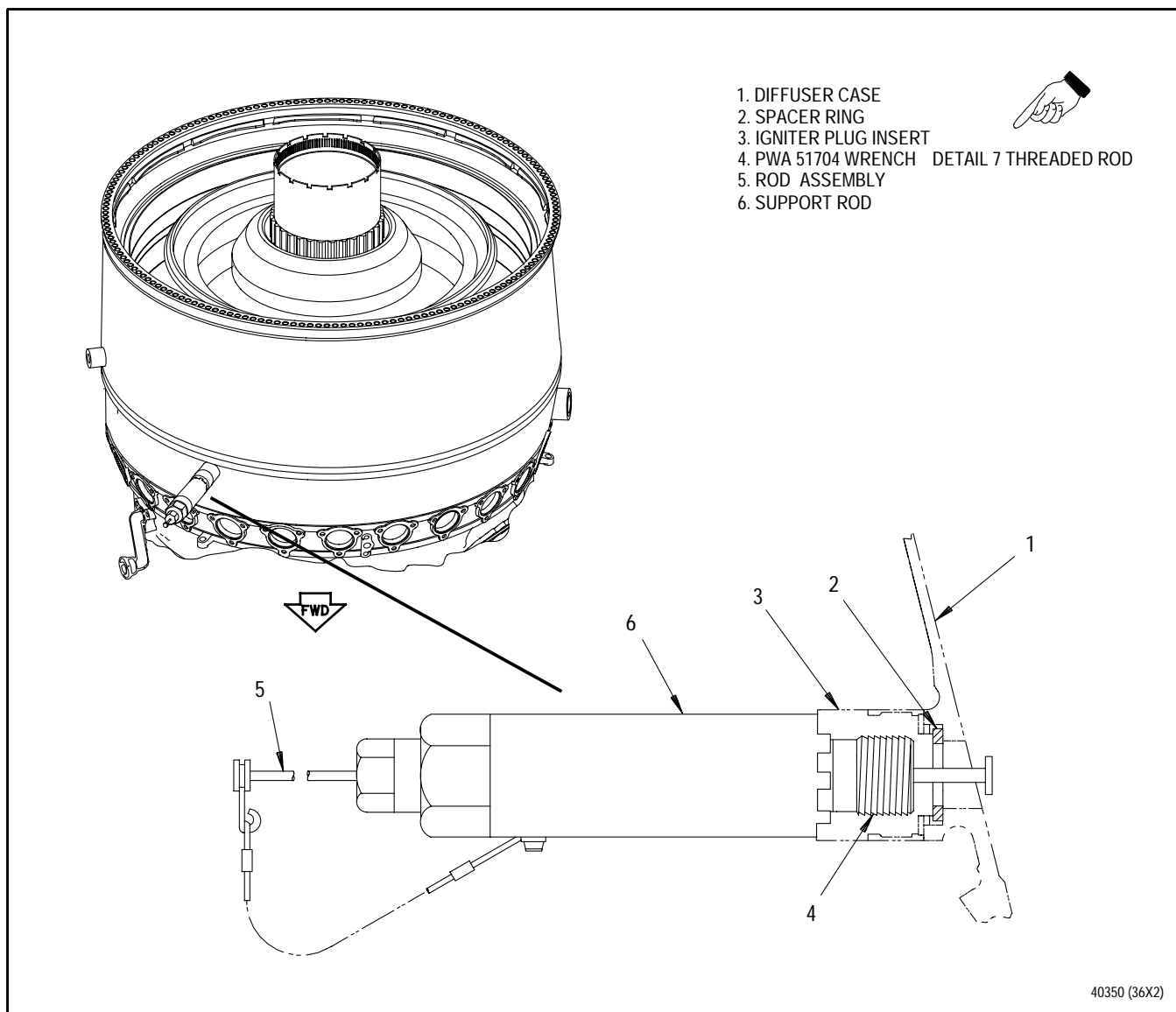


Figure 3. Igniter Plug Insert and Spacer Ring - Removal With PWA 51704 Wrench

**4. No. 4 BEARING SEAL AIR SUPPLY TUBE
AND No. 4 BEARING INTERNAL AIR VENT
TUBE - REMOVAL.**

(See Figures 4 and 5.)

- a. Remove No. 4 bearing seal air supply tube(2, figure 4) as follows:

(1) Remove lockwire and bolts(1) securing triangular flange of air supply tube to diffuser case.

(2) Pull air supply tube(2) out of heat shield fitting.

NOTE

Do not remove seal rings(3) unless they are damaged, stuck, or frozen in tube grooves.

(3) If necessary, remove seal rings(3).

- b. Remove No. 4 bearing internal air vent tube(3, figure 5) as follows:

(1) Remove lockwire and nut(1).

(2) Remove lockwire and loosen tube nut(4).

(3) Remove nut and bolt securing clamp(2).

(4) Remove tube(3).

(5) Remove lockwire and bolts(11) securing plate(10).

(6) Remove plate(10).

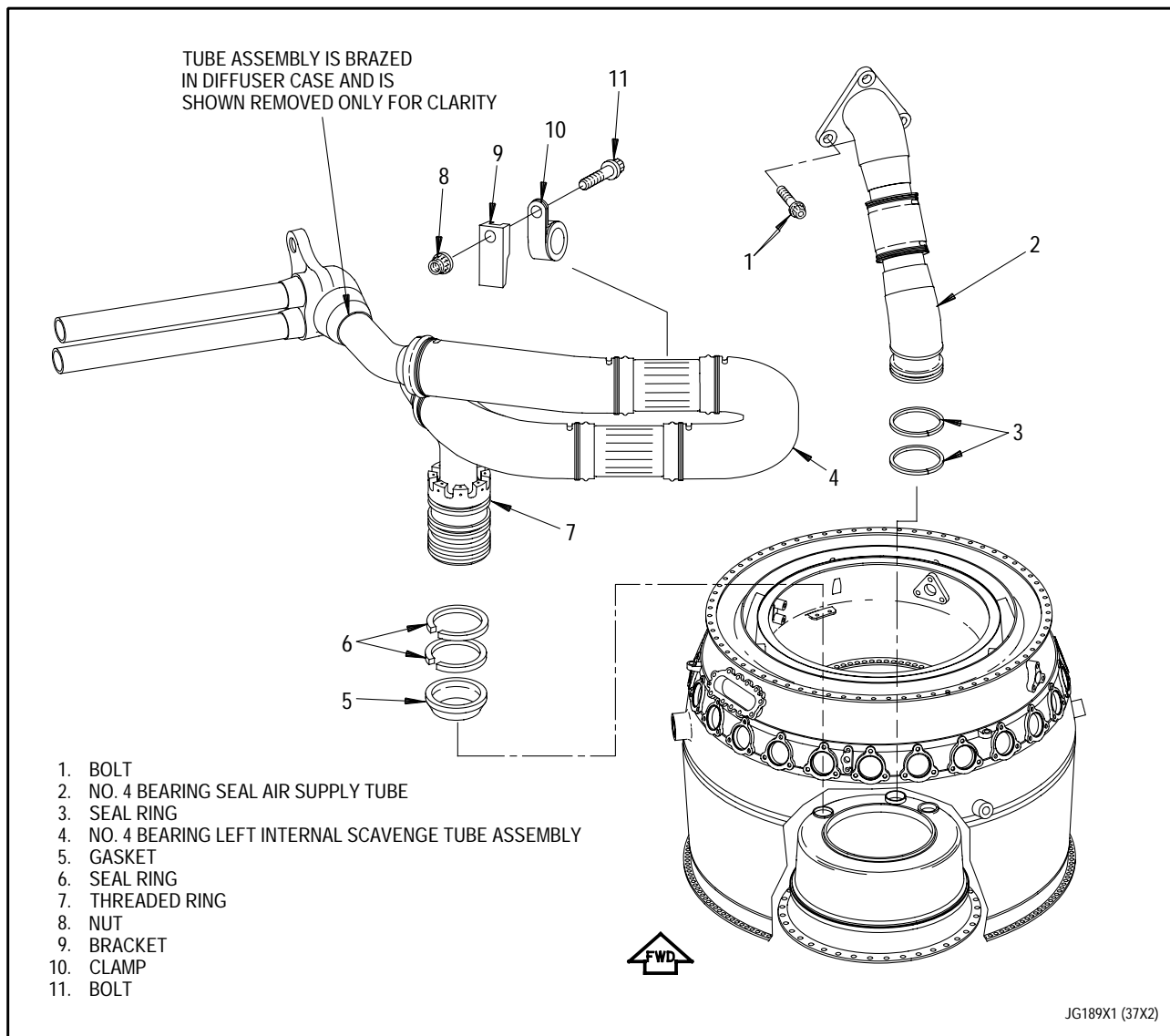
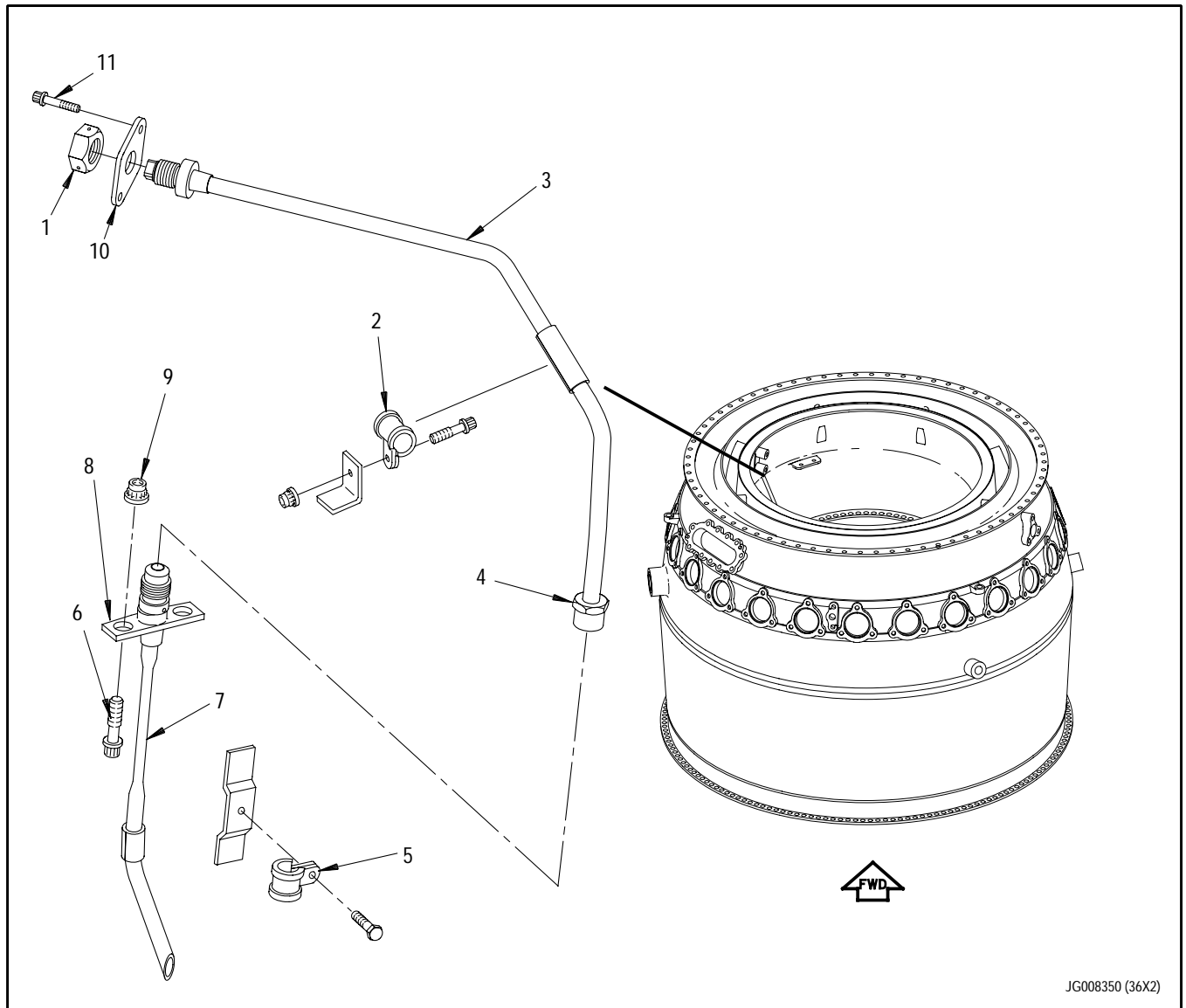


Figure 4. No. 4 Bearing Seal Air Supply Tube - Removal



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- | | |
|---|--------------------------------|
| 1. Nut | 6. Bolt |
| 2. Loop clamp | 7. No. 4 bearing air vent tube |
| 3. No. 4 bearing internal air vent tube | 8. Plate |
| 4. Tube nut | 9. Nut |
| 5. Loop clamp | 10. Plate |
| | 11. Bolt |

Figure 5. No. 4 Bearing Air Vent Tubes - Removal

**5. No. 4 BEARING FRONT SEAL ASSEMBLY,
No. 4 BEARING FRONT AIR SEALING RING
FLANGE AND No. 4 BEARING AIR VENT TUBE -
REMOVAL.**

(See figures 2, 4, and 5 and
Figures 6, 7 and 8.)

NOTE

No. 4 bearing left internal
scavenge tube is brazed in and
cannot be removed.

- a. Remove lockwire from threaded
ring(7, figure 4) and completely
loosen threaded ring with
PWA 57734 torque adapter.
- b. Remove No. 4 bearing front seal
assembly and No. 4 bearing front
air sealing ring as follows:



If support is not provided
during removal of nut(13,
figure 2) stress can be induced
in No. 4 bearing internal
pressure tube that may result
in cracks and subsequent bore
fire.

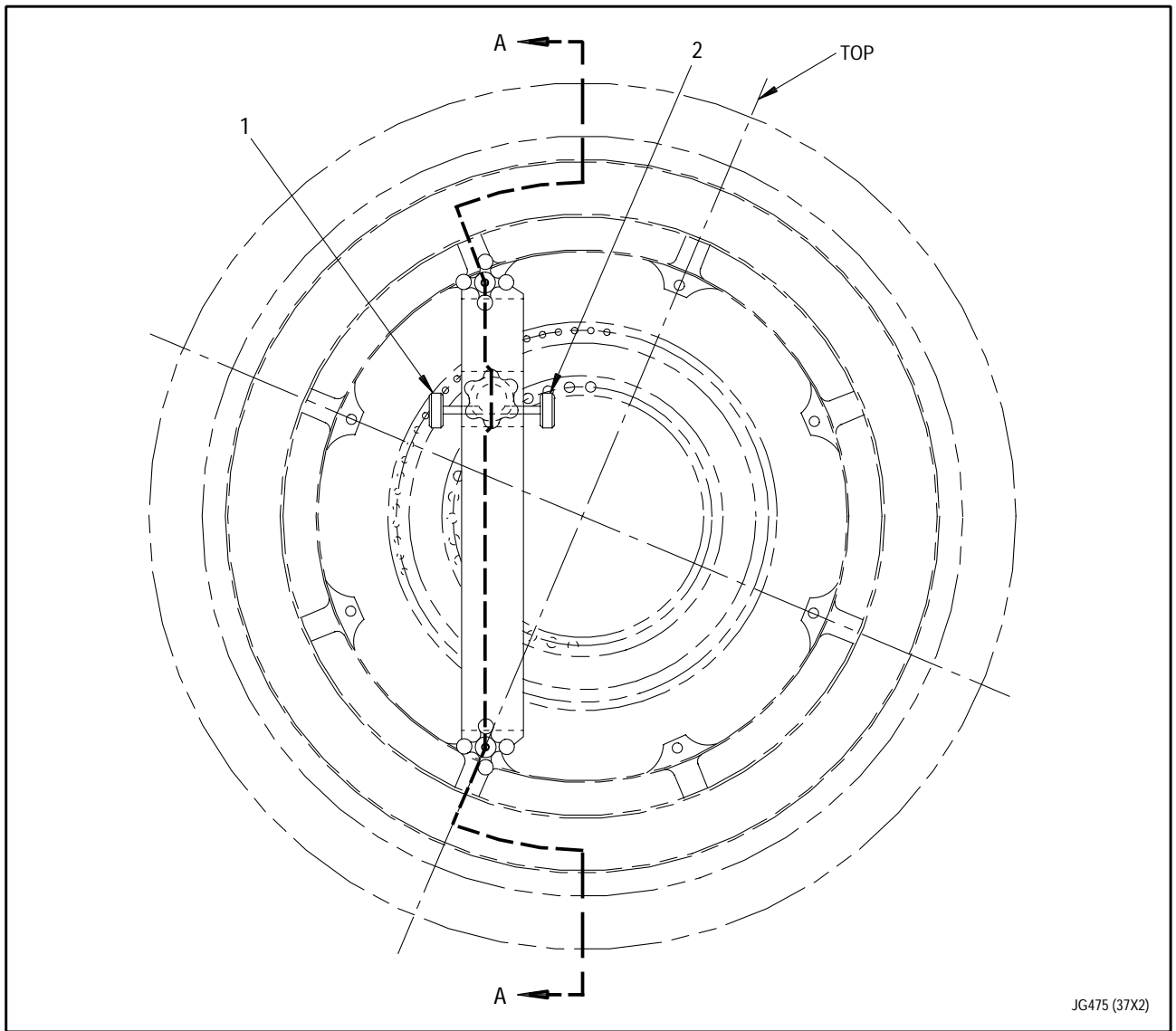
- (1) Remove No. 4 bearing
internal pressure tube
nut(13) as follows:
 - (a) Position PWA 57542 torque
adapter, detail-1
crossbar(9, figure 6) on
inside forward flange of
diffuser case with arrow
on crossbar pointing to
top center of diffuser
case.
 - (b) Hand tighten detail-8
knobs(3 and 8).

- (c) Assemble ratchet
adapter(4) and detail-3
extension assembly(6) and
install on detail-2
torque assembly(10).



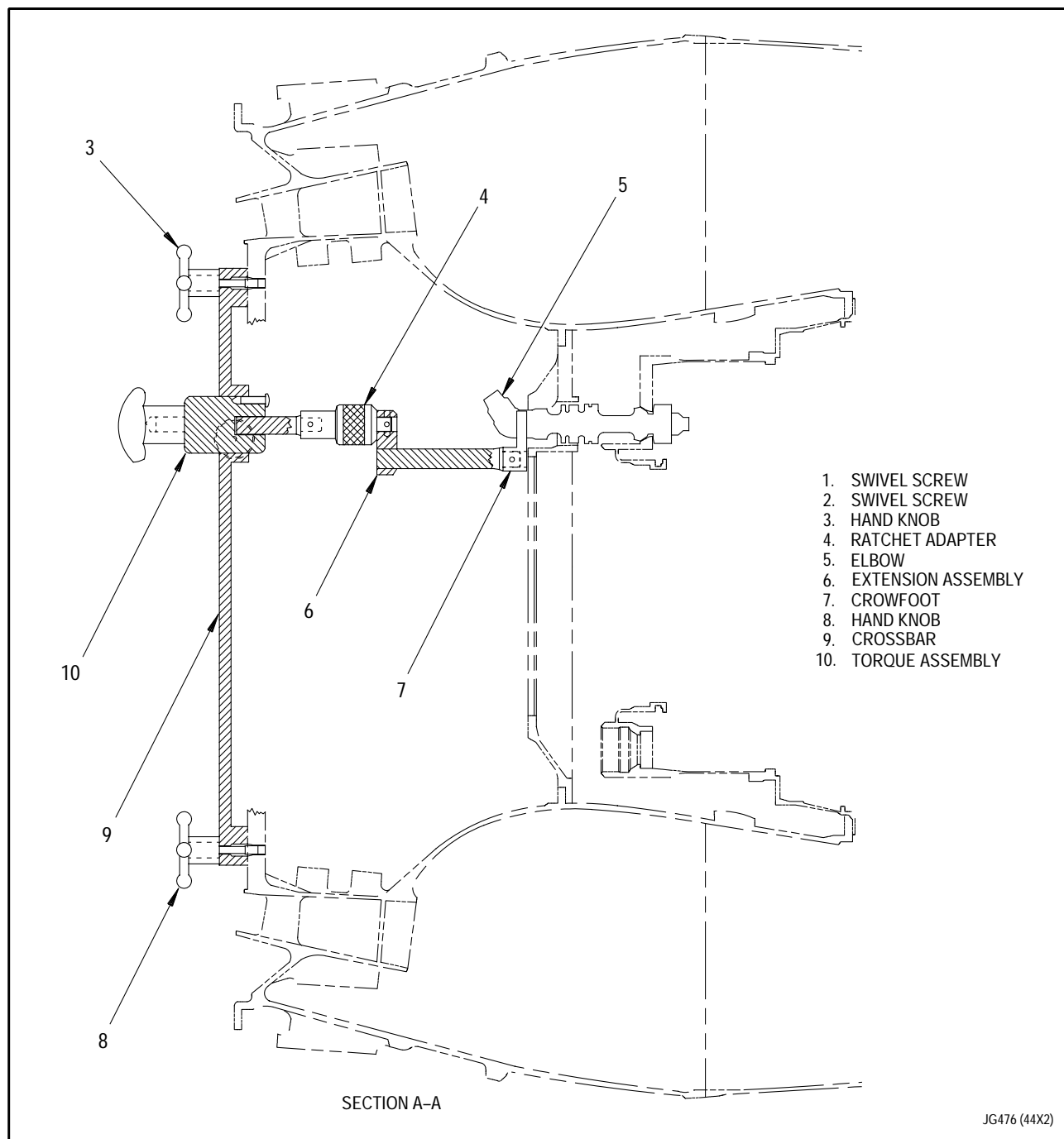
To prevent damage, ensure
crowfoot does not contact
diffuser case wall.

- (d) Install crowfoot(7) on
detail-3 extension
assembly(6) and position
on back-up flats of
elbow(5).
 - (e) With crowfoot(7) down,
position button on
ratchet adapter(4)
counterclockwise.
 - (f) Loosen right swivel
screw(2).
 - (g) While holding crowfoot(7)
on elbow(5), tighten left
swivel screw(1) until it
contacts detail-2 torque
assembly(10) then tighten
an additional 1/4 turn.
 - (h) Use PWA 51944 wrench to
remove nut(13, figure 2.)
 - (i) Remove PWA 57542 torque
adapter.
- (2) Remove screws(5, figure 7)
securing seal assembly(6) to
diffuser case(2).



JG475 (37X2)

**Figure 6. No. 4 Bearing Internal Pressure Tube Nut -
Removal Using PWA 57542 Torque Adapter (Sheet 1 of 2)**



**Figure 6. No. 4 Bearing Internal Pressure Tube Nut -
 Removal Using PWA 57542 Torque Adapter (Sheet 2 of 2)**

- (3) Install PWA 52478 puller(4, figure 8) on inner flange of front seal assembly(2).

NOTE

Ensure bolts(3) are installed in nutplate in No. 4 bearing front seal assembly(2) and not in No. 4 bearing front air sealing ring assembly(5).

- (4) Install bolts(3) to secure puller to No. 4 bearing front seal assembly(2).
- (5) Work slide hammer of puller to remove No. 4 bearing front seal assembly(2) and No. 4 bearing front air sealing ring(5).
- (6) For local (in-house) handling, protect seal by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal assembly in a cardboard box.

- (7) For shipping, protect seal with a cardboard collar. Refer to T.O. 2-1-111.

c. Remove No. 4 bearing air vent tube(7, figure 5) as follows:

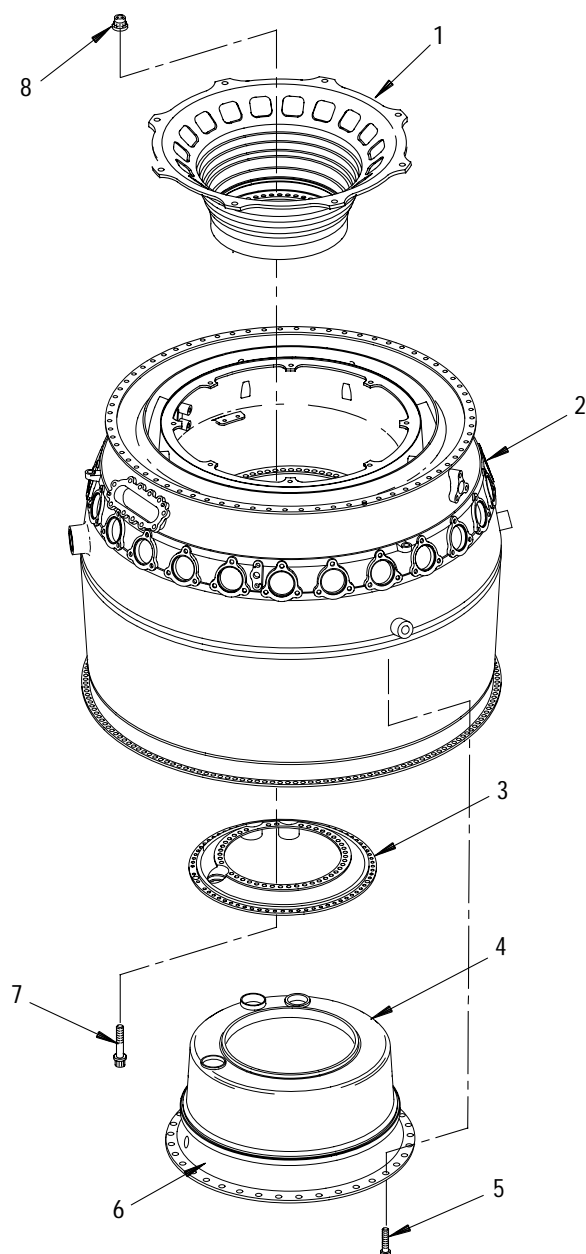
- (1) Remove lockwire and bolt securing clamp(5) to boss in diffuser case.
- (2) Remove bolts(6) and nuts(9) securing tube to flange inside diffuser case.
- (3) Remove tube(7).

d. Remove No. 4 bearing front air sealing ring flange(3, figure 7) as follows:

- (1) Remove bolts(7) and nuts(8) securing No. 4 bearing air sealing ring flange(3) to diffuser case(2).

Legend for figure 7

- | | |
|--|--|
| 1. No. 4 bearing front air sealing ring | 5. Screw |
| 2. Diffuser case | 6. No. 4 bearing front seal support assembly |
| 3. No. 4 bearing air sealing ring flange | 7. Bolt |
| 4. No. bearing front air sealing ring assembly | 8. Nut |



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Figure 7. No. 4 Bearing Front Seal Support Assembly and Front Air Sealing Ring - Removal

(2) Ensure gasket(5, figure 4) is still attached to tube and does not remain in diffuser case this will cause improper sealing at assembly. If necessary, use locally manufactured tool to remove gasket from diffuser case.

(3) Remove No. 4 bearing air sealing ring flange(3, figure 7) using care not to damage seal rings (6, figure 4) and (15, figure 2).

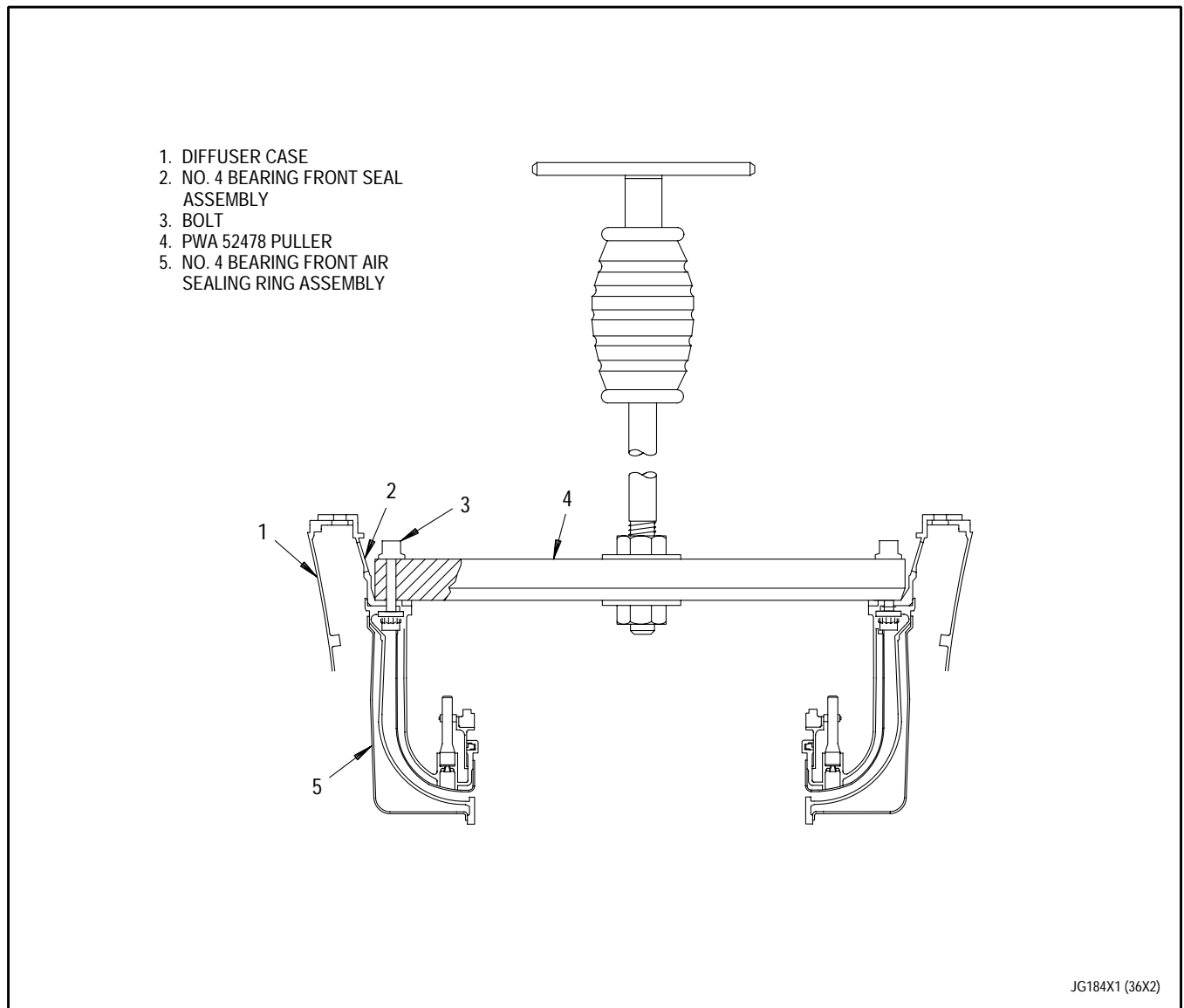


Figure 8. No. 4 Bearing Front Seal Assembly and No. 4 Bearing Front Air Sealing Ring - Removal With PWA 52478 Puller

**6. No. 4 BEARING INTERNAL PRESSURE
TUBE - REMOVAL.**

(See figure 2.)

- a. Place diffuser case so that rear flange is down.
- b. Remove No. 4 bearing internal pressure tube(16, figure 2) as follows:

NOTE

Do not remove pin(3) from coupling nut(4).

- (1) Remove No. 4 bearing pressure tube(5) by loosening tube coupling nut(4).
- (2) Check that conical gasket is still attached to tube and does not remain in engine cavity. If necessary, use locally manufactured tool to remove gasket(14) from engine cavity.
- (3) Remove gasket(14) from No. 4 bearing pressure tube(5).
- (4) Remove lockwire and bolts(6) securing diffuser case adapter(2).

- (5) Remove adapter(2) and tube retaining plate(1).
- (6) Remove nut(19) and bolt(17) which secure clamp(18) to bracket inside case.
- (7) Remove lockwire and bolts(20) and bracket(21) securing pressure tube.
- (8) Remove tube(16).
- (9) Check that conical gasket is still attached to tube and does not remain in engine cavity. If necessary, use locally manufactured tool to remove gasket(14) from engine cavity.
- (10) Remove gasket(14) by threading detail-3 nut of PWA 55325 extractor onto No. 4 bearing internal pressure tube(16). Insert lever detail of extractor into slot in nut and pry off gasket. Discard gasket.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, No. 4 BEARING FRONT (AND AIR SEALING RING) -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7	0				
8 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

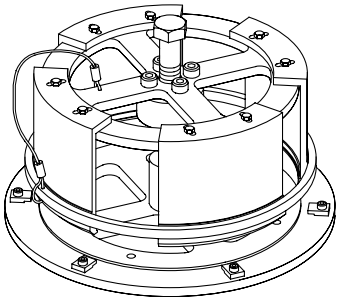
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 4 Bearing Front Seal Assembly and Air Sealing Ring - Disassembly	
	Fixture, Removal, No. 4 bearing front air sealing ring - - - - -	PWA 57724

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57724 -C

Figure T1. PWA 57724 Fixture

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 4 bearing front seal assembly and front seal support.

**2. No. 4 BEARING FRONT SEAL ASSEMBLY
AND AIR SEALING RING - DISASSEMBLY.**

(See Figures 1 and 2.)

- a. Place assembly(2, figure 1) on bench so carbon seal is up.
- b. Straighten cotter pins(7). Do not remove cotter pins at this time.
- c. Carefully press down on front seal assembly(5); then remove cotter pins(7).
- d. Remove front seal assembly(5), bushings(6) and springs(3).
- e. Remove metal seal ring(4).
- f. For local (in-house) handling, protect seal by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal assembly in a cardboard box.
- g. For shipping, protect seal with a cardboard collar. Refer to T.O. 2-1-111.

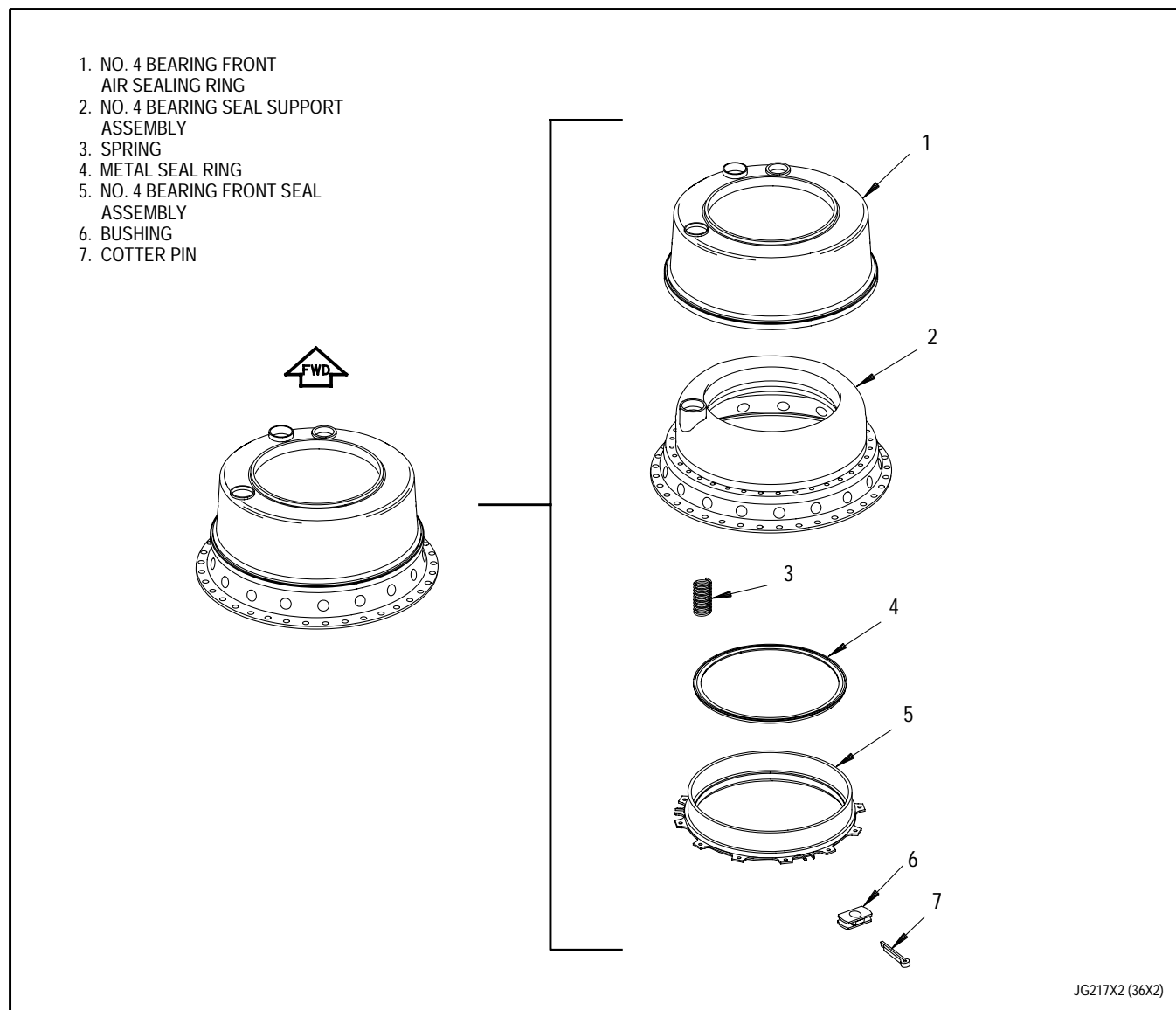


Figure 1. No. 4 Bearing Front Seal Support, Front Seal Assembly and Front Air Sealing Ring - Disassembly



Air sealing ring and seal support have thin walls. They can be easily damaged.

h. Disassemble the air sealing ring(5, figure 2) and seal support(3) as follows:

- (1) If required, remove upper half of fixture plate(9) from lower half(12) by loosening thumb screw(11).
- (2) Install air sealing ring(5) and seal support(3) onto PWA 57724 fixture(12).
- (3) Secure with screws(2) and clamps(1).
- (4) Position jaws(6) outward, onto air sealing ring(5) and seal support(3).
- (5) Adjust bolt(10) to set height of shoulder of jaws(6) with lip of air sealing ring(5).
- (6) Position jaws(6) inward under lip of air sealing ring(5). Slide ring(4) down to secure jaws(6).
- (7) Tighten screws(8) and washers(7).
- (8) Tighten bolt(10) in a clockwise direction to remove air sealing ring(5) from seal support(3).
- (9) Remove upper half of fixture plate(9), air sealing ring(5), and seal support(3).
- (10) Place parts in protective containers.
- (11) For storage of PWA 57724, secure upper half of fixture plate(9) to lower half(12) with thumb screws(11).

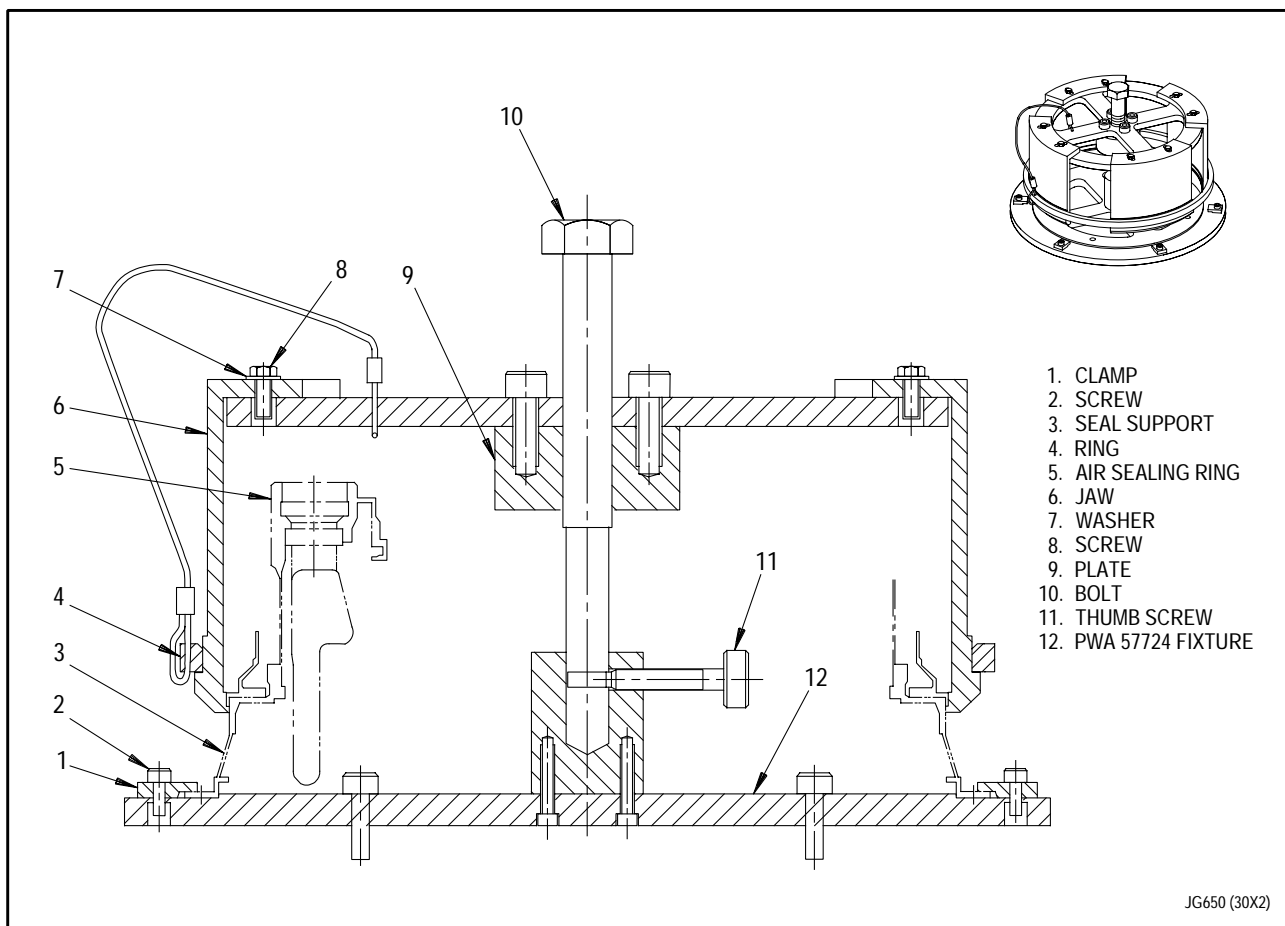


Figure 2. Front Air Sealing Ring and Seal Support - Disassembly With PWA 57724 Fixture

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, NO. 4 BEARING AND RACE, OUTER -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6	26	7 - 8 Added	26		

REFERENCE MATERIAL REQUIRED

Title	Number
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench	
- PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
GLOVES, LINT-FREE	-
OIL, LUBRICATING	MIL-L-7808

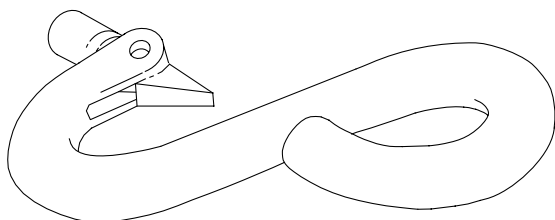
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

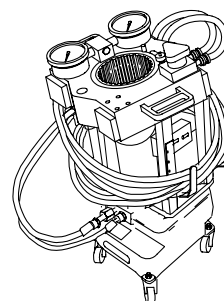
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 4 BEARING HOUSING AND OUTER RACE - DISASSEMBLY	
	WRENCH, NO. 4 BEARING OUTER RACE RETAINING NUT - - -	PWA 50971
	ADAPTER, NO. 5 BEARING OUTER RACE RETAINING NUT - - -	PWA 52453
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
		OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	BASE, NO. 4 BEARING OUTER RACE ASSEMBLY - - - - -	PWA 50970
	DRIFT, NO. 4 BEARING OUTER RACE ASSEMBLY - - - - -	PWA 50968

ILLUSTRATED SUPPORT EQUIPMENT



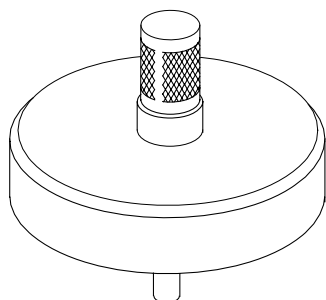
PWA 2388 -C

Figure T1. PWA 2388 HOOK



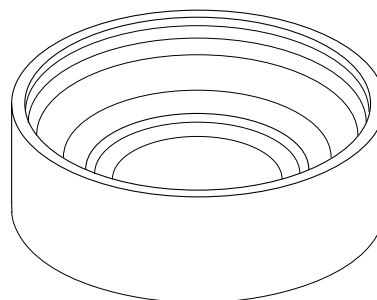
PWA 50308 -C

Figure T2. PWA 50308 WRENCH



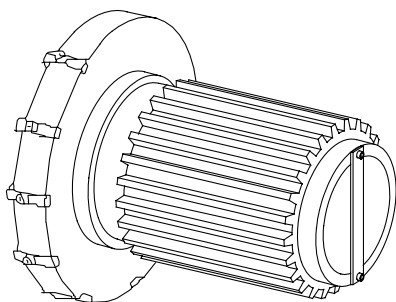
PWA 50968 -C

Figure T3. PWA 50968 DRIFT



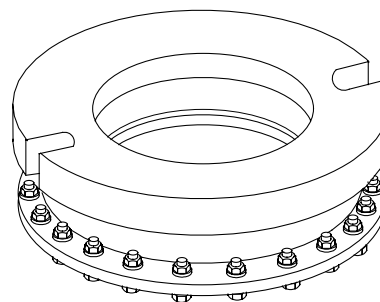
PWA 50970 -C

Figure T4. PWA 50970 BASE



PWA 50971 -C

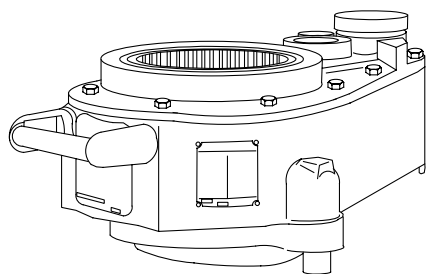
Figure T5. PWA 50971 WRENCH



PWA 52453 -C

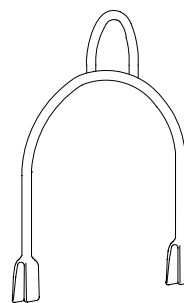
Figure T6. PWA 52453 ADAPTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



SWE 8200 -C

Figure T7. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T8. SWE 81001/81002 SLING

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 4 bearing outer race from the No. 4 bearing housing.

2. No. 4 BEARING HOUSING AND OUTER RACE - DISASSEMBLY.

(See Figures 1, 2, and 3.)

- a. Remove rivet(2, figure 1) securing retaining nut(1).
- b. Install PWA 50971 wrench(1, figure 2) so teeth engage outer race retaining nut(8).
- c. Install PWA 52453 adapter(3) onto No. 4 bearing housing(6). Secure with bolts(5) and nuts(4).
- d. If SWE 8100/8200 torque multiplier(2, figure 3) is used, install SWE 81001/81002 sling(5) onto torque multiplier.
- e. Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 hydraulic wrench(1) or connect PWA 2388 hook to SWE 81001/81002 sling(5).
- f. Install PWA 50308 hydraulic wrench(2, figure 2) or SWE 8100/8200 torque multiplier(2) so splines engage with PWA 50971 wrench(1) and pins engage slots in PWA 52453 adapter(3). Attach ratchet adapter(3, figure 3) and work handle(4) if SWE 8100/8200 torque multiplier(2) is used.



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.

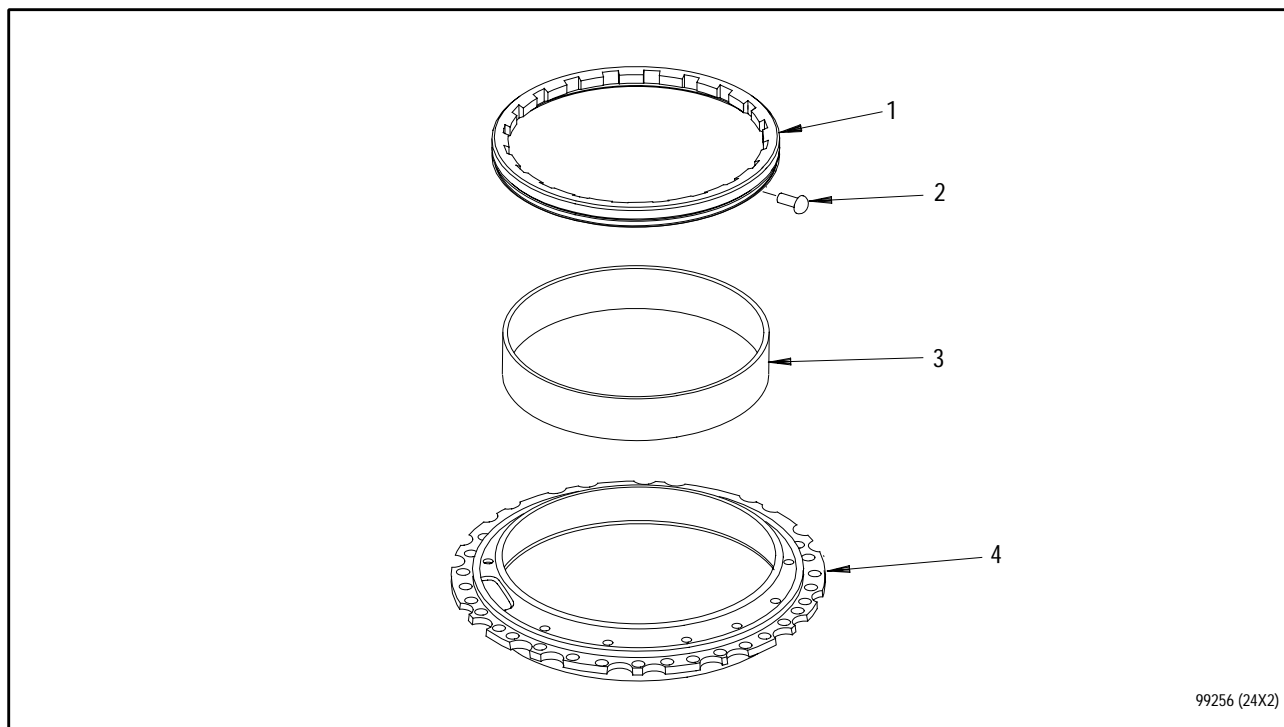
NOTE

Retaining nut has left-hand threads. Turn nut clockwise (right-hand) to loosen it.

- g. Actuate PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier to loosen nut(8, figure 2) turning in clockwise direction. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
- h. Remove wrench or torque multiplier using hoist with nylon strap or sling respectively. Remove tools and nut.
- i. Install large threaded end of No. 4 bearing housing(6) PWA 50970 base.
- j. Place No. 4 bearing housing(6) and PWA 50970 base under arbor press.

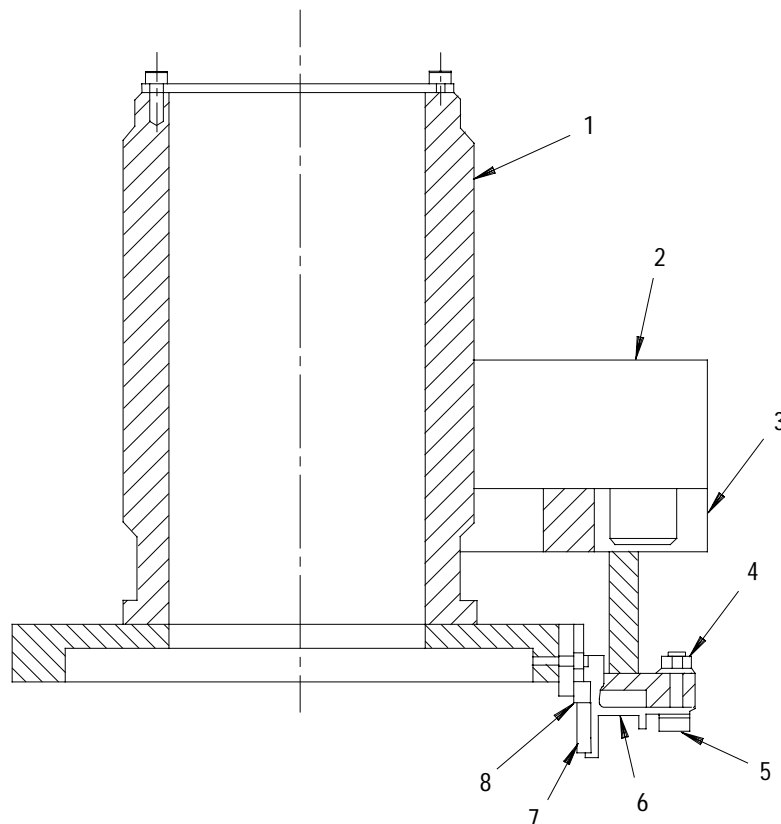
k. Place PWA 50968 drift on No. 4 bearing outer race(7); press race aft.

l. Coat No. 4 bearing outer race with lubricating oil and place with inner race and rollers (previously removed).



1. Bearing retaining nut
2. Rivet, PN 4007054
3. No. 4 bearing outer race
4. No. 4 bearing housing

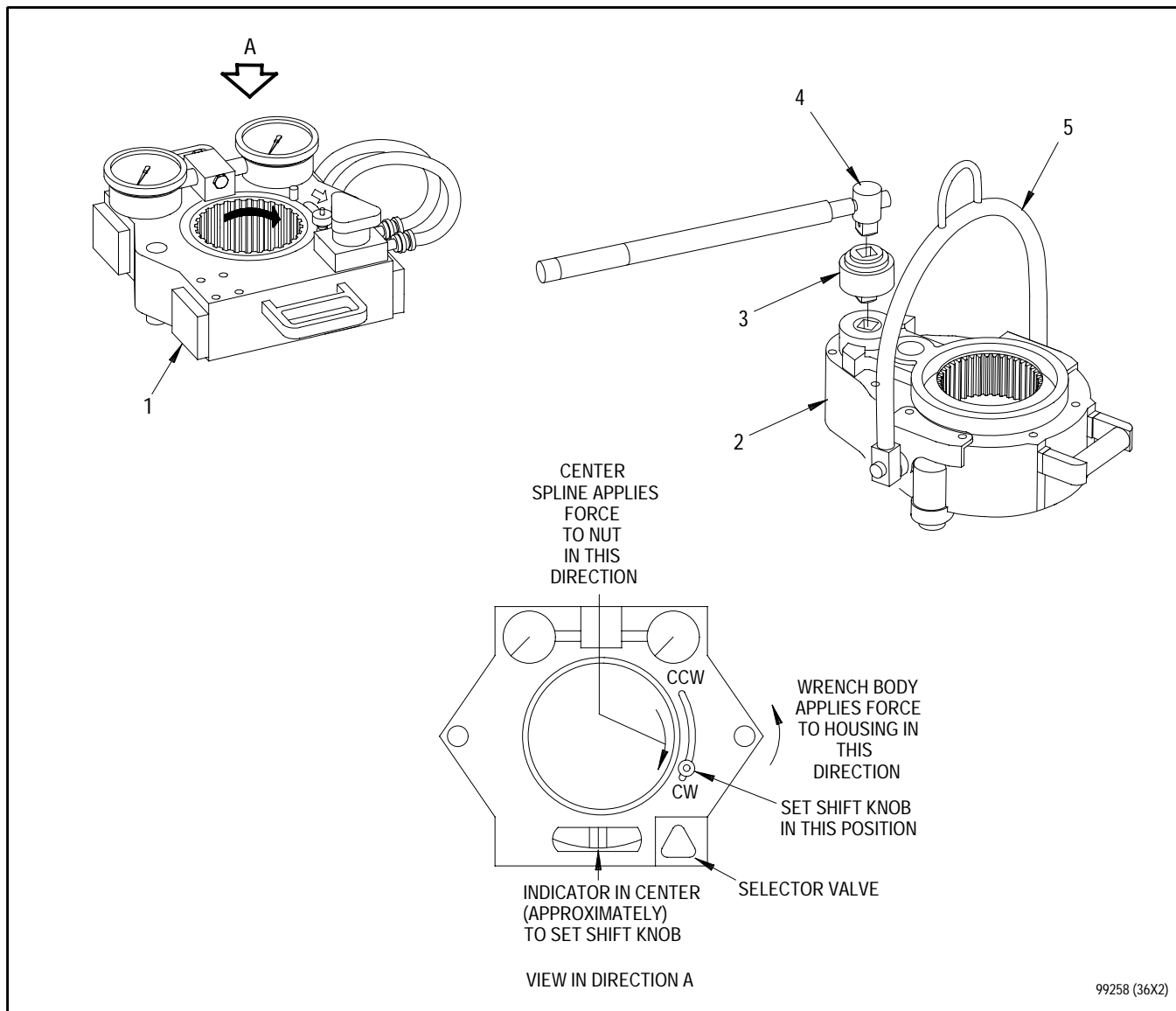
Figure 1. No. 4 Bearing Housing and Outer Race - Disassembly



99257 (36X2)

- | | |
|---|-----------------------------|
| 1. PWA 50971 wrench | 5. Bolt |
| 2. PWA 50308 hydraulic wrench or
SWE 8100/8200 torque multiplier | 6. No. 4 bearing housing |
| 3. PWA 52453 adapter | 7. No. 4 bearing outer race |
| 4. Nut | 8. Outer race retaining nut |

Figure 2. No. 4 Bearing Outer Race Retaining Nut - Removal



1. PWA 50308 hydraulic wrench
2. SWE 8100/8200 torque multiplier
3. Ratchet adapter
4. Work handle
5. SWE 81001/81002 sling

Figure 3. PWA 50308 Hydraulic Wrench and SWE 8100/8200 Torque Multiplier

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, No. 4 BEARING REAR -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for disassembling the No. 4 bearing rear seal assembly.

2. No. 4 BEARING REAR SEAL ASSEMBLY - DISASSEMBLY.

(See Figure 1.)

- a. Position No. 4 bearing seal support(6) on bench with carbon seal(1) facing up.
- b. Press down on metal edge of carbon seal(1) to remove spring pressure against three cotter pins(4).

- c. Remove cotter pins(4) from seal pins(5). Gently release pressure on carbon face seal.
- d. Remove bearing seal(1), bushings(2) and springs(7).
- e. Remove metal seal ring(3).
- f. For local (in-house) handling, protect seal by placing it between two pieces of styrofoam wrapped in plastic. Tape around open ends and place seal in a cardboard box.
- g. For shipping protect seal with a cardboard collar. Refer to T.O. 2-1-111.

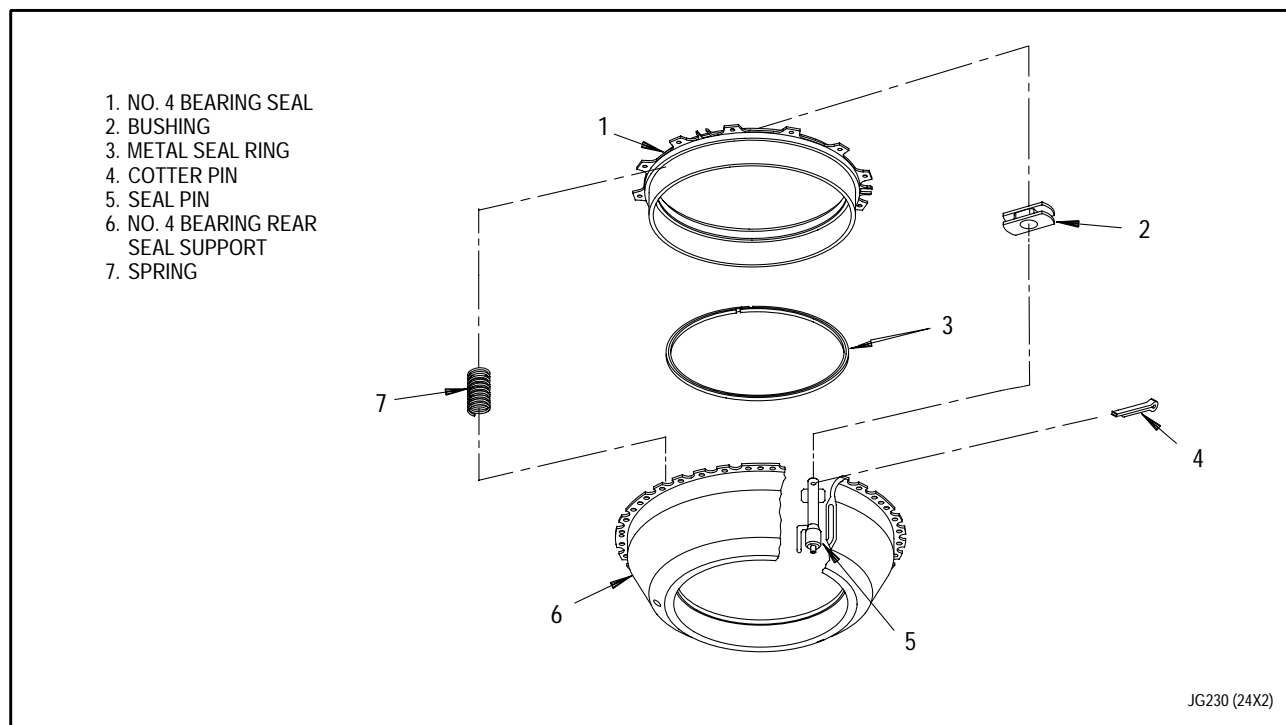


Figure 1. No. 4 Bearing Rear Seal Assembly - Disassembly

WORK PACKAGE

TECHNICAL PROCEDURES

CHAMBER - COMBUSTION, VANES AND SUPPORT, FIRST STAGE TURBINE STATOR -

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	29	10	29	11 - 12	22
4 - 9	22				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
OIL, PENETRATING	VV-P-216
PENCIL (CRAYON), SILVER METAL	COLORBRITE NO. 2101
MARKING (HARD) (PMC 4059-7)	OR ANADEL NO. 1936
PENCIL (CRAYON), SILVER METAL	COLOR-TEX NO. 1843
MARKING (HARD)	

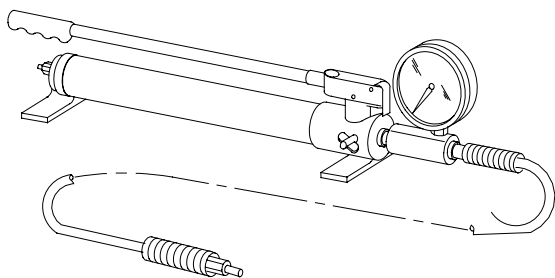
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

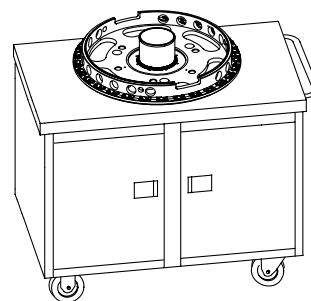
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES AND SUPPORT - DISASSEMBLY	
	FIXTURE, GUIDE INSTALLATION AND REMOVAL, FIRST STAGE TURBINE STATOR SUPPORT, COMBUSTOR AND FIRST STAGE TURBINE STATOR VANES - - - - -	PWA 57506
	PULLER, RING, 1ST STAGE TURBINE OUTER ASSEMBLY - - -	PWA 57916
	STAND, ASSY/DISASSY, HIGH PRESSURE TURBINE - - - - -	PWA 57830
		OR
	STAND, ASSY/DISASSY, HPT - - - - -	PWA 57765
		OR
	STAND, HIGH PRESSURE TURBINE ASSEMBLY AND DISASSEMBLY - - - - -	PWA 57503
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380

ILLUSTRATED SUPPORT EQUIPMENT



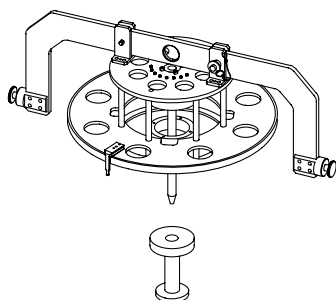
PWA 55380 -C

Figure T1. PWA 55380 PUMP



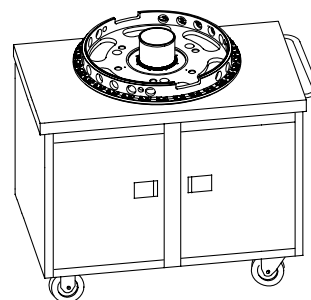
PWA 57503 -C

Figure T2. PWA 57503 STAND



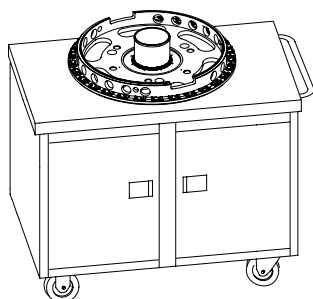
PWA 57506 -C

Figure T3. PWA 57506 FIXTURE



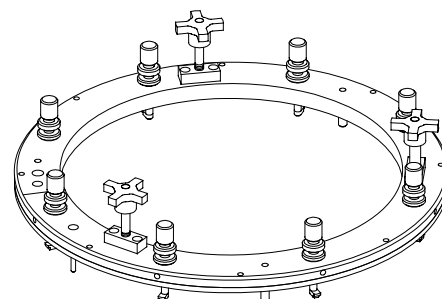
PWA 57765 -C

Figure T4. PWA 57765 STAND



PWA 57830 -C

Figure T5. PWA 57830 STAND



PWA 57916 -C

Figure T6. PWA 57916 PULLER

1. INTRODUCTION.

- a. This work package contains detailed instructions for separating 1st stage turbine stator vanes and 1st stage turbine stator support (TOBI) from combustion chamber. This includes removal of outer support and removal of 1st stage turbine stator vanes.

2. COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES AND SUPPORT - DISASSEMBLY.

(See Figures 1 through 5.)

NOTE

Combustion chamber, 1st stage turbine stator vanes and support were removed from core engine module as an assembly using PWA 57506 fixture.

- a. Remove 1st stage turbine stator vanes(3, figure 1) and 1st stage turbine stator support(4) from combustion chamber(1) as follows:

- (1) Place PWA 57506 fixture(5), combustion chamber(1), 1st stage turbine stator vanes(3), and 1st stage turbine stator support(4) on bench with fixture center post pointing up.



Failure to use care when removing bolts can result in damage to combustion chamber liner segment retainers.

- (2) Remove bolts(2) securing 1st stage turbine stator support(4) to combustion chamber(1).



Storing combustion chamber assembly on dome end or on its side can cause damage to combustion chamber liner segment retainers.

- (3) Remove combustion chamber(1) and place on bench, rear end down.

- (4) Remove 1st stage turbine stator vanes(3) as follows:

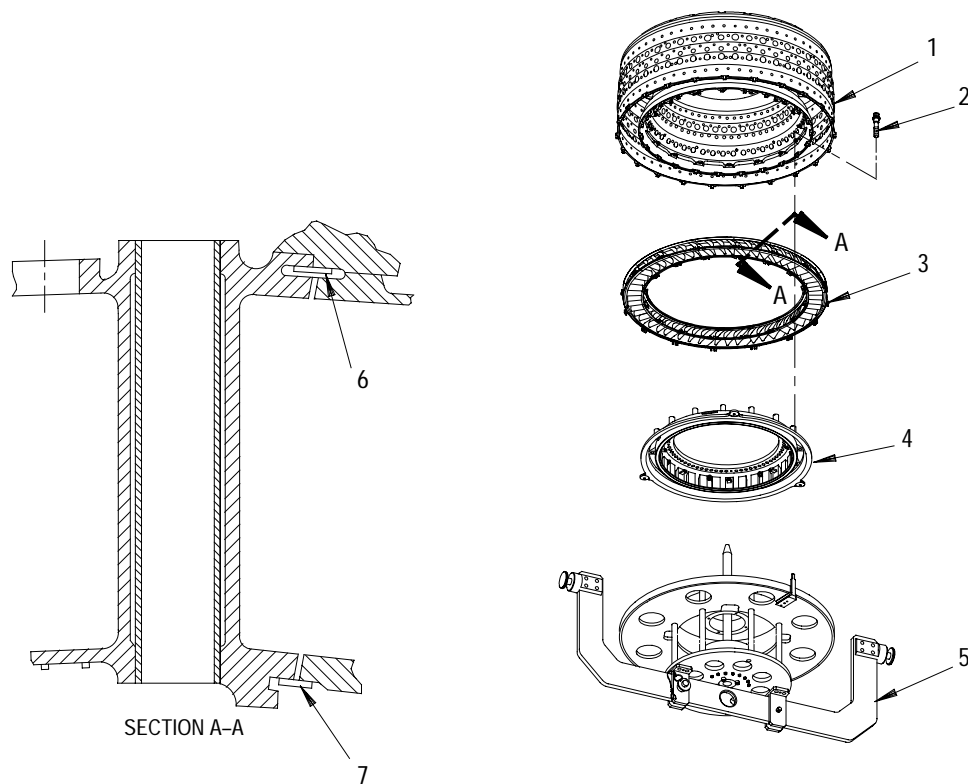
- (a) If same vanes are to be installed at assembly, attach tags and label in numerical sequence in counterclockwise direction. Number one vane is located in line with offset slot on PWA 57506 fixture(5).

- (b) Remove 1st stage turbine stator vanes(3).

- (c) Remove 1st stage turbine stator outer and inner seals(6 and 7) from 1st stage turbine stator vanes(3).

- (5) Remove four cap screws securing 1st stage turbine stator support(4) to PWA 57506 fixture(5) from bottom.

- (6) Mark offset hole in 1st stage turbine stator support(4). Remove 1st stage turbine stator support and place front down on bench.



92079 (36X2)

1. Combustion chamber
2. Bolt
3. 1st stage turbine stator vanes
4. 1st stage turbine stator support
5. PWA 57506 fixture
6. 1st stage turbine stator outer seal
7. 1st stage turbine stator inner seal

Figure 1. Combustion Chamber, First Stage Turbine Stator Vanes, and First Stage Turbine Stator Support - Disassembly

- b. Remove 1st stage turbine inner air sealing ring(1, figure 2) from 1st stage turbine stator support(5). If necessary, tap inner air sealing ring to remove.
- c. Remove 1st stage turbine outer air sealing ring(4) from 1st stage turbine stator support(5) as follows:

NOTE

There are three 1st stage turbine outer air sealing ring(4) configurations identified by part number printed on rear face of ring. PN 4082788-01 will require separation from 1st stage turbine stator support(5) using PWA 57916 puller per step (1). Other air sealing rings are removed per step (2).

- (1) Remove PN 4082788-01 1st stage turbine outer air sealing ring as follows:

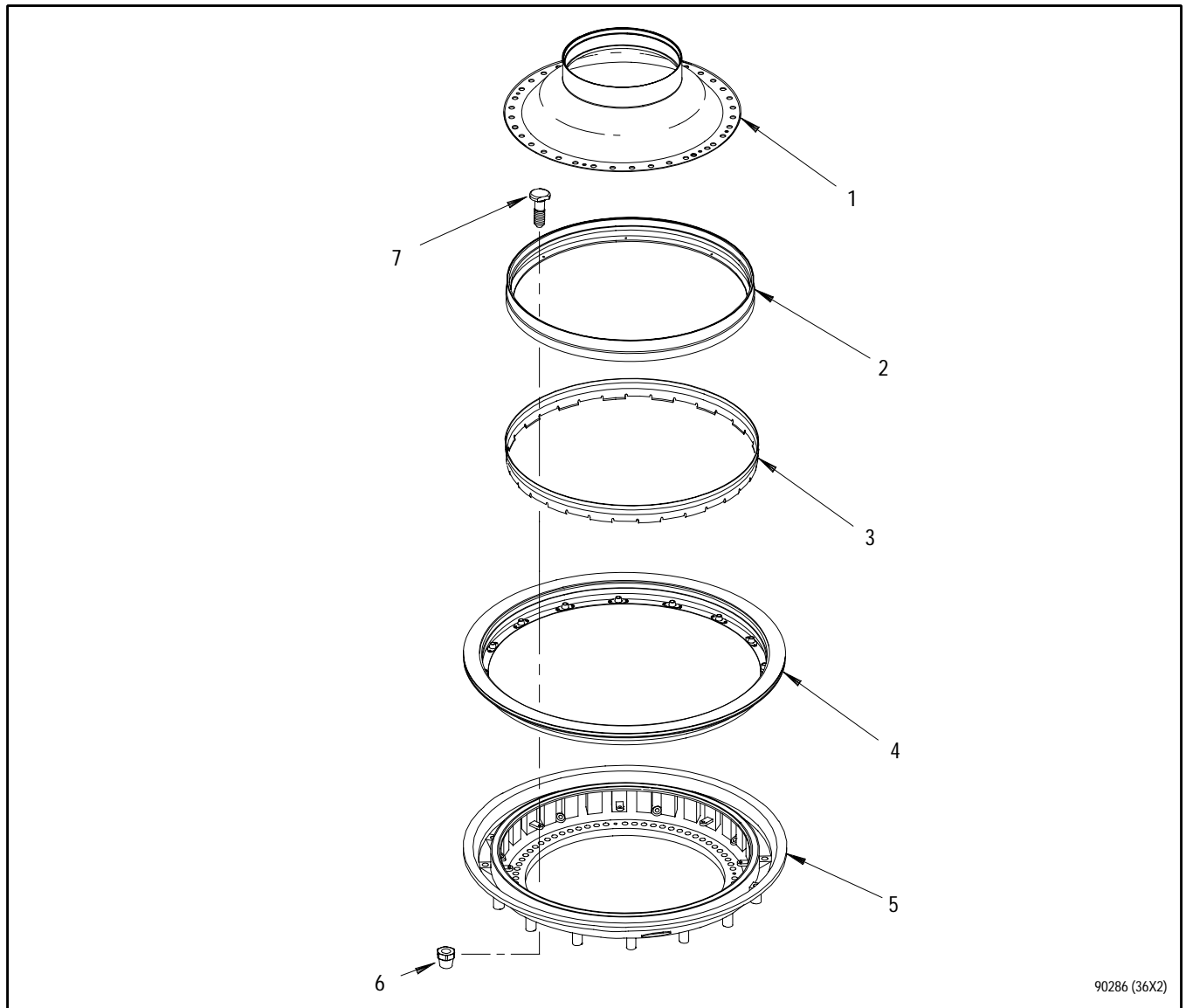
- (a) Rotate three hand knobs(4, figure 3) and eight knurled check nuts(3) of PWA 57916 puller(1) counterclockwise to their full up position.
- (b) Rotate eight puller assemblies(2) counterclockwise until locked in detent position. Arrows on top of puller assemblies will point circumferentially in counterclockwise direction.

- (c) Locate offset nutplate in 1st stage turbine outer air sealing ring(7). This is top dead center (TDC).
- (d) Align two alignment pins(9) on either side of TDC mark(10) of puller with offset nutplate and adjacent counterclockwise nutplate on air sealing ring(7).



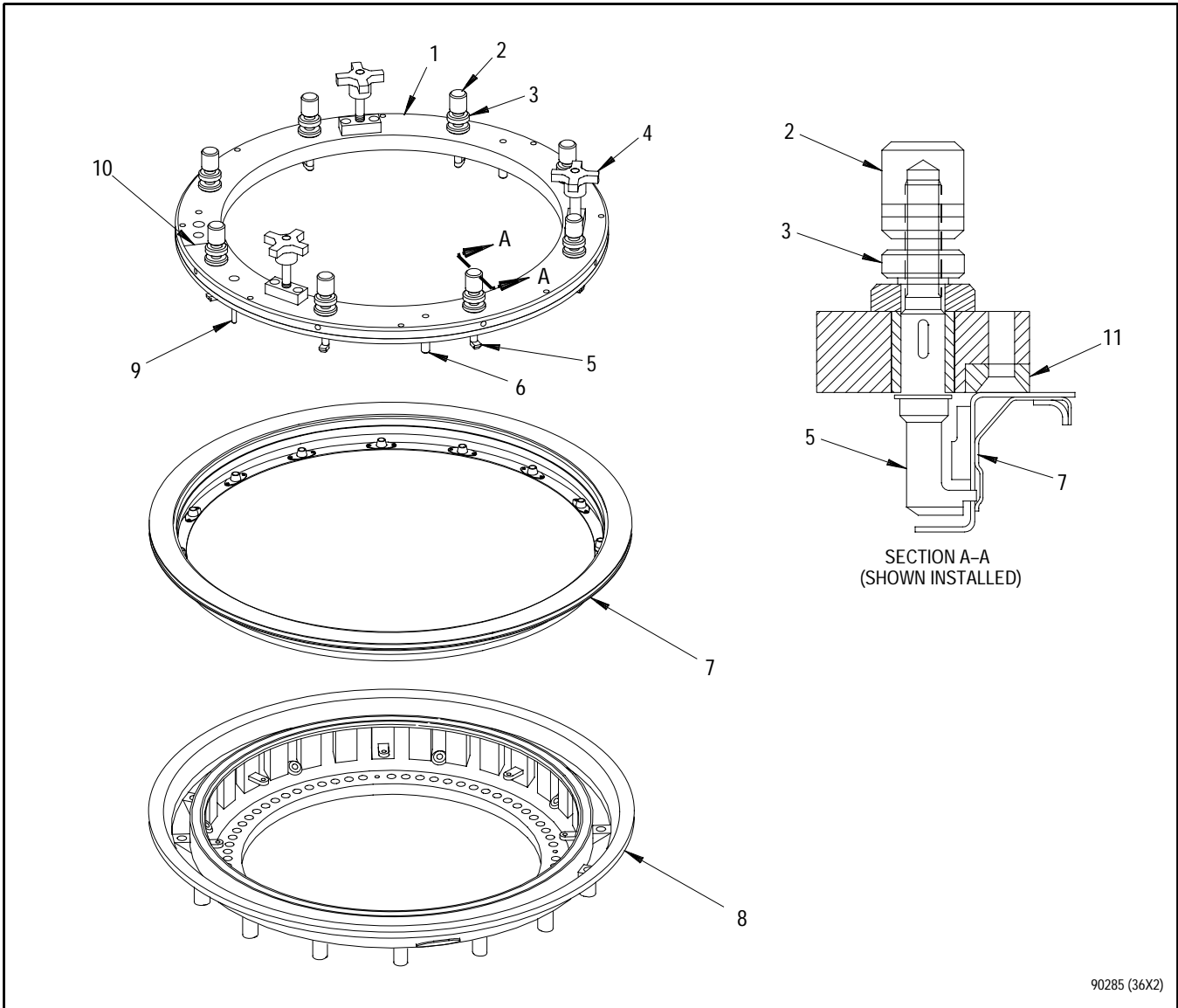
Failure to use care when installing puller on 1st stage turbine outer air sealing ring can result in damage to honeycomb seal land.

- (e) Carefully install PWA 57916 puller on air sealing ring engaging alignment pins(9) into threaded portion of offset nutplates and ensuring locating pins(6) are inside honeycomb seal land.
- (f) Ensure protective pad(11) on bottom of puller contacts top surface of air sealing ring(7) all around. If gap exists, remove puller, realign and reinstall.



1. 1st stage turbine inner air sealing ring
2. 1st stage turbine air sealing ring
3. 1st stage turbine air sealing ring support
4. 1st stage turbine outer air sealing ring
5. 1st stage turbine stator support
6. Nut
7. Rivet pin

Figure 2. First Stage Outer Air Sealing Ring and First Stage Turbine Air Sealing Ring - Removal



90285 (36X2)

1. PWA 57916 puller
2. Puller assembly
3. Knurled check nut
4. Hand knob
5. Puller jaw
6. Locating pin (larger diameter)
7. 1st stage turbine outer air sealing ring
8. 1st stage turbine stator support
9. Alignment pin (smaller diameter)
10. TDC position
11. Protective pad

Figure 3. First Stage Turbine Outer Air Sealing Ring - Removal Using PWA 57916 Puller

- (g) Lift and rotate clockwise eight puller assemblies(2) so puller jaws(5) rotate into tooling slots of air sealing ring, below honeycomb seal land. Arrows on top of puller assemblies will point radially outward when jaws are properly engaged.
- (h) Rotate knurled check nuts(3) clockwise to secure jaws(5) against top of tooling slots in air sealing ring(7). Apply equal light finger pressure to each of eight knurled nuts(3).
- (i) Rotate three hand knobs(4) clockwise until they make contact with 1st stage turbine stator support(8). Rotate each of three knobs(4) clockwise in a pattern 1/4 turn at a time to remove air sealing ring.
- (j) Lift puller and air sealing ring from turbine stator support and place on workbench.
- (k) Loosen knurled check nuts(3). Rotate puller assemblies(2) counterclockwise to click into detent position with direction arrows pointing circumferentially counterclockwise. Lift and remove puller from air sealing ring.
- (2) Remove 1st stage turbine outer air sealing rings not exhibiting PN 4082788-01 as follows:
 - (a) Thread four work bolts equally spaced through front of turbine stator support(5, figure 2) into nutplates on outer air sealing ring(4).
 - (b) Raise turbine stator support and tap bolts to separate outer air sealing ring(4) from stator support(5).
 - (c) Remove work bolts.
 - (d) Remove outer air sealing ring(4).

NOTE

Crowfoot wrench NSN 5120-01-348-7323 (Snap On 5/16 inch Flank Drive crowfoot PN TMRX10) can be used without alteration for removal of rivet pins and nuts.

- d. Remove rivet pins(7) and nuts(6) securing 1st stage turbine air sealing ring(2) to 1st stage turbine stator support(5). Discard rivet pins and nuts.
- e. Remove 1st stage turbine air sealing ring(2) from stator support(5).

- f. Remove 1st stage air sealing ring support(5, figure 4) from 1st stage turbine stator support(6) as follows:
- (1) Spray OD area of sealing ring support(5) with VV-P-216 penetrating oil or equivalent.
 - (2) Position PWA 57830 stand detail-23 ring(7) on stand base assembly(9).
 - (3) Position 1st stage turbine stator support(6), front end down, on detail-23 ring(7) and secure with detail-97 ring assembly(4).
 - (4) Ensure screws line up with puller area (curled area of seal).
 - (5) Install detail-103 threaded shaft(8) into stand base assembly(9).
 - (6) Install detail-102 plate(3) on ring assembly(4).
 - (7) Install detail-74 hydraulic cylinder(2).
 - (8) Thread detail-9 nut(1) onto detail-103 threaded shaft(8) 1/4 to 1/2 inch above hydraulic cylinder(2).

- (9) Connect PWA 55380 hydraulic hand pump to hydraulic cylinder(2).
- (10) Actuate PWA 55380 hydraulic hand pump. Apply approximately 50 to 100 psig hydraulic pressure to cylinder assembly.

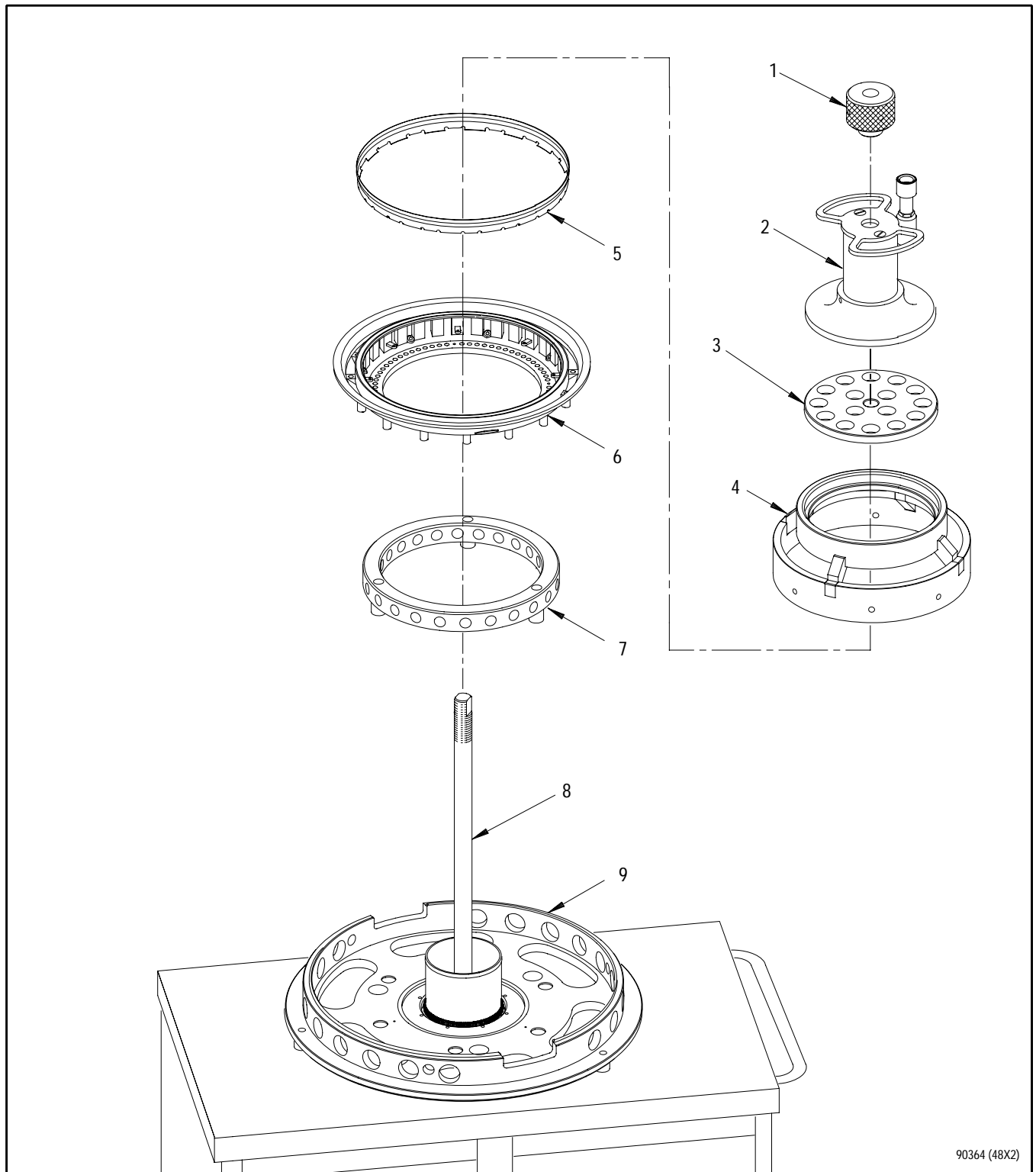


Failure to use care when removing air sealing ring support either by using slide hammer or by grinding can result in damage to turbine stator support.

- (11) Using stand slide hammer assembly, engage forward lip of air sealing ring support(5). Remove support evenly by working around support to prevent cocking. If support is frozen in position and can not be removed using slide hammer, use a hand grinder to cut support two places, 180 degrees apart.
- (12) Remove 1st stage air sealing ring support(5).
- (13) Release pressure from hydraulic hand pump. Remove nut(1).

Legend for figure 4

1. Nut
2. Hydraulic cylinder
3. Plate
4. Ring assembly
5. 1st stage air sealing ring support
6. 1st stage turbine stator support (TOBI)
7. Ring
8. Threaded shaft
9. Base assembly



90364 (48X2)

Figure 4. First Stage Air Sealing Ring Support - Removal

(14) Remove hydraulic cylinder(2).

(15) Remove plate(3) and ring assembly(4).

NOTE

First stage turbine stator support(6) may have to be separated from ring(7) with jackscrews.

(16) Remove 1st stage turbine stator support(6).

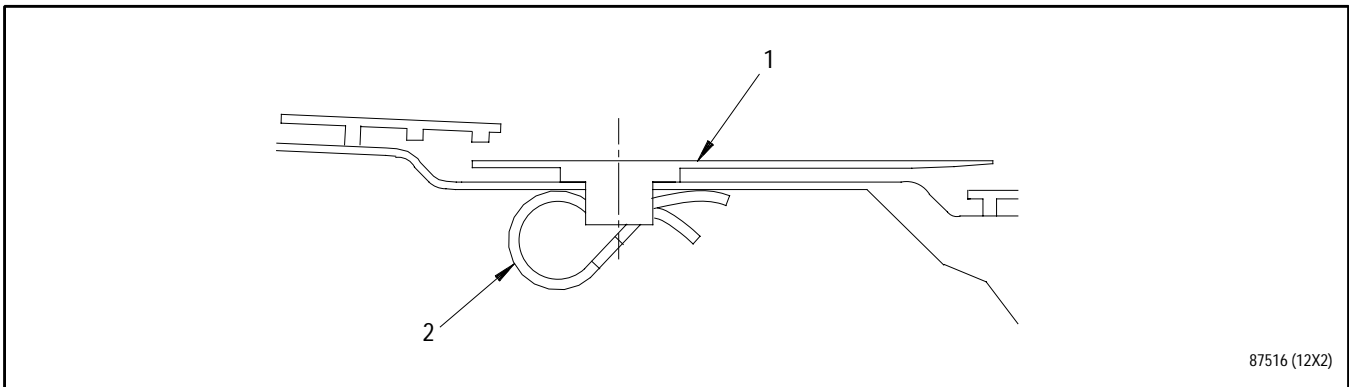
g. If required, remove combustion chamber liner segments(1, figure 5) as follows:

NOTE

Individual combustion chamber liner segments may be removed as required, without disassembling complete assembly.

(1) Remove and discard retainers(2) securing combustion chamber liner segments(1).

(2) Remove liner segments(1).



- 1. Combustion chamber liner segment
- 2. Combustion chamber liner retainer

Figure 5. Combustion Chamber Liner Segment - Removal

SUBORDINATE WORK PACKAGE**TECHNICAL PROCEDURES**

**CHAMBER - COMBUSTION;
VANES AND SUPPORT, FIRST STAGE TURBINE STATOR;
AND FRONT TURBINE CASE -**

DISASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	11	31	14	31
2 - 4	29	12 - 13	23	15 - 17	23
5 - 10	23			18 Blank	23

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-552	31 OCT 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
LOCKWIRE, (0.032 INCH DIAMETER)	MS9226-04
OIL, PENETRATING	VV-P-216
PENCIL (CRAYON), SILVER METAL	COLORBRITE NO. 2101
MARKING (HARD) (PMC 4059-7)	

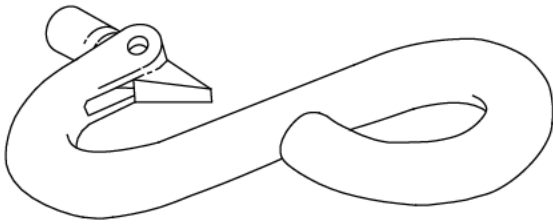
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

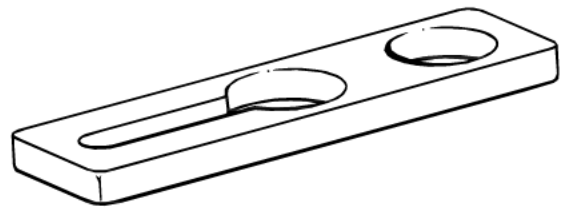
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT AND FRONT TURBINE CASE - DISASSEMBLY	
	FIXTURE, LIFT - - - - -	PWA 57919
	FIXTURE, ASSEMBLY - - - - -	PWA 57918
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, ADJUSTABLE MODULE HANDLING, 2000 LB CAPACITY (LONG AND SHORT CABLES) - - - - -	PWA 56336
	HOOK, SAFETY - - - - -	PWA 2388
3	FIRST STAGE TURBINE STATOR SUPPORT AND AIR SEALS - DISASSEMBLY	
	PULLER, RING 1ST STAGE TURBINE OUTER ASSY (229) - - -	PWA 57916
	STAND, ASSY/DISASSY, HIGH PRESSURE TURBINE - - - - -	PWA 57830
		OR
	STAND, ASSY/DISASSY, HPT - - - - -	PWA 57765
		OR
	STAND, HPT ASSY/DISASSY - - - - -	PWA 57503
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380

ILLUSTRATED SUPPORT EQUIPMENT



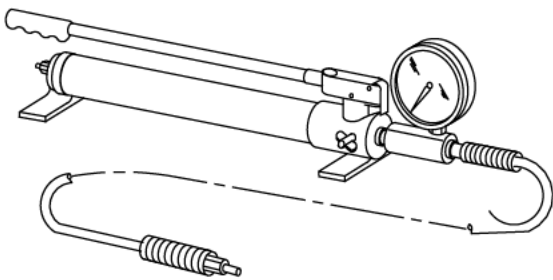
PWA 2388 -C

Figure T1. PWA 2388 HOOK



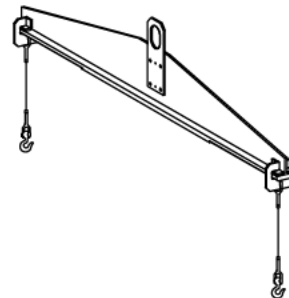
PWA 26147 -C

Figure T2. PWA 26147 ADAPTER



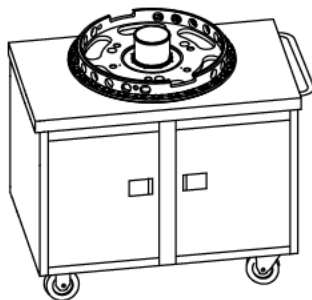
PWA 55380 -C

Figure T3. PWA 55380 PUMP



PWA 56336 -C

Figure T4. PWA 56336 SLING



PWA 57503 -C

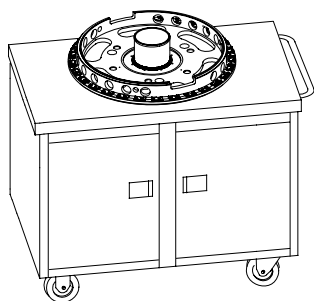
Figure T5. PWA 57503 STAND



PWA 57765 -C

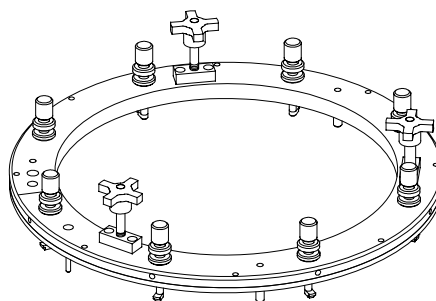
Figure T6. PWA 57765 STAND

ILLUSTRATED SUPPORT EQUIPMENT (continued)



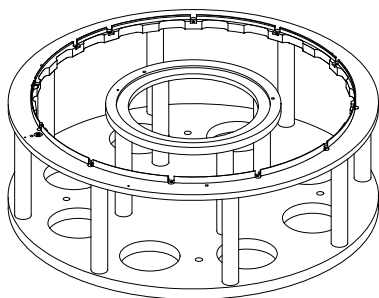
PWA 57830 -C

Figure T7. PWA 57830 STAND



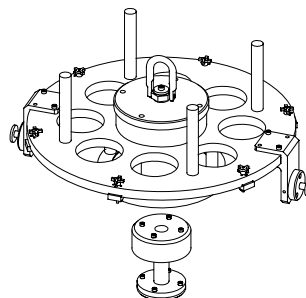
PWA 57916 -C

Figure T8. PWA 57916 PULLER



PWA 57918 -C

Figure T9. PWA 57918 FIXTURE



PWA 57919 -C

Figure T10. PWA 57919 FIXTURE

1. INTRODUCTION.

- a. This subordinate work package contains instructions for separating front turbine case, 1st stage turbine stator vanes, and 1st stage turbine stator support (TOBI), from combustion chamber. This includes removal of air seals from turbine stator support.

**2. COMBUSTION CHAMBER, FIRST STAGE
TURBINE STATOR VANES, FIRST STAGE
TURBINE STATOR SUPPORT AND FRONT
TURBINE CASE - DISASSEMBLY.**

(See Figures 1, 2, and 3.)

NOTE

Combustion chamber, 1st stage turbine stator vanes, 1st stage turbine stator support and front turbine case were removed from core engine module as an assembly using PWA 57919 lift fixture.

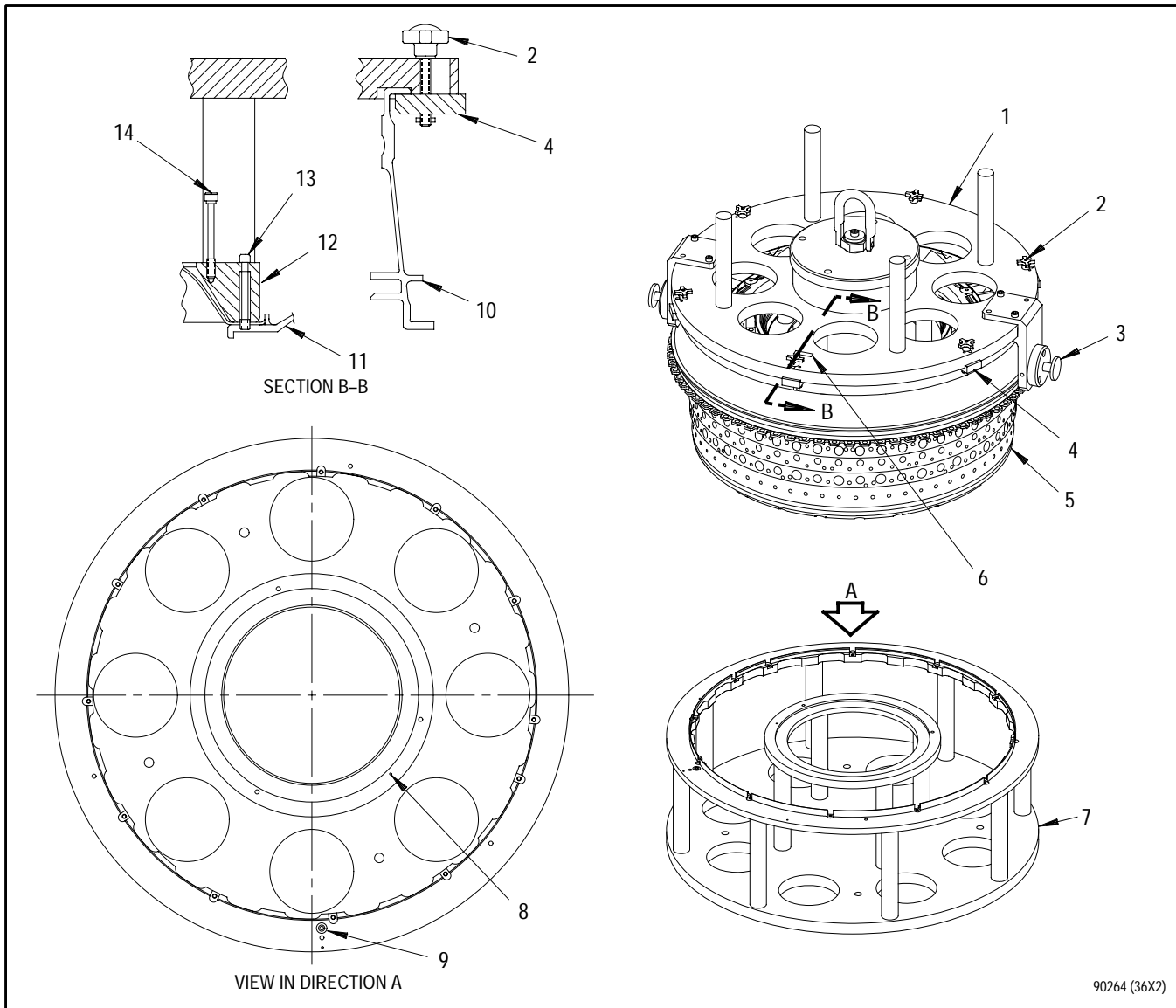
- a. Install combustion chamber, 1st stage turbine stator vanes, 1st stage turbine stator support and front turbine case assembly(5, figure 1) in PWA 57918 assembly fixture(7) as follows:

- (1) Attach PWA 26147 adapters to trunnions(3) on PWA 57919 lift fixture(1).
- (2) Attach PWA 56336 sling to overhead hoist with PWA 2388 hook. Attach sling to PWA 26147 adapters.
- (3) Raise lift fixture(1) and assembly(5) and position above PWA 57918 assembly fixture(7).

NOTE

There are two types of jackscrews(13 and 14) on PWA 57919 lift fixture. Jackscrews(14) for removal can be identified by presence of longer threads and shoulder beneath socket head. Jackscrews(13) for installation have shorter threads and no shoulder beneath socket head.

- (4) Ensure short thread installation jackscrews(13) are installed in lift/puller plate(12) and screw threads do not protrude below turbine stator support(11).
- (5) Align TDC marking(6) on lift fixture with alignment pin(9) on outer flange of assembly fixture(7).
- (6) Locate alignment hole in lift/puller plate(12) approximately 45 degrees counterclockwise from TDC marking(6).



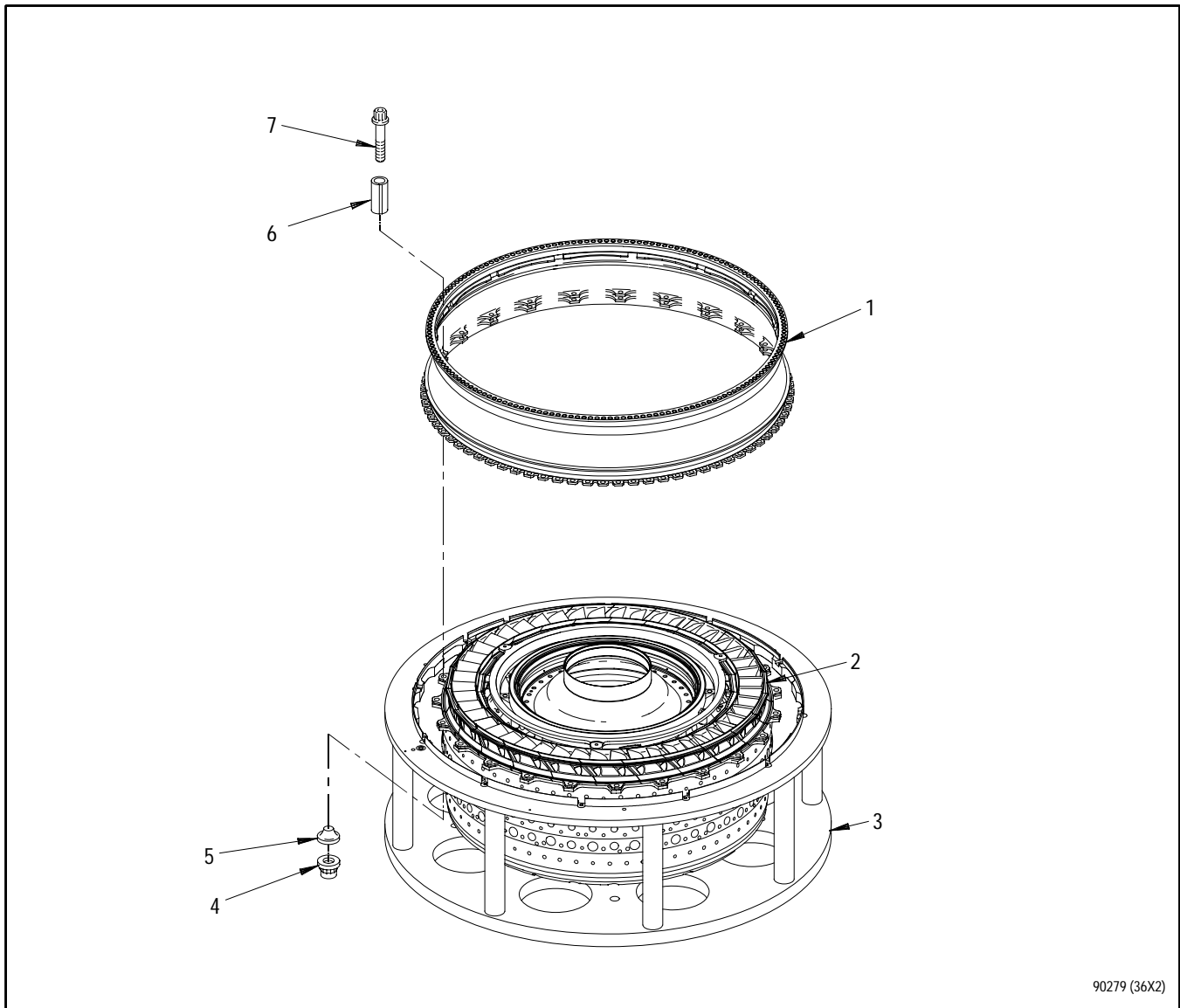
1. PWA 57919 lift fixture
2. Hand knob
3. Trunnion
4. Clamp
5. Front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support, and combustion chamber, assembly
6. TDC marking
7. PWA 57918 assembly fixture
8. Alignment pin
9. Alignment pin
10. Front turbine case
11. 1st stage turbine stator support
12. Lift/puller plate
13. Jackscrew (installation)
14. Jackscrew (removal)

Figure 1. Combustion Chamber, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support and Front Turbine Case - Installation Into PWA 57918 Fixture



Failure to use care when lowering assembled parts into assembly fixture can result in damage to combustion chamber or front turbine case.

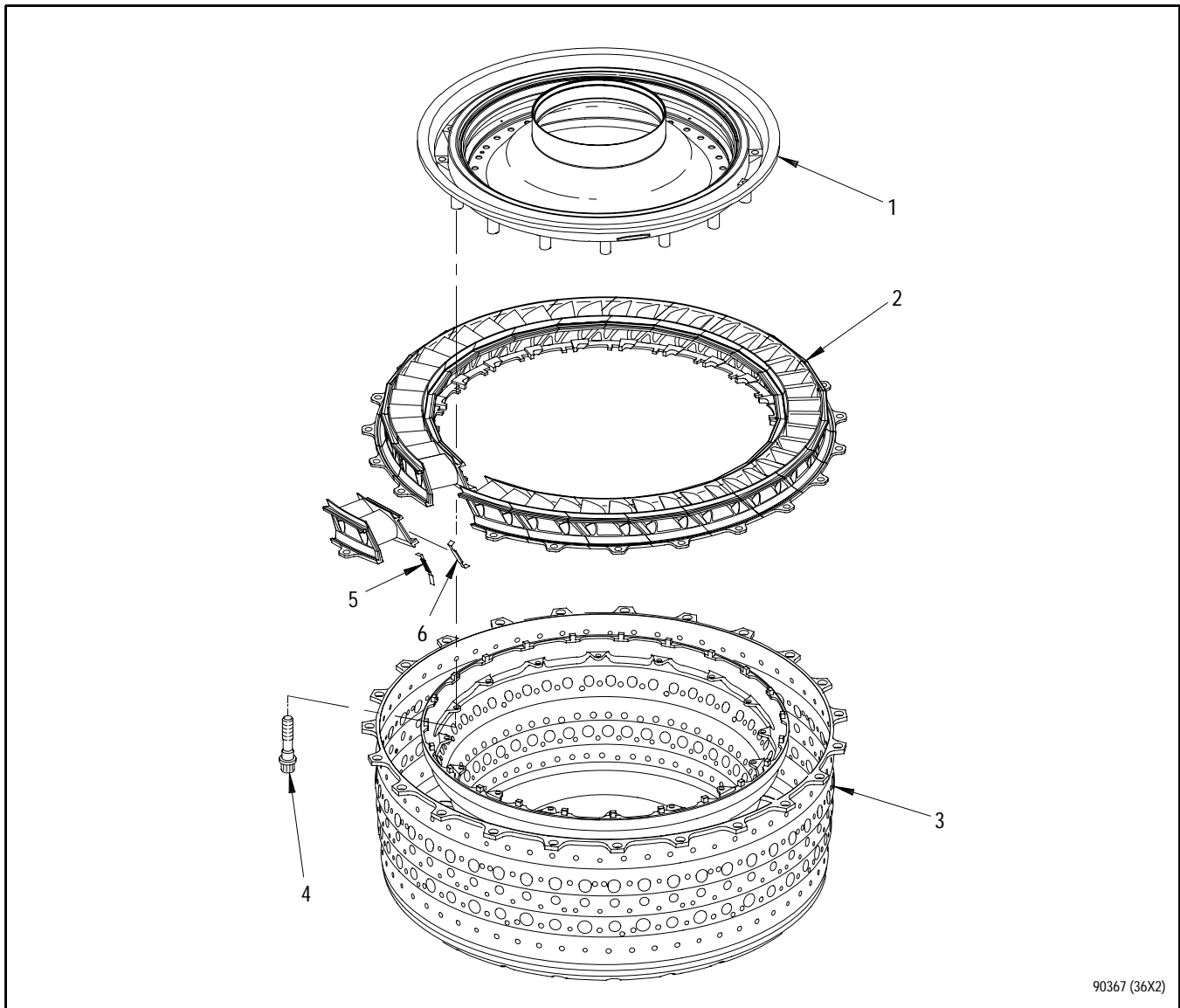
- (7) Carefully lower assembled parts(5) into assembly fixture(7) engaging alignment hole in lift/puller plate(12) with alignment pin(8) on inner flange of assembly fixture. Engage slotted hole between two boltholes on forward flange of front turbine case(10) with alignment pin(9) on assembly fixture. If both pins do not align, remove pin(9).
 - (8) Ensure flange of front turbine case(10) is seated on outer flange of assembly fixture(7).
 - (9) Loosen four jackscrews(13) from turbine stator support(11).
 - (10) Loosen six hand knobs(2). Slide six clamps(4) to their outermost position and secure with hand knobs(2). Ensure clamps disengage from front turbine case flange.
 - (11) Carefully raise PWA 57919 lift fixture from assembled parts(5).
- b. Remove front turbine case(1, figure 2) from combustion chamber, 1st stage turbine stator vanes, and 1st stage turbine stator support assembly(2) as follows:
 - (1) Locate first bolt(7) inside front turbine case(1) clockwise from alignment pin(9, figure 1). Mark as No. 1 position on inside of front turbine case using Colorbrite No. 2101 silver pencil or equivalent. Mark remaining bolt positions two through 23 in clockwise sequence on inside of case.
 - (2) Mark 1st stage turbine stator vanes in same clockwise sequence one through 23 using silver pencil.
 - (3) Loosen 23 nuts(4, figure 2).
 - (4) Remove nut(4), eccentric sleeve(5), bolt(7) and split sleeve(6) in sequence from each of 23 positions. Bag or tag each set of parts with sequence number.
 - (5) Remove alignment pin(9, figure 1) from assembly fixture OD flange.
 - (6) Rotate front turbine case(1, figure 2) either direction until lugs on ID of case disengage from lugs on OD of 1st stage turbine stator vanes.
 - (7) Lift front turbine case from assembly(2) and place on workbench.



1. Front turbine case
2. Combustion chamber, 1st stage turbine stator vanes and 1st stage turbine stator support, assembly
3. PWA 57918 assembly fixture
4. Nut
5. Eccentric sleeve
6. Split sleeve
7. Bolt

Figure 2. Combustion Chamber, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support and Front Turbine Case - Front Turbine Case Removal

- c. Remove 1st stage turbine stator support and air seal assembly(1, figure 3) from combustion chamber(3) as follows:
- (1) Wrap lockwire around OD of 1st stage turbine stator vanes of assembly(2, figure 2).
 - (2) Remove combustion chamber, vanes and stator support assembly(2) from PWA 57918 assembly fixture. Position assembly on its side on soft protective surface with forward dome area of combustion chamber facing assembler.
 - (3) Loosen 16 bolts(4, figure 3) on ID flange of combustion chamber(3). Remove 14 bolts, leaving two bolts in place fingertight 180 degrees apart.
 - (4) Rotate assembly to position combustion chamber forward dome end down on soft protective surface.
 - (5) Carefully reach through ID opening of stator support and air seal assembly(1) and remove remaining two bolts(4).
 - (6) Remove stator support and air seal assembly(1) from combustion chamber.
- d. Remove 1st stage turbine stator vanes(2) from combustion chamber(3) as follows:
- (1) Ensure vanes are numbered one through 23 clockwise from TDC.
 - (2) Remove lockwire from OD of vanes.
 - (3) Remove vanes from combustion chamber.
 - (4) Remove and discard outer and inner 1st stage turbine stator seals(5 and 6).



1. 1st stage turbine stator support and air seal assembly
2. 1st stage turbine stator vanes
3. Combustion chamber
4. Bolt
5. 1st stage turbine stator outer seal
6. 1st stage turbine stator inner seal

Figure 3. Combustion Chamber, First Stage Turbine Stator Vanes and First Stage Turbine Stator Support - Disassembly

3. FIRST STAGE TURBINE STATOR SUPPORT AND AIR SEALS - DISASSEMBLY.

(See Figures 4, 5, and 6.)

- a. Remove 1st stage turbine inner air sealing ring(1, figure 4) from 1st stage turbine stator support(5). If necessary, tap inner air sealing ring to remove.
- b. Remove 1st stage turbine outer air sealing ring(4) from 1st stage turbine stator support(5) as follows:

NOTE

There are three 1st stage turbine outer air sealing ring(4) configurations identified by part number printed on rear face of ring. PN 4085123-01 or 4082788-01 ring will require separation from 1st stage turbine stator support(5) using PWA 57916 puller per step (1). Other air sealing ring is removed per step (2).

- (1) Remove PN 4085123-01 or 4082788-01 air sealing ring as follows:

- (a) Rotate three hand knobs(4, figure 5) and eight knurled check nuts(3) of PWA 57916 puller counterclockwise to their full up position.
- (b) Rotate eight puller assemblies(2) counterclockwise until locked in detent position. Arrows on top of puller assemblies will point circumferentially in counterclockwise direction.

- (c) Locate offset nutplate in 1st stage turbine outer air sealing ring(7). This is top dead center (TDC).

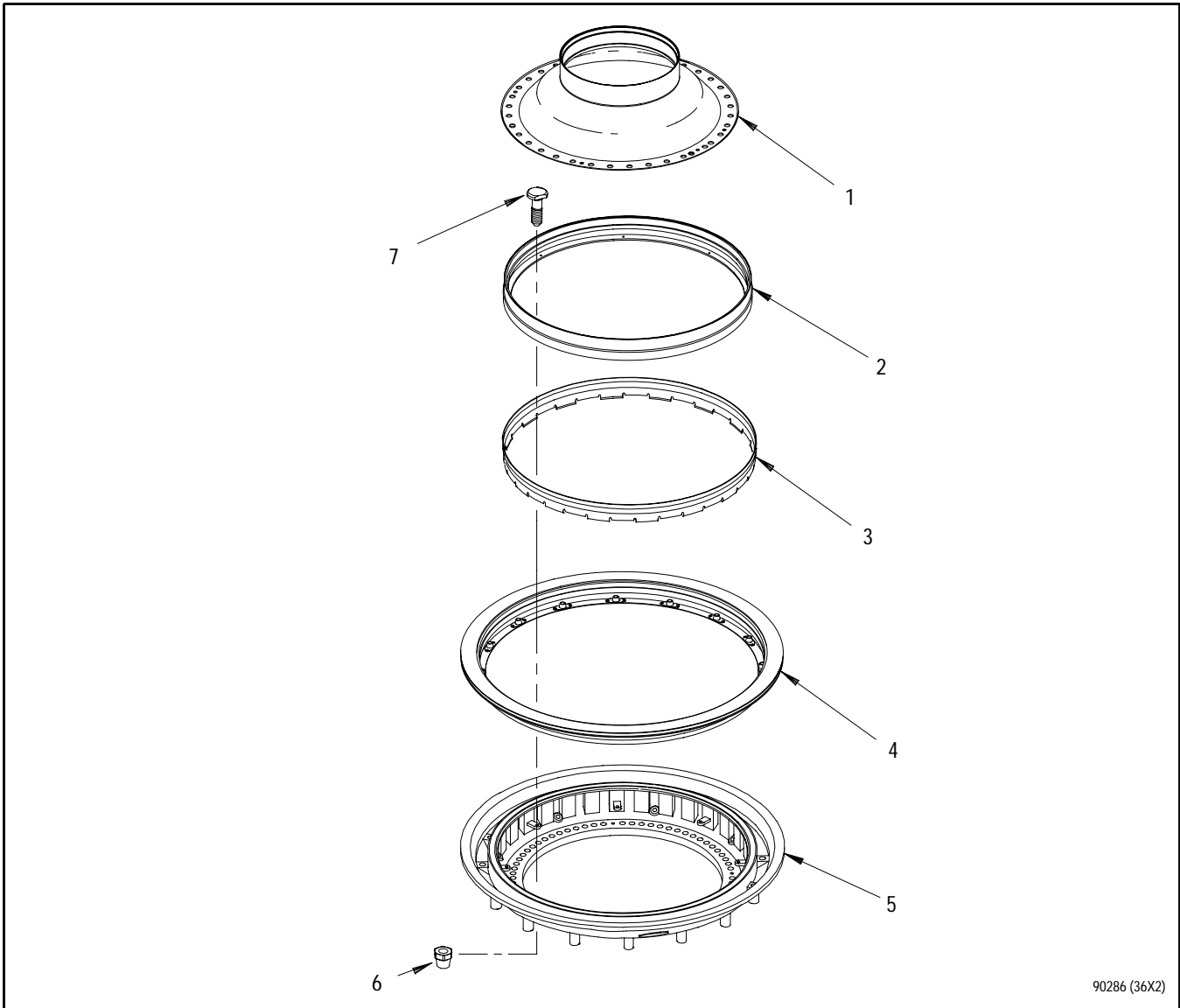
- (d) Align two alignment pins(9) on either side of TDC marking(10) of puller with offset nutplate and adjacent counterclockwise nutplate on air sealing ring(7).



Failure to use care when installing puller on 1st stage turbine outer sealing ring can result in damage to honeycomb seal land.

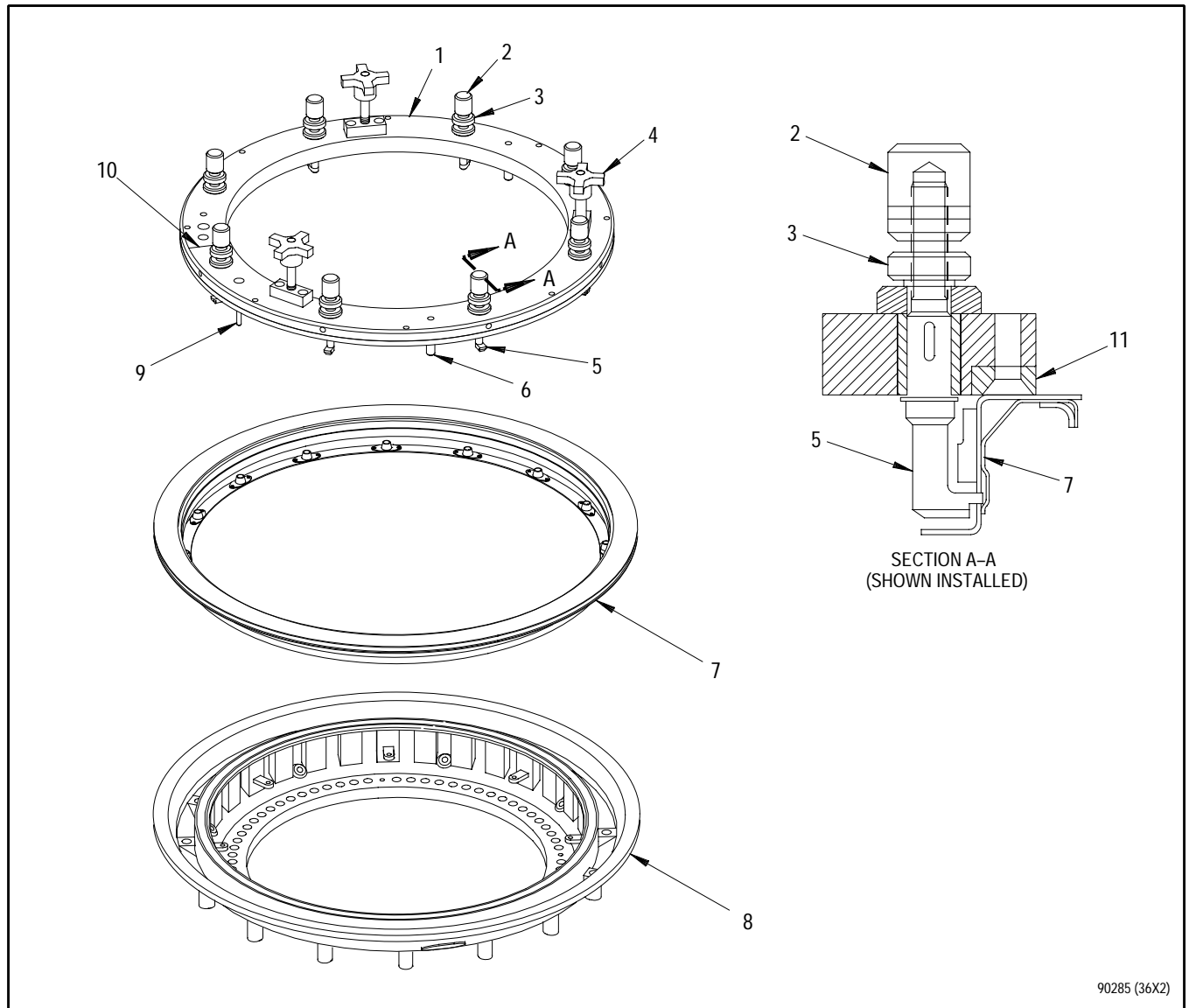
- (e) Carefully install PWA 57916 puller on air sealing ring engaging alignment pins(9) into threaded portion of offset nutplates and ensuring locating pins(6) are inside honeycomb seal land.

- (f) Ensure protective pad(11) on bottom of puller contacts top surface of air sealing ring(7) all around. If gap exists, remove puller, realign and reinstall.



1. 1st stage turbine inner air sealing ring
2. 1st stage turbine air sealing ring
3. 1st stage turbine air sealing ring support
4. 1st stage turbine outer air sealing ring
5. 1st stage turbine stator support
6. Nut
7. Bolt

Figure 4. First Stage Turbine Stator Support and Air Seals - Disassembly



90285 (36X2)

1. PWA 57916 puller
2. Puller assembly
3. Knurled check nut
4. Hand knob
5. Puller jaw
6. Locating pin (larger diameter)
7. 1st stage turbine outer air sealing ring
8. 1st stage turbine stator support
9. Alignment pin (smaller diameter)
10. TDC marking
11. Protective pad

Figure 5. First Stage Turbine Outer Air Sealing Ring - Removal Using PWA 57916 Puller

- (g) Lift and rotate clockwise eight puller assemblies(2) so puller jaws(5) rotate into tooling slots of air sealing ring, below honeycomb seal land. Arrows on top of puller assemblies will point radially outward when jaws are properly engaged.
- (h) Rotate knurled check nuts(3) clockwise to secure jaws(5) against top of tooling slots in air sealing ring(7). Apply equal light finger pressure to each of eight knurled nuts(3).
- (i) Rotate three hand knobs(4) clockwise until they make contact with 1st stage turbine stator support(8). Rotate each of three knobs(4) clockwise in a pattern 1/4 turn at a time to remove air sealing ring.
- (j) Lift puller and air sealing ring from turbine stator support and place on workbench.
- (k) Loosen knurled check nuts(3). Rotate puller assemblies(2) counterclockwise to click into detent position with direction arrows pointing circumferentially counterclockwise. Lift and remove puller from air sealing ring.
- (2) Remove air sealing ring not exhibiting PN 4085123-01 or 4082788-01 as follows:
 - (a) Install four work bolts equally spaced through front of stator support(5, figure 4) into nutplates on air sealing ring(4).
 - (b) Raise turbine stator support and tap bolts to separate air sealing ring(4) from stator support(5).
 - (c) Remove work bolts.
 - (d) Remove air sealing ring(4).
- c. Remove bolts(7) and nuts(6) securing 1st stage turbine air sealing ring(2) to 1st stage turbine stator support(5). Discard bolts and nuts.
- d. Remove 1st stage turbine air sealing ring(2) from stator support(5).
- e. Remove 1st stage turbine air sealing ring support(3) from stator support(5) using PWA 57830 stand as follows:
 - (1) Spray OD area of air sealing ring support(3) with VV-P-216 penetrating oil or equivalent.



- (2) Position detail-23 ring(7, figure 6) on stand base assembly(9).
- (3) Position 1st stage turbine stator support(6), front end down, on ring(7) and secure with detail-97 ring assembly(4).
- (4) Install detail-118 threaded shaft(8) into stand base assembly(9).
- (5) Install detail-102 plate(3) on ring assembly(4).
- (6) Install stand hydraulic cylinder assembly(2).
- (7) Thread detail-9 nut(1) onto threaded shaft(8) 1/4 to 1/2 inch above hydraulic cylinder assembly(2).
- (8) Connect PWA 55380 hydraulic hand pump to hydraulic cylinder assembly(2).
- (9) Actuate PWA 55380 hydraulic hand pump. Apply approximately 50 to 100 psig hydraulic pressure to cylinder assembly.

Failure to use care when removing air sealing ring support either by using slide hammer or by grinding can result in damage to turbine stator support.

- (10) Using stand slide hammer assembly, engage forward lip of air sealing ring support(5). Remove support evenly by working around support to prevent cocking. If it is frozen in position and can not be removed using slide hammer, use a hand grinder to cut support two places, 180 degrees apart.
- (11) Remove air sealing ring support(5).
- (12) Release pressure from hydraulic hand pump. Remove nut(1) and hydraulic cylinder assembly(2).
- (13) Remove plate(3) and ring assembly(4).

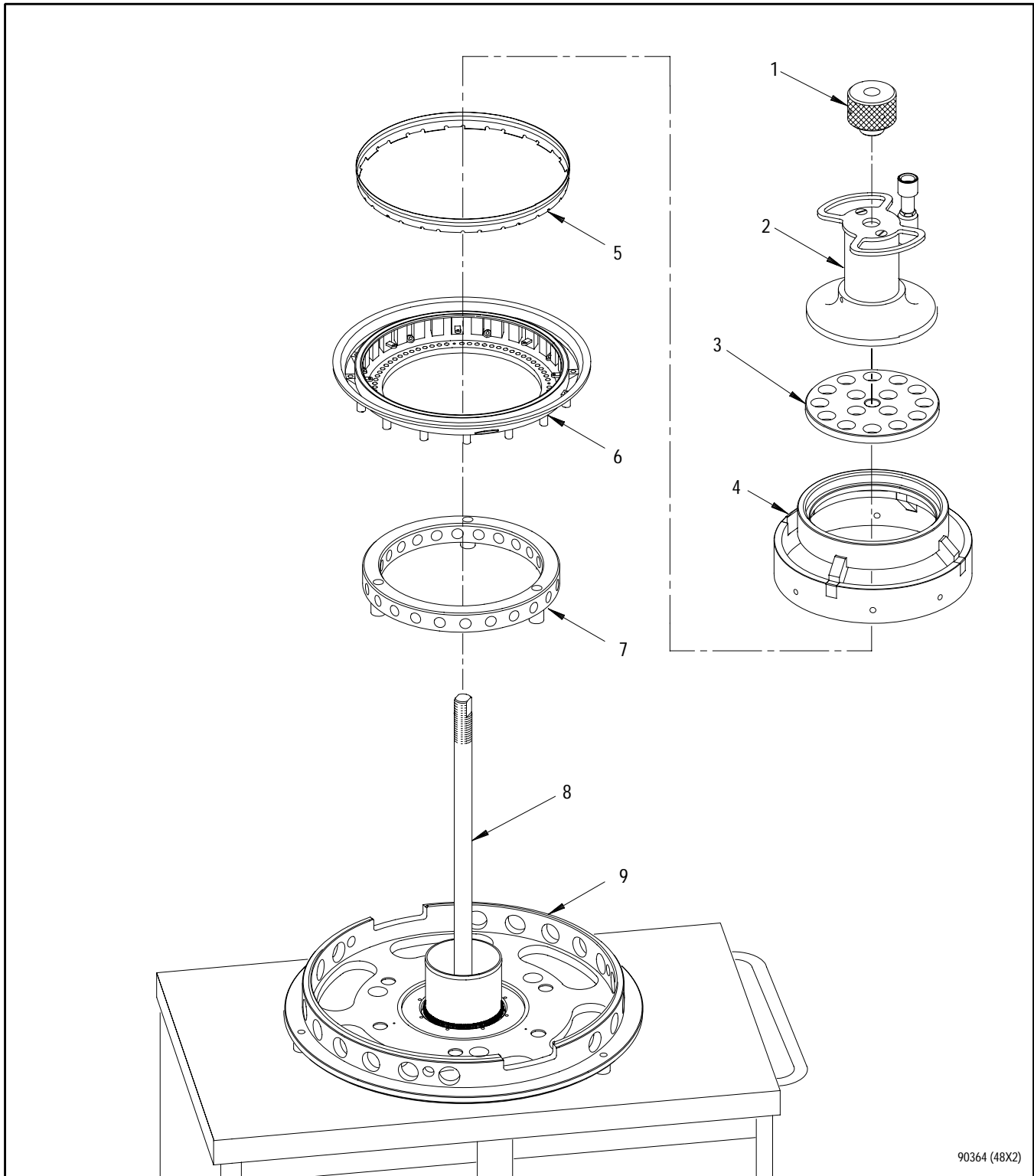
NOTE

First stage turbine stator support(6) may have to be separated from ring(7) with jackscrews.

- (14) Remove 1st stage turbine stator support(6).

Legend for figure 6

- 1. Nut
- 2. Hydraulic cylinder assembly
- 3. Plate
- 4. Ring assembly
- 5. 1st stage turbine air sealing ring support
- 6. 1st stage turbine stator support
- 7. Ring
- 8. Threaded shaft
- 9. Base assembly



90364 (48X2)

Figure 6. First Stage Air Sealing Ring Support - Removal

4. COMBUSTION CHAMBER ASSEMBLY - LINER SEGMENT REMOVAL.

(See Figure 7.)

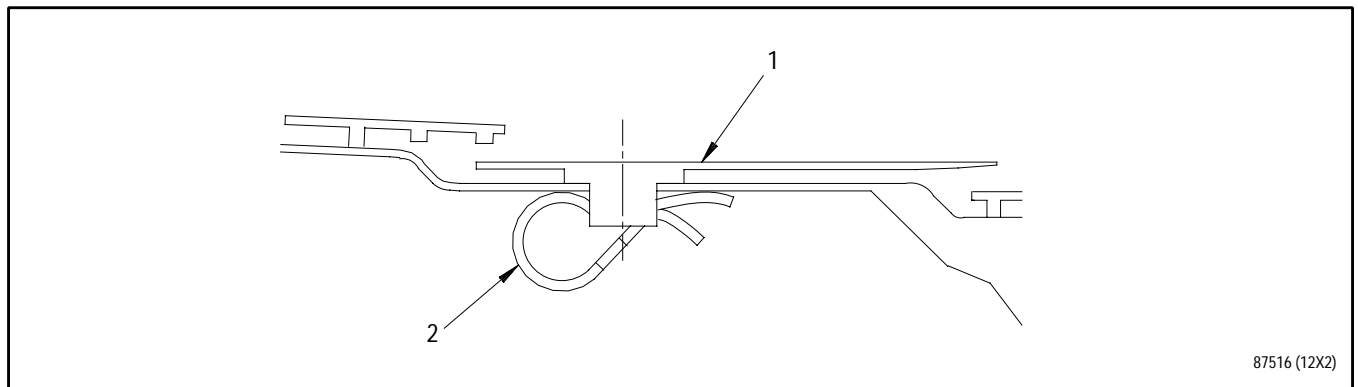
- a. If required, remove combustion chamber liner segments(1, figure 7) as follows:

NOTE

Individual combustion chamber liner segments may be removed as required, without disassembling complete assembly.

- (1) Remove and discard retainers(2) securing combustion chamber liner segments(1).

- (2) Remove liner segments(1).



1. Combustion chamber liner segment
2. Combustion chamber liner retainer

Figure 7. Combustion Chamber Liner Segment - Removal

WORK PACKAGE**TECHNICAL PROCEDURES****CASE AND STATOR ASSEMBLY,
REAR COMPRESSOR FOURTH THROUGH NINTH STAGE -****DISASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 30

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	10 - 13	0	21	13
2A Deleted	20	14	1	22	2
2B Blank Deleted	20	14A - 14B Added	1	22A Added	2
3	30	15	0	22B Blank Added	2
4 - 7	0	16	13	23 - 24	20
8 - 9	30	17 - 20	0	25 - 26 Added	7

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Stator Segment Assemblies, Compressor, Seventh Through	
Ninth Stage - Inspection - - - - -	WP 355 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
PENCIL (CRAYON), SILVER, METAL	COLORBRITE NO. 2101
MARKING (HARD) (PMC 4059-7)	OR ANADEL NO. 1936
PENCIL (CRAYON), SILVER, METAL	COLOR-TEX NO. 1843
MARKING (HARD)	

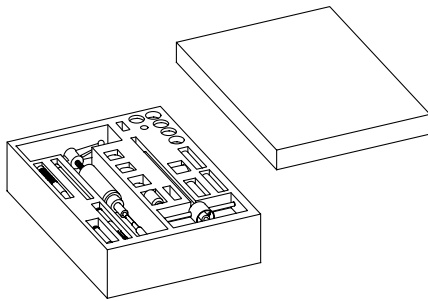
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

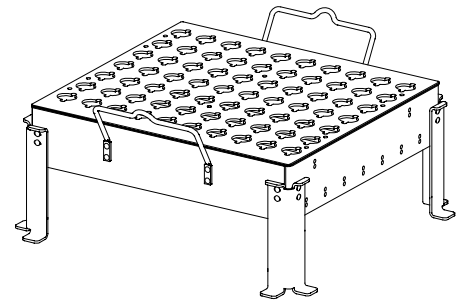
Paragraph	Function - Tool Nomenclature	Tool Number
3	FOURTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - REMOVAL	
	FIXTURE, HOLDING, 4TH STAGE REAR COMPRESSOR VARIABLE VANE - - - - -	PWA 71471
4	FIFTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - REMOVAL	
	FIXTURE, HOLDING, 5TH STAGE REAR COMPRESSOR VARIABLE VANE - - - - -	PWA 71472
9	FOURTH, FIFTH, AND SIXTH STAGE VARIABLE VANE OUTER BEARINGS (BUSHINGS) - REMOVAL USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790	
	PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790
10	COMPRESSOR STATOR SIXTH STAGE BEARING (BUSHING) - REMOVAL USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790	
	PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790

ILLUSTRATED SUPPORT EQUIPMENT



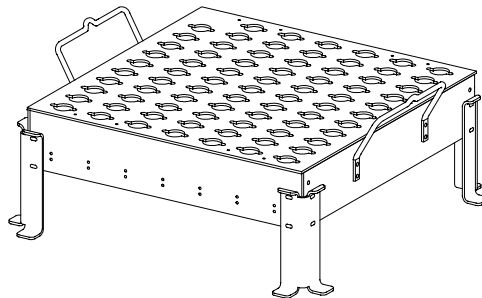
PWA 57790 -C

Figure T1. PWA 57790 PUSHER/PULLER



PWA 71471 -C

Figure T2. PWA 71471 FIXTURE



PWA 71472 -C

Figure T3. PWA 71472 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for disassembly of upper and lower 4th through 9th stage case and stator assembly. Disassembly of upper and lower case halves is the same.

2. BLEED VALVE STRAP LOCKING SEAT - REMOVAL.

(See Figure 1.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Bend tabs of locking seats(2 and 3, figure 1) away from bolts(1 and 4).

- b. Remove bolts(1) and locking seat(2) at split flange of case.

NOTE

There are five locking seats(3) on upper case half and four on lower case half.

- c. Remove bolts(4) and locking seats(3).

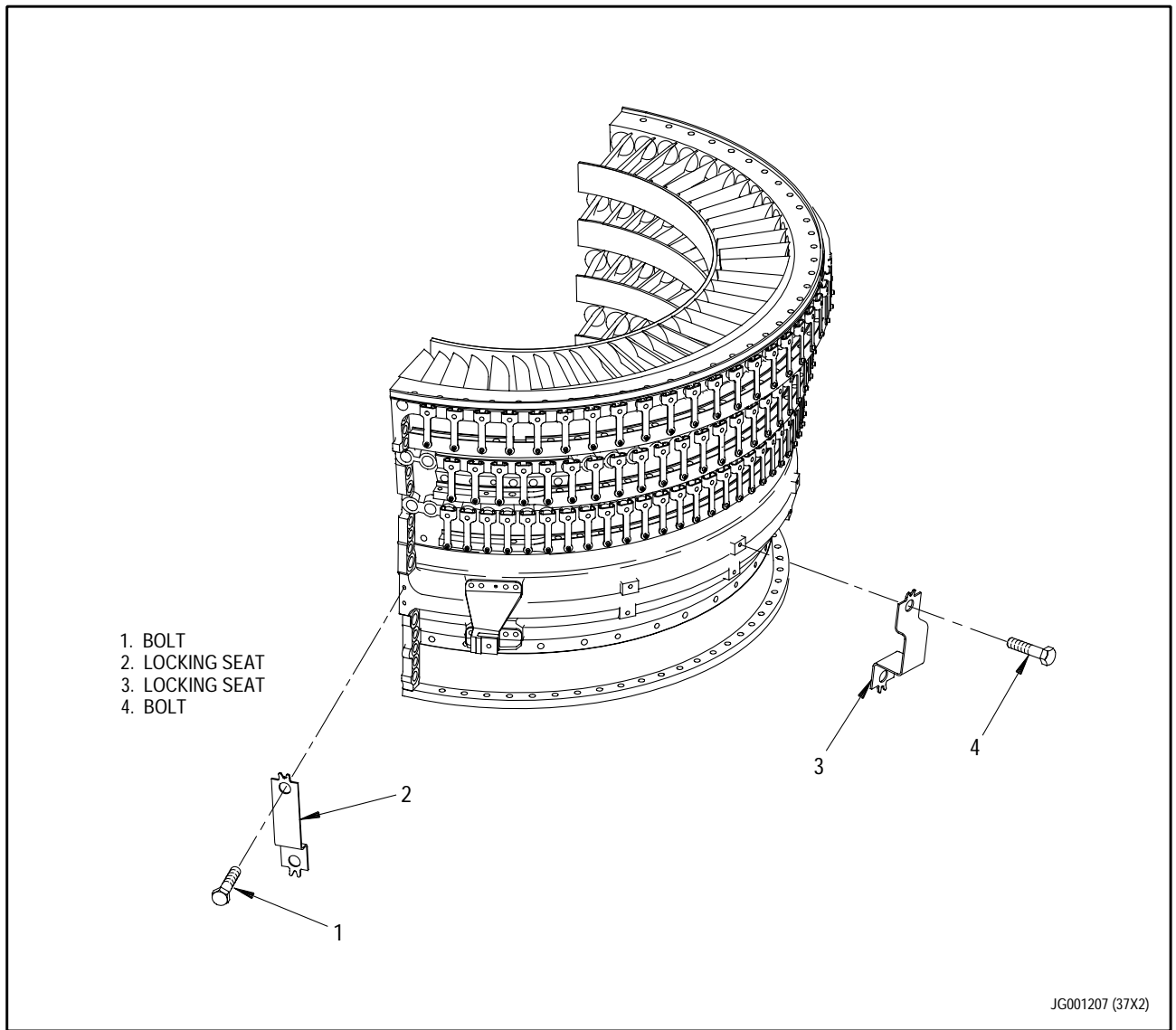
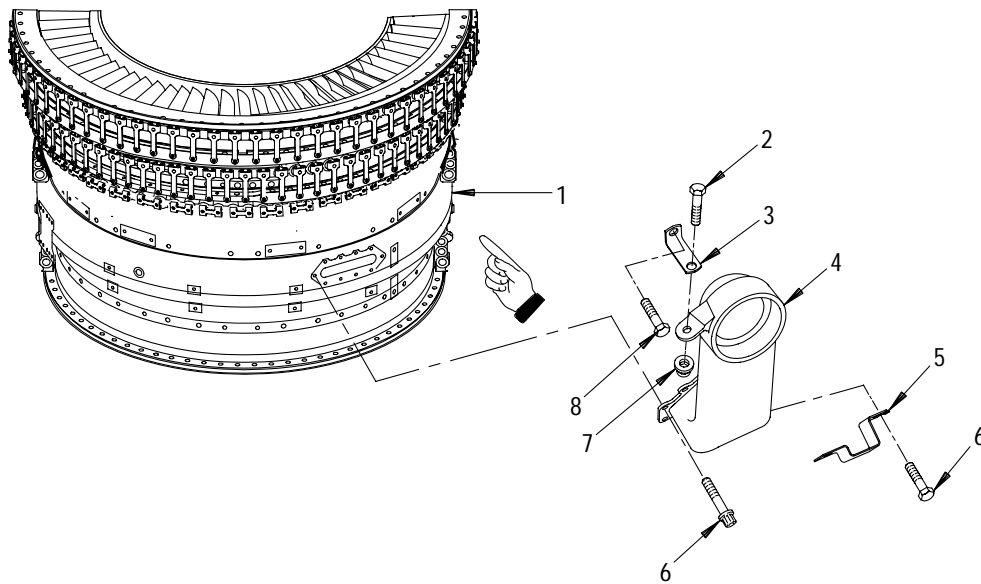


Figure 1. Bleed Valve Strap Locking Seats - Removal

2A. COMPRESSOR BLEED TUBE ASSEMBLY - REMOVAL.

(See Figure 1A.)

- a. Remove lockwire and bolts (6, figure 1A) securing compressor bleed tube(4) to lower 4th through 9th stage case(1). Remove locking bleed valve strap seat(5).
- b. Remove bolt(2) and nut(7) securing tube assembly to angle bracket(3). Remove tube assembly.
- c. Remove bolt(8) securing angle bracket(3) to case and remove bracket.



1. Fourth through ninth stage case and stator assembly (lower)
2. Bolt
3. Angle bracket
4. Compressor bleed tube assembly
5. Locking bleed valve strap seat
6. Bolt
7. Nut
8. Bolt

Figure 1A. Compressor Bleed Tube Assembly - Removal

2B. COMPRESSOR STATOR LINKAGE ARM BRACKET AND BLEED VALVE STRAP SEAT - REMOVAL.

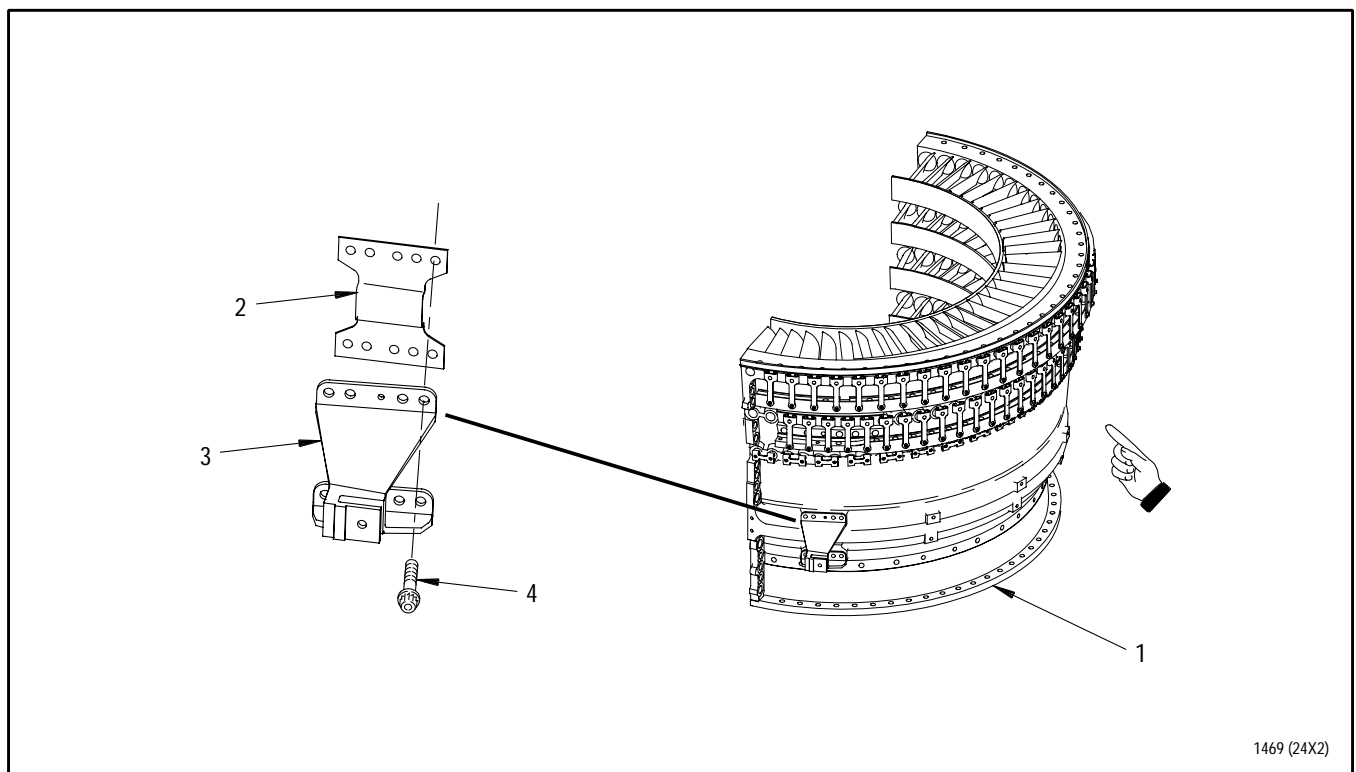
(See Figure 1B.)

- b. Remove compressor stator linkage arm bracket(3) and bleed valve strap seat(2).

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove lockwire and bolts(4, figure 1B) securing compressor stator linkage arm bracket(3) and bleed valve strap seat(2) to 4th through 9th stage case(1).



1. Fourth through ninth stage case and stator assembly (upper and lower)
2. Bleed valve strap seat
3. Compressor stator linkage arm bracket
4. Bolt

Figure 1B. Compressor Stator Linkage Arm Bracket and Bleed Valve Strap Seat - Removal

3. FOURTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - REMOVAL.

(See Figures 2 and 3.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove 4th stage variable vane synchronizing ring(2, figure 2) and vane arms(7) as follows:

- (1) Remove bolts(8) securing vane arms(7) to variable vane stems(6) at each vane location around case.

NOTE

Bolts(1) will fall out of forward flange of case(9) when synchronizing ring(2) is removed.

- (2) Remove synchronizing ring(2) by tapping all vane arms(7) rearward clear of vane stems(6).

- (3) Remove synchronizing ring(2) and bolts(1) from around case(9).

- (4) Remove vane arms(7) from synchronizing ring(2).

- b. Remove four bumpers(3) from synchronizing ring(2) as follows:

- (1) Remove collars(5) securing bumpers(3).

- (2) Remove bumpers(3) from synchronizing ring(2).

- (3) Remove bushings(4) from synchronizing ring(2).

- c. Remove variable vanes(9, figure 3) as follows:

- (1) Slide lock ring segment(14) securing shroud segments(3 and 4) and (16 and 17) out of case from left side.

- (2) Slide lock ring segment(12) securing shroud segments(3 and 4) and (10 and 11) out of case from right side.

- (3) Remove three nuts(15) and bolts(1) and remove outer, aft shroud segment(16) and forward shroud segment(17) and bearings(7) from ID stems of vanes. Discard bearings.

- (4) Remove three nuts(13) and bolts(2) and remove center, aft shroud segment(4) and forward shroud segment(3) and bearings(7) from ID stems of vanes. Discard bearings.

- (5) Remove three nuts(6) and bolts(5) and remove outer, aft shroud segment(10) and forward shroud segment(11) and bearings (7) from ID stems of vanes. Discard bearings.

- (6) Remove variable vanes(9) and thrust washers(8) from case. Place vanes, long stem down, in PWA 71471 fixture.

4. FIFTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - REMOVAL.

(See figures 2 and 3.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove 5th stage variable vane synchronizing ring(2, figure 2) and vane arms(7) as follows:
 - (1) Remove bolts(8) securing vane arms(7) to variable vane stems(6) at each vane location around case.
 - (2) Remove synchronizing ring(2) by tapping all vane arms(7) rearward clear of vane stems(6).
 - (3) Remove vane arms(7) from synchronizing ring(2).
- b. Remove four bumpers(3) from synchronizing ring(2) as follows:
 - (1) Remove collars(5) securing bumpers(3).
 - (2) Remove bumpers(3) from synchronizing ring(2).
 - (3) Remove bushings(4) from synchronizing ring(2).
- c. Remove variable vanes(9, figure 3) as follows:
 - (1) Slide lock ring segment(14) securing shroud segments(3 and 4) and (16 and 17) out of case from left side.
 - (2) Slide lock ring segment(12) securing shroud segments(3 and 4) and (10 and 11) out of case from right side.
 - (3) Remove three nuts(15) and bolts(1) and remove outer, aft shroud segment(16) and forward shroud segment(17) and bearings(7) from ID stems of vanes. Discard bearings.
 - (4) Remove three nuts(13) and bolts(2) and remove center, aft shroud segment(4) and forward shroud segment(3) and bearings(7) from ID stems of vanes. Discard bearings.
 - (5) Remove three nuts(6) and bolts(5) and remove outer, aft shroud segment(10) and forward shroud segment(11) and bearings (7) from ID stems of vanes. Discard bearings.
 - (6) Remove variable vanes(9) and thrust washers(8) from case. Place vanes, long stem down, in PWA 71472 fixture.

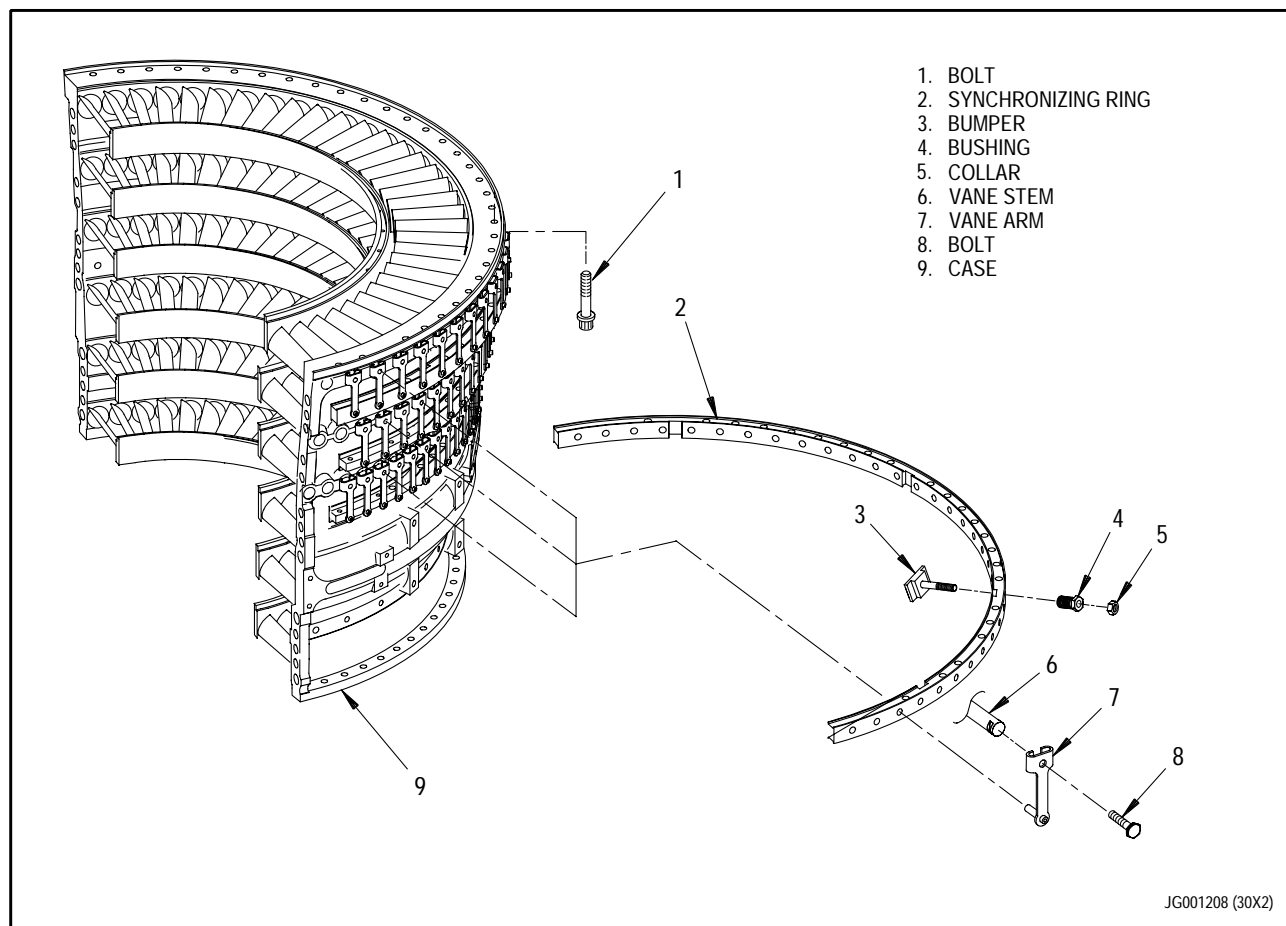


Figure 2. Fourth and Fifth Stage Variable Vane Synchronizing Rings and Vane Arms - Removal (Typical)

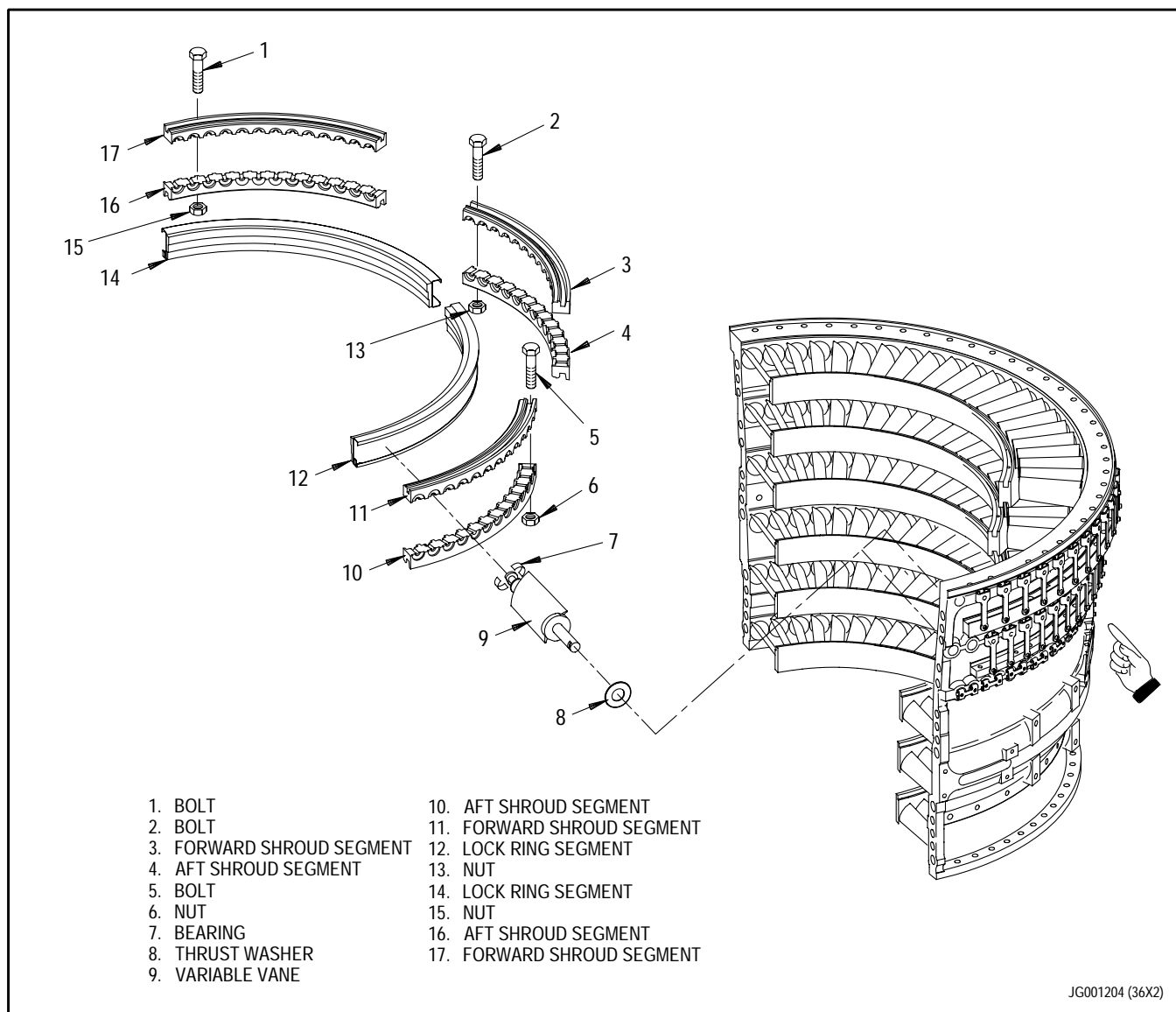


Figure 3. Fourth And Fifth Stage Variable Vanes - Removal (Typical)

**5. SIXTH STAGE VARIABLE VANES,
SYNCHRONIZING RING AND VANE ARMS -
REMOVAL.**

(See figure 2 and Figure 4.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove 6th stage variable vane synchronizing ring(2, figure 2) and vane arms as follows:

- (1) Remove bolts(8) securing vane arms(7) to variable vane stems(6) at each vane location around case.
- (2) Secure vane arm(7) to synchronizing ring(2) with tape.
- (3) Remove synchronizing ring (2) by sliding all vane arms(7) forward clear of vane stems(6).
- (4) Remove vane arms(7) from synchronizing ring(2).

- b. Remove four bumpers(3) from synchronizing ring(2) as follows:

- (1) Remove collars(5) securing bumpers(3).
- (2) Remove bumpers(3) from synchronizing ring(2).

- (3) Remove bushings(4) from synchronizing ring(2).

- c. Remove variable vanes (9, figure 4) as follows:

- (1) Slide lock ring segment(14) securing shroud segments(4 and 5) and (15 and 16) out of case from left side.
- (2) Slide lock ring segment(12) securing shroud segments(4 and 5) and (10 and 11) out of case from right side.
- (3) Remove three nuts(1) and bolts(2) and remove outer, aft shroud segment(15) and forward shroud segment(16) from ID stems of vanes.
- (4) Remove three nuts(3) and bolts(13) and remove center, aft shroud segment(5) and forward shroud segment(4) from ID stems of vanes.
- (5) Remove three nuts(6) and bolts(7) and remove outer, aft shroud segment(10) and forward shroud segment(11) from ID stems of vanes.
- (6) Remove variable vanes(9) and thrust washers(8) from case.

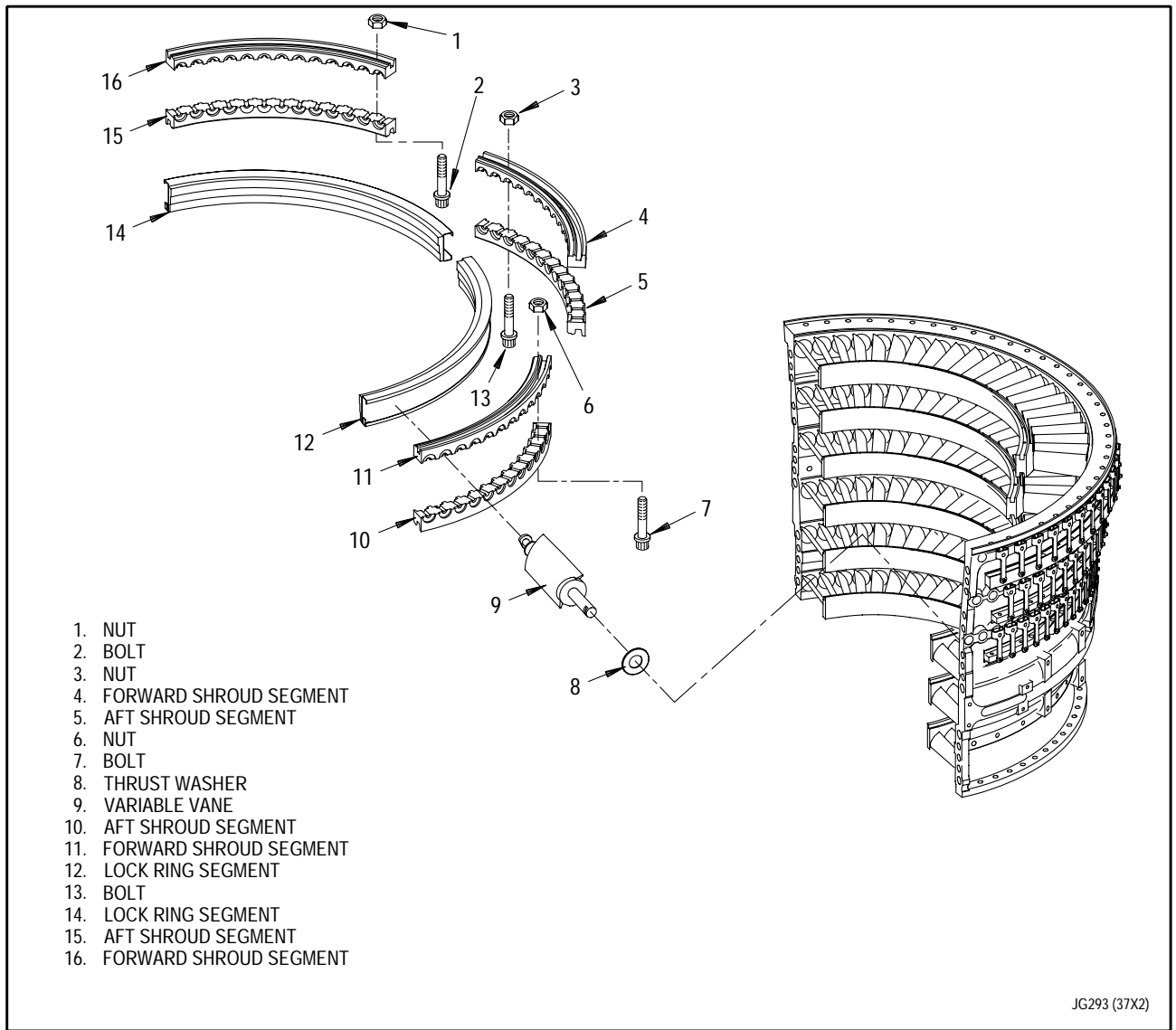


Figure 4. Sixth Stage Variable Vanes - Removal

5A. SIXTH STAGE FIXED VANES - REMOVAL.

(See Figure 4A.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove bolts(18, figure 4A) securing locks(17) to fixed vane stems at each vane location around case. Remove locks(17).
- b. Remove fixed vanes (9) as follows:
 - (1) Slide lock ring segment(14) securing shroud segments(4 and 5) and (15 and 16) out of case from left side.
 - (2) Slide lock ring segment(12) securing shroud segments(4 and 5) and (10 and 11) out of case from right side.

- (3) Remove three nuts(1) and bolts(2) and remove outer, aft shroud segment(15) and forward shroud segment(16) from ID stems of vanes.
- (4) Remove three nuts(3) and bolts(13) and remove center, aft shroud segment(5) and forward shroud segment(4) from ID stems of vanes.
- (5) Remove three nuts(6) and bolts(7) and remove outer, aft shroud segment(10) and forward shroud segment(11) from ID stems of vanes.
- (6) Remove fixed vanes(9) and thrust washers(8) from case.

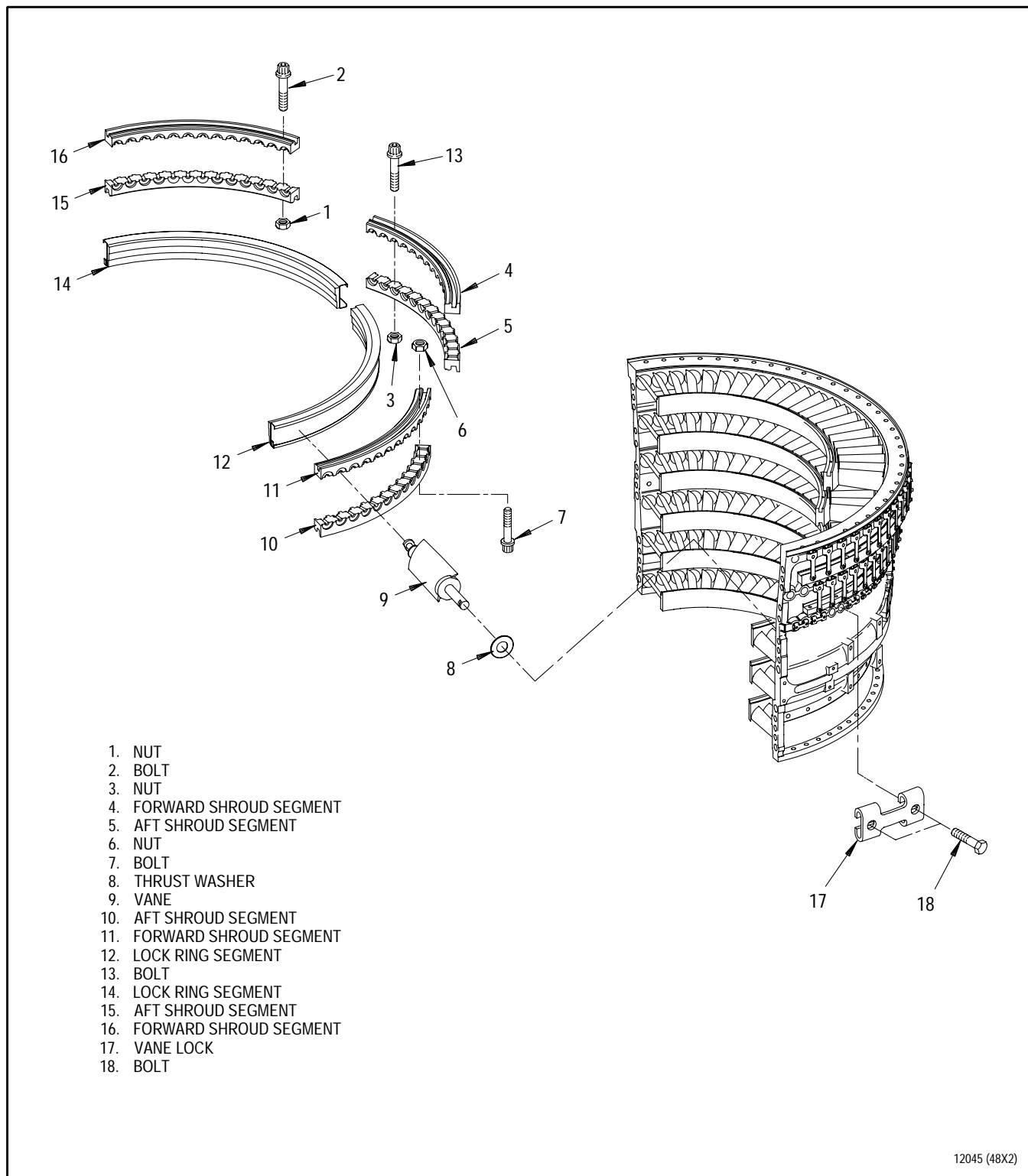


Figure 4A. Sixth Stage Fixed Vanes - Removal

6. FIFTH AND SIXTH STAGE DUCT SEGMENTS - REMOVAL.

(See Figure 5.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Remove pin(1, figure 5) and 5th stage duct segment key(2) from case.

NOTE

The 5th stage duct segments and case must be marked so duct segments will be installed in the same position during assembly.

- b. Mark in numerical sequence the three 5th stage duct segments(3) and case to indicate position, using silver pencil.

- c. Remove 5th stage duct segments(3) by sliding them around and out of case.

- d. Remove pin(9) and 6th stage duct segment key(8) from case.

NOTE

The 6th stage duct segments and case must be marked so duct segments will be installed in the same position during assembly.

- e. Mark in numerical sequence the three 6th stage duct segments(4) and case to indicate position, using silver pencil.
- f. Remove 6th stage duct segments(4) by sliding them around and out of case.

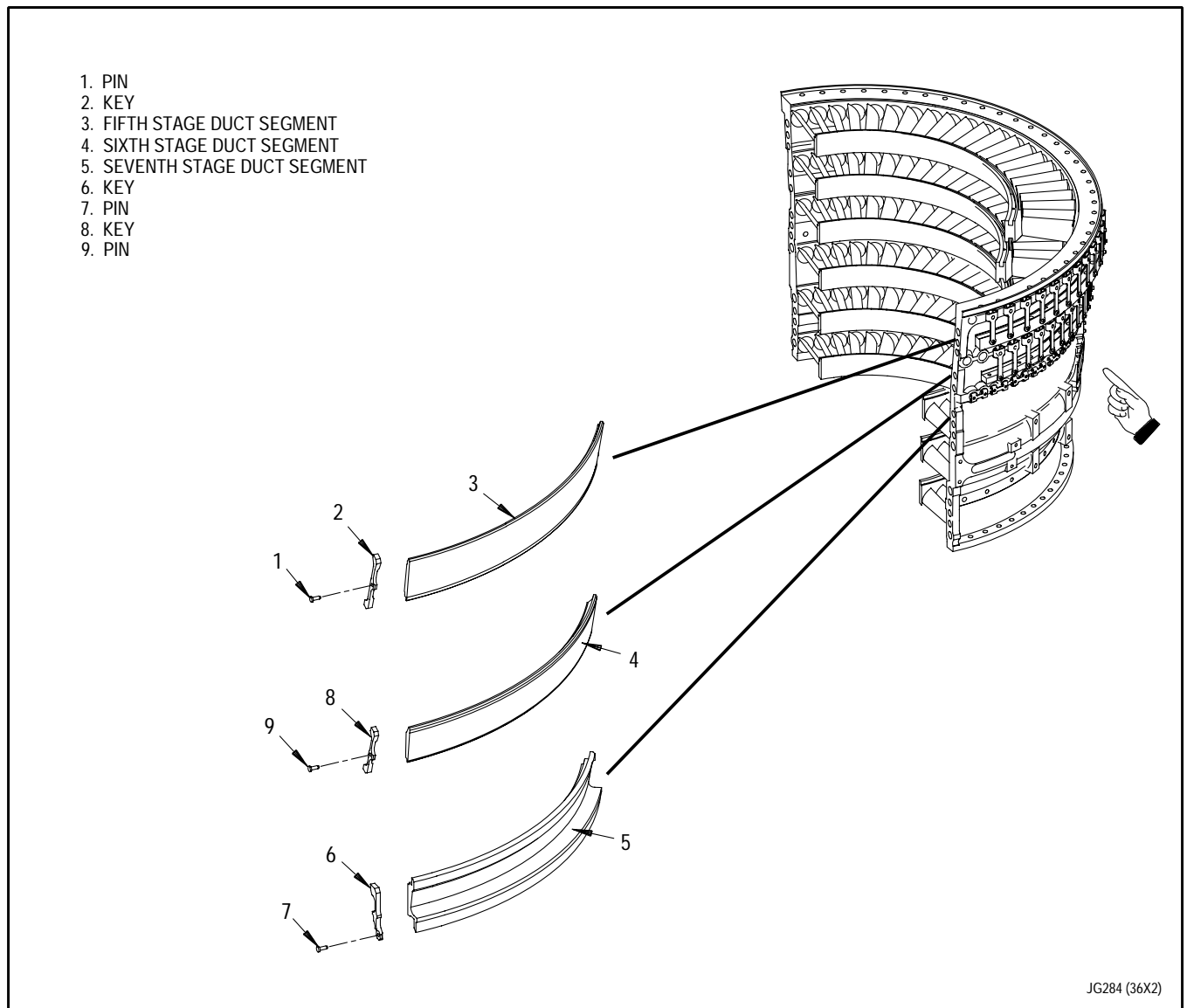


Figure 5. Fifth, Sixth, And Seventh Stage Duct Segments - Removal

7. EIGHTH AND NINTH STAGE STATOR SEGMENTS - REMOVAL.

(See Figure 6.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Position case on table, front flange down.

NOTE

The 9th stage stator segments and case must be marked so stator segments will be installed in the same position during assembly.

- b. Mark in numerical sequence the five 9th stage stator segments(7, figure 6, Sheet 1) and case to indicate position, using silver pencil.
- c. Bend tabs of key washers(16, Sheet 3) away from 8th/9th stage rail bolts(15).
- d. Loosen rail bolts(15).
- e. Remove PN 4080549-01 or 4078339-01 9th stage stator segments(7, Sheet 1) one at a time from case and place on bench. Remove and discard seals(10 and 11, Sheet 2).
- e1. Visually inspect 9th stage stators for antirotation lug tack weld cracks and protruding lugs per WP 355 00.
- e2. Prod each antirotation lug from rear side of stator using a small instrument. Movement of lug or protrusion from forward side of stator indicates cracked tack welds. No cracks allowed.
- f. Remove entire set of typical PN 4079089-01 9th stage stator

segments(7, Sheet 1) from case, place on bench, and proceed as follows:

NOTE

The 8th/9th stage rails and case must be marked so rails will be installed in the same position during assembly.

- (1) Mark in numerical sequence the 10 8th/9th stage rails(6) and case to indicate position, using silver pencil.

NOTE

The 8th stage stator segments and case must be marked so stator segments will be installed in the same position during assembly.

- (2) Mark in numerical sequence the five 8th stage stator segments(5) and case to indicate position, using silver pencil.
- (3) Remove four bolts(15, Sheet 3), two 8th/9th stage rails(6, Sheet 1) and key washer(16, Sheet 3) which secure the first 8th stage stator segment(5, Sheet 1) in left side of case.
- (4) Tighten remaining 8th/9th stage rail bolts(15, Sheet 3).
- (5) Apply penetrating oil to contact surfaces of 8th stage stator segments(5, Sheet 4), 8th stage shrouds(20), damping spring(21) and case.

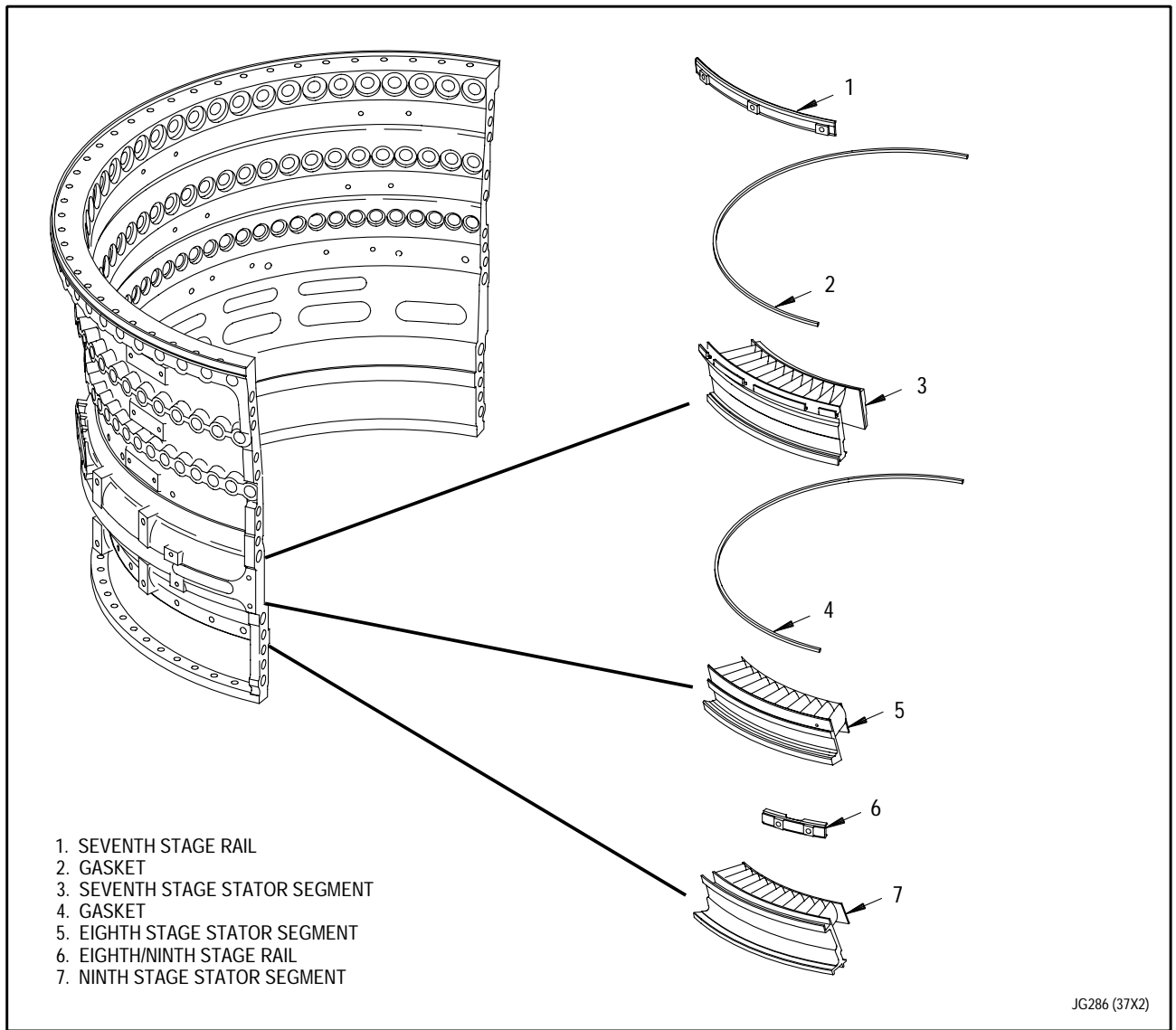


Figure 6. Seventh, Eighth, And Ninth Stage Stators - Removal (Sheet 1 of 4)

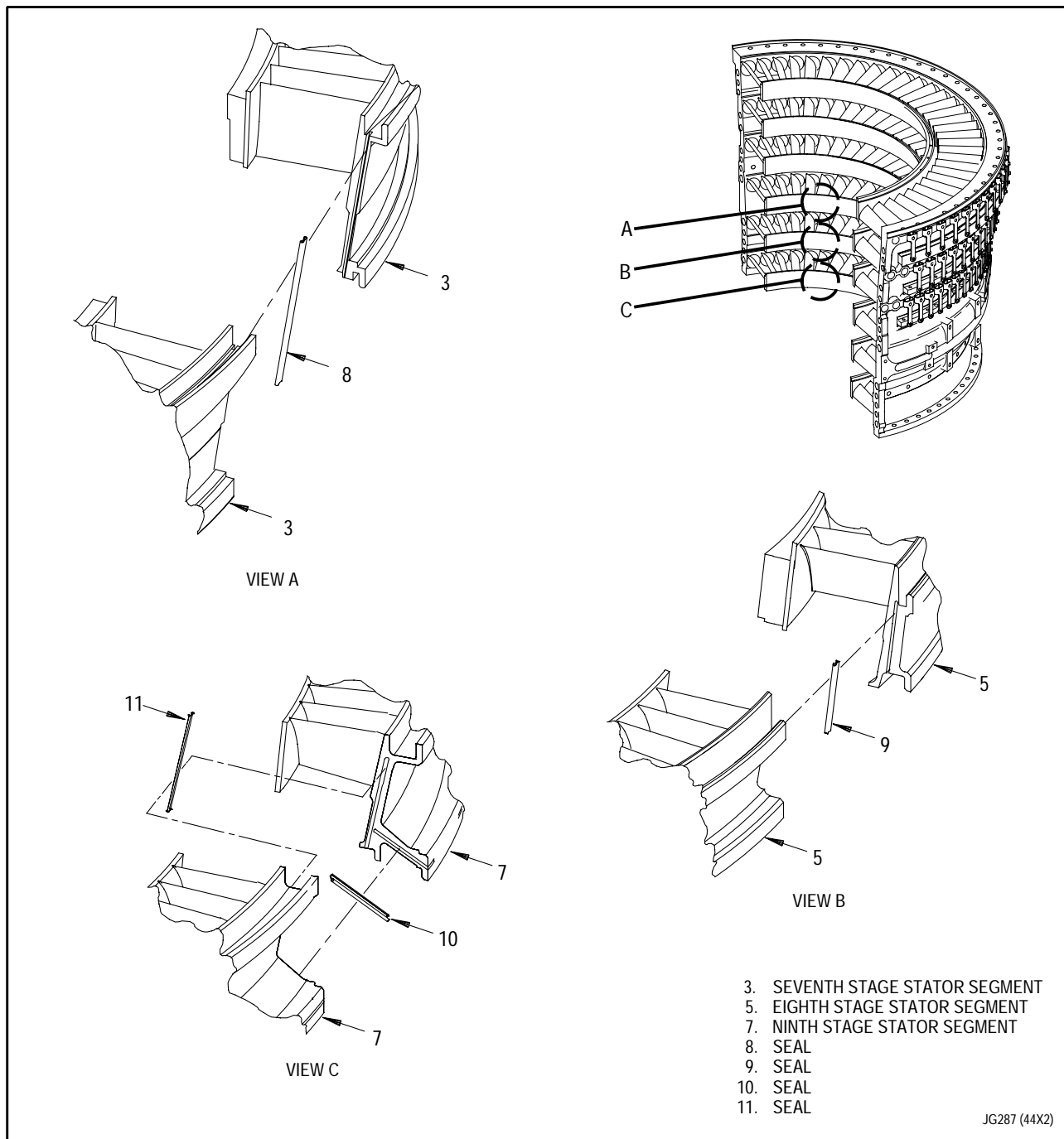


Figure 6. Seventh, Eighth, And Ninth Stage Stators - Removal (Sheet 2 of 4)

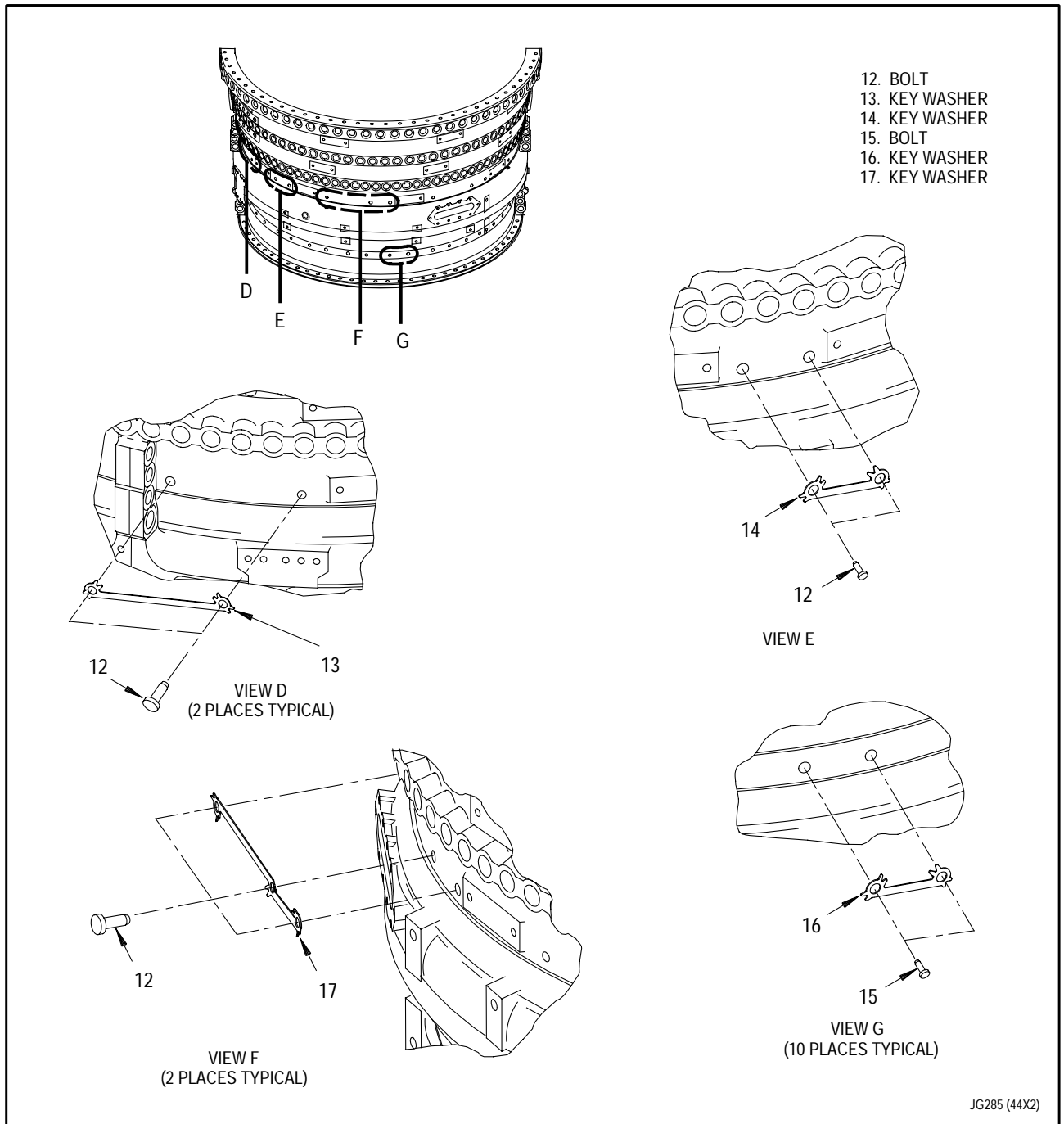
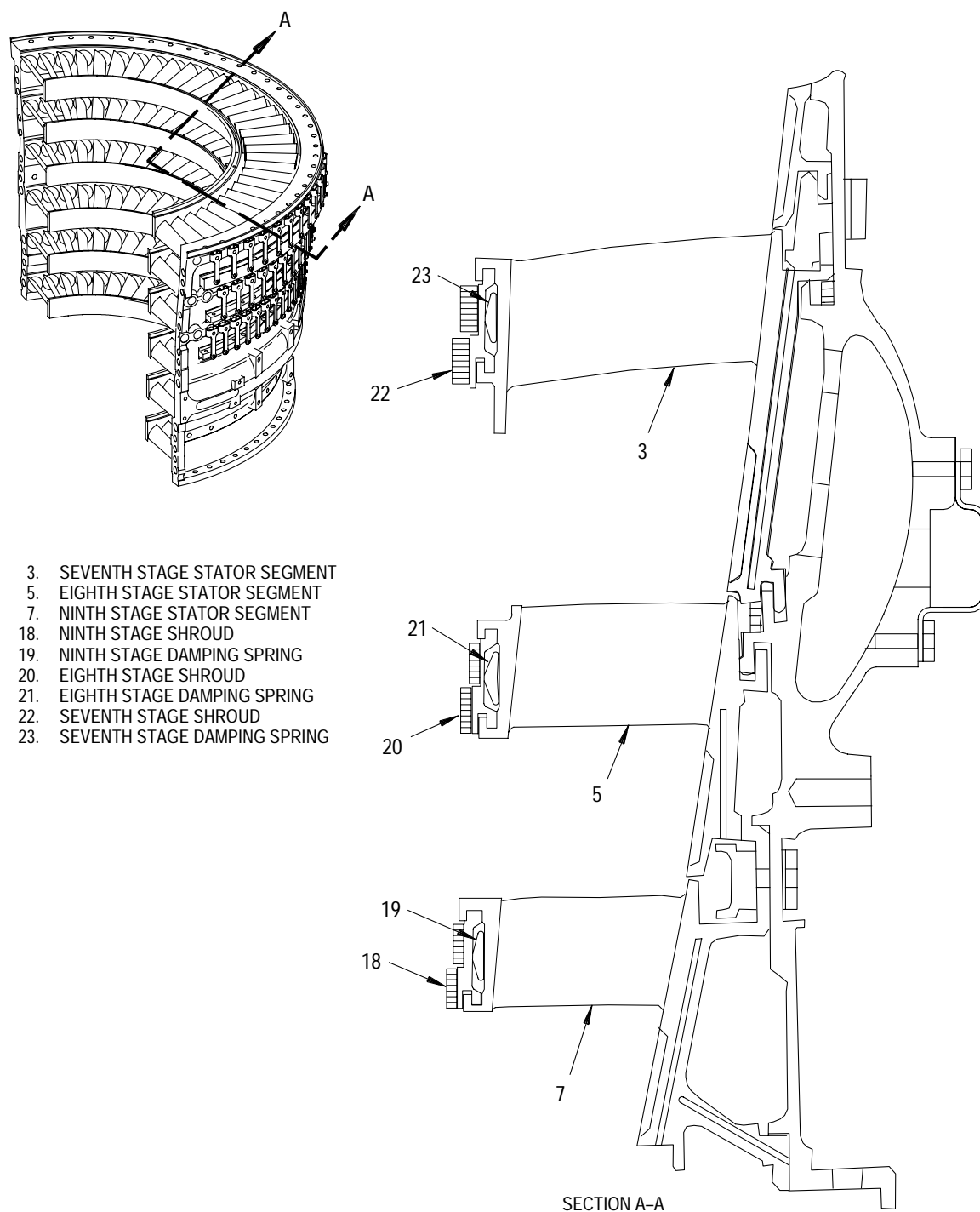


Figure 6. Seventh, Eighth, And Ninth Stage Stators - Removal (Sheet 3 of 4)



8074 (48X2)

Figure 6. Seventh, Eighth, And Ninth Stage Stators - Removal (Sheet 4 of 4)

- (6) Using nonmetallic or brass drift and mallet, tap first 8th stage stator segment(5, Sheet 2) against antirotation lug around and out of case, separating from 8th stage shroud(20, Sheet 4) and damping spring(21).
- (7) Remove and discard seal(9, Sheet 2).
- (8) Repeat steps h, k, and l for second, third, and fourth stator segments(5) in case.
- (9) Tap 8th stage shroud(20, Sheet 4) around and out of last 8th stage stator segment(5). Discard damping spring(21).
- (10) Remove four bolts(15, Sheet 3), two 8th/9th stage rails(6, Sheet 1) and key washer(16, Sheet 3) and remove last stator segment(5, Sheet 2) from case.
- (10a) Visually inspect 8th stage stators for antirotation lug tack weld cracks and protruding lugs per WP 355 00.
- (10b) Prod each antirotation lug from rear side of stator using a small instrument. Movement of lug or protrusion from forward side of stator indicates cracked tack welds. No cracks allowed.
- (11) Remove and discard seal(9).
- (12) Install 8th/9th stage rails(6, Sheet 1) in case and secure with bolts(15, Sheet 3). Do not tighten bolts.
- (13) Install entire set of 9th stage stator segments(7) in case.
- (14) Remove four bolts(15, Sheet 3) and two 8th/9th stage rails(6, Sheet 1) which secure the first 9th stage stator segment(7) in left side of case.
- (15) Tighten remaining 8th/9th stage rail bolts(15, Sheet 3).
- (16) Apply penetrating oil to contact surfaces of 9th stage stator segments(7, Sheet 4), 9th stage shrouds(18), damping spring(19) and case.
- (17) Using nonmetallic or brass drift and mallet tap first 9th stage stator segment(7, Sheet 2) against antirotation lug around and out of case, separating from 9th stage shroud(18, Sheet 4) and damping spring(19).
- (18) Remove and discard seals(10 and 11, Sheet 2).
- (19) Repeat steps s, v, and w for second, third and fourth stator segments(7) in case.
- (20) Tap 9th stage shroud(18, Sheet 4) around and out of last 9th stage stator segment(7). Discard damping spring(19).
- (21) Remove four bolts(15, Sheet 3), two 8th/9th stage rails(6, Sheet 1) and remove last stator segment(7) from case.
- (22) Remove and discard seals(10 and 11, Sheet 2).

g. If required, remove shroud and damping spring from PN 4080549-01 or 4078339-01 9th stage stator segments (having damping spring and shroud the same length as stator segment) as follows:

(1) Place 9th stage stator segment(7, Sheet 4) on bench.

(2) Using nonmetallic drift and hammer, tap shroud(18) out of slot for each stator segment(7).

(3) Remove 9th stage damping spring(19) by sliding it around and out of slot in each stator segment. Discard damping spring.

8. SEVENTH STAGE STATOR AND DUCT SEGMENTS - REMOVAL.

(See figures 5 and 6.)

NOTE

The following instructions apply to both upper and lower 4th through 9th stage case.

- a. Bend tabs of key washers(13, 14, and 17, figure 6, Sheet 3) away from 7th stage rail bolts(12).
- b. Loosen rail bolts(12).
- c. Remove pin(7, figure 5) and 7th stage duct segment key(6) from case.

NOTE

The 7th stage duct segments and case must be marked so duct segments will be installed in the same position during assembly.

- d. Mark in numerical sequence the three 7th stage duct segments(5) and case to indicate position, using silver pencil.
- e. Remove 7th stage duct segments(5) by sliding them around and out of case.

NOTE

The 7th stage rails and case must be marked so rails will be installed in the same position during assembly.

- f. Mark in numerical sequence the four 7th stage rails(1, figure 6, Sheet 1) and case to indicate position, using silver pencil.

NOTE

The 7th stage stator segments and case must be marked so stator segments will be installed in the same position during assembly.

- g. Mark in numerical sequence the four 7th stage stator segments (3) and case to indicate position, using silver pencil.
- h. Remove three bolts(12, Sheet 3), key washer(13) and 7th stage rail(1, Sheet 1) which secure the first 7th stage stator segment(3) in left side of case.
- i. Tighten remaining 7th stage rail bolts(12, Sheet 3).
- j. Apply penetrating oil to contact surfaces of 7th stage stator segments(3, Sheet 1), 7th stage shrouds(22, Sheet 4), damping spring(23) and case.
- k. Using nonmetallic or brass drift and mallet, tap first 7th stage stator segment(3, Sheet 1) against antirotation lug around and out of case, separating from 7th stage shroud(22, Sheet 4) and damping spring(23).

- l. Remove and discard seal(8, Sheet 2).
- m. Remove three bolts(12, Sheet 3), key washer(14) and 7th stage rail(1, Sheet 1) which secures the second 7th stage stator segment(3) in case.
- n. Using nonmetallic or brass drift and mallet, tap second 7th stage stator segment(3) against antirotation lug around and out of case, separating from 7th stage shroud(22, Sheet 4) and damping spring(23).
- o. Remove and discard seal(8, Sheet 2).
- p. Remove three bolts(12, Sheet 3), key washer(17) and 7th stage rail(1, Sheet 1) which secures the third 7th stage stator segment(3) in case.
- q. Using nonmetallic or brass drift and mallet, tap third 7th stage stator segment(3) against antirotation lug around and out of case, separating from 7th stage shroud(22, Sheet 4) and damping spring(23).
- r. Remove and discard seal(8, Sheet 2).
- s. Tap 7th stage shroud(22, Sheet 4) around and out of last 7th stage stator segment(3, Sheet 1). Discard damping spring(23, Sheet 4).
- t. Remove three bolts(12, Sheet 3), key washers(13 and 17), and 7th stage rail(1, Sheet 1) and remove last stator segment(3) from case.
- t1. Visually inspect 7th stage stators for antirotation lug tack weld cracks and protruding lugs per WP 355 00.
- t2. Prod each antirotation lug from rear side of stator using a small instrument. Movement of lug or protrusion from forward side of stator indicates cracked tack welds. No cracks allowed.
- u. Remove and discard seal(8, Sheet 2).
- v. Remove and discard 7th stage gasket(2, Sheet 1).
- w. Remove and discard 8th stage gasket(4, Sheet 1).

**9. FOURTH, FIFTH, AND SIXTH STAGE
VARIABLE VANE OUTER BEARINGS
(BUSHINGS) - REMOVAL USING PWA 57782
PUSHER/PULLER, DETAIL OF PWA 57790.**

(See Figure 7.)

NOTE

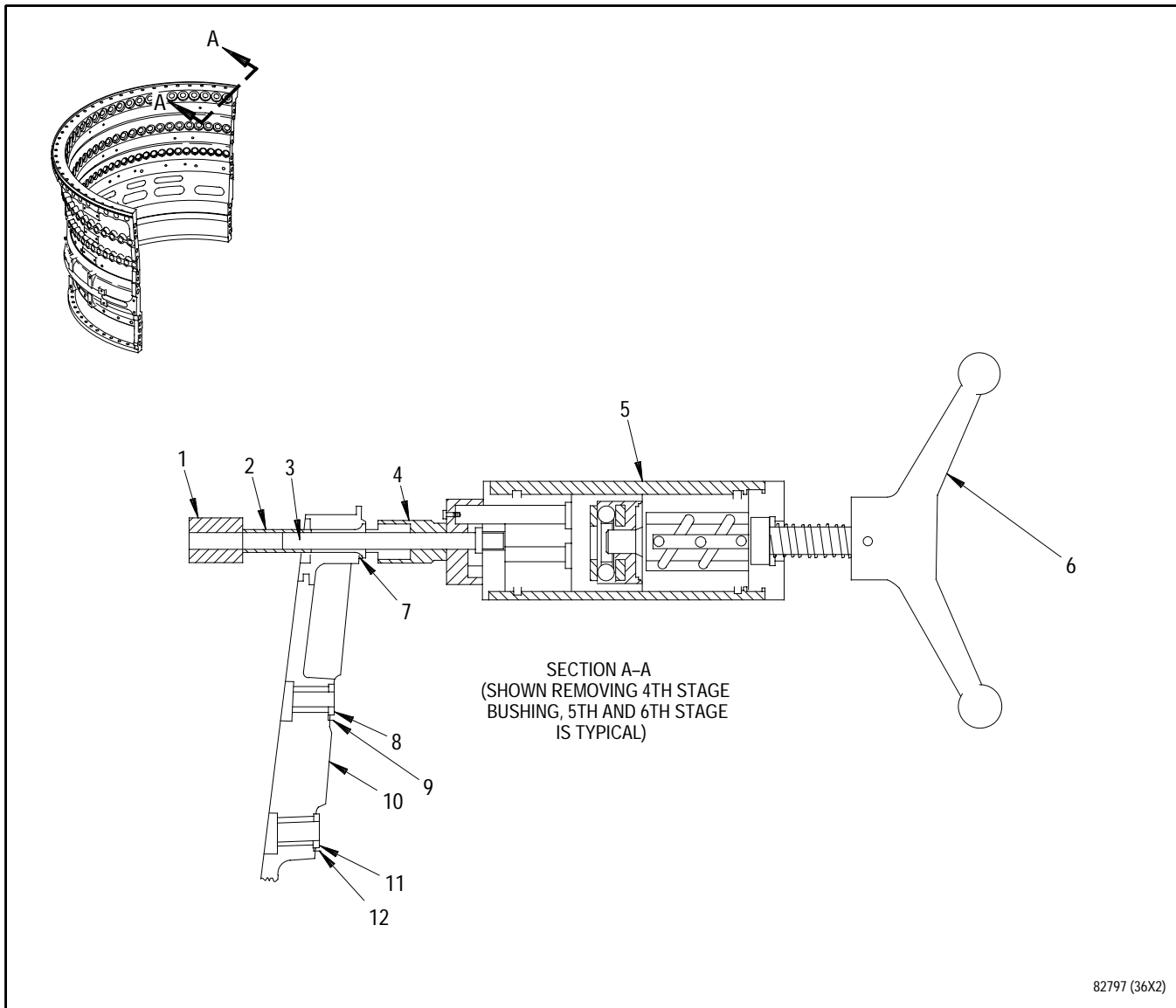
- The following instructions apply to both upper and lower 4th through 9th stage case.
- Paragraph 9 applies for 6th stage bearing PN 4074432. Proceed to paragraph 10 for removal of 6th stage bearing PN 4079117.

- a. Position case(10, figure 7) on table, front flange up.
- b. Remove bushings using PWA 57782 pusher/puller(5) as follows:



Applying excessive force to extend detail-11 guide post(3) past hard stop will damage tool.

- (1) Rotate detail-19 speed handle(6) counterclockwise to extend detail-11 guide post(3).
- (2) Install detail-10 puller ring(4) on detail-11 guide post(3).



1. Locating knob
2. Puller sleeve
3. Guide post
4. Puller ring
5. PWA 57782 pusher/puller
6. Speed handle
7. 4th stage bushing
8. 5th stage bushing
9. Key washer
10. Case
11. 6th stage bushing
12. Key washer

Figure 7. Fourth, Fifth and Sixth Stage Variable Vane Outer Bearings (Bushings) - Removal Using PWA 57782 Pusher/Puller, Detail of PWA 57790

- (3) Install detail-11 guide post(3) through bushing.
- (4) Install detail-12 puller sleeve(2) on detail-11 guide post(3).

NOTE

Detail-22 locating knob is used for 4th stage, detail-23 locating knob is used for 5th stage, and detail-24 locating knob is used for 6th stage.

- (5) Thread locating knob(1) onto detail-11 guide post(3).
- (6) Rotate detail-19 speed handle(6) clockwise to push bushing(7) bushing(8) and key washers(9), or bushing(11) and key washers(12) out of case.

10. COMPRESSOR STATOR SIXTH STAGE BEARING (BUSHING) - REMOVAL USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790.

(See Figure 8.)

NOTE

- Newer 4-9th stage compressor case set, PN 4080545-01 does not have 6th stage bumpers, PN 4077056.
- The following instructions apply to both upper and lower 4th through 9th stage case.
- Paragraph 10 applies to 6th stage bearing PN 4079117.

- a. Position case(7, figure 8) on table, front flange up.

- b. Remove bushings using PWA 57782 pusher/puller(5) as follows:

- (1) Rotate detail-19 speed handle(6) counterclockwise to extend detail-11 guide post(3).
- (2) Install detail-10 puller ring(4) on detail-11 guide post(3).
- (3) Install detail-11 guide post(3) through bushing.
- (4) Install detail-12 puller sleeve(2) on detail-11 guide post(3).
- (5) Thread detail-24 locating knob(1) onto detail-11 guide post(3).
- (6) Rotate detail-19 speed handle(6) clockwise to push bushing(8) and key washer(9) out of case.

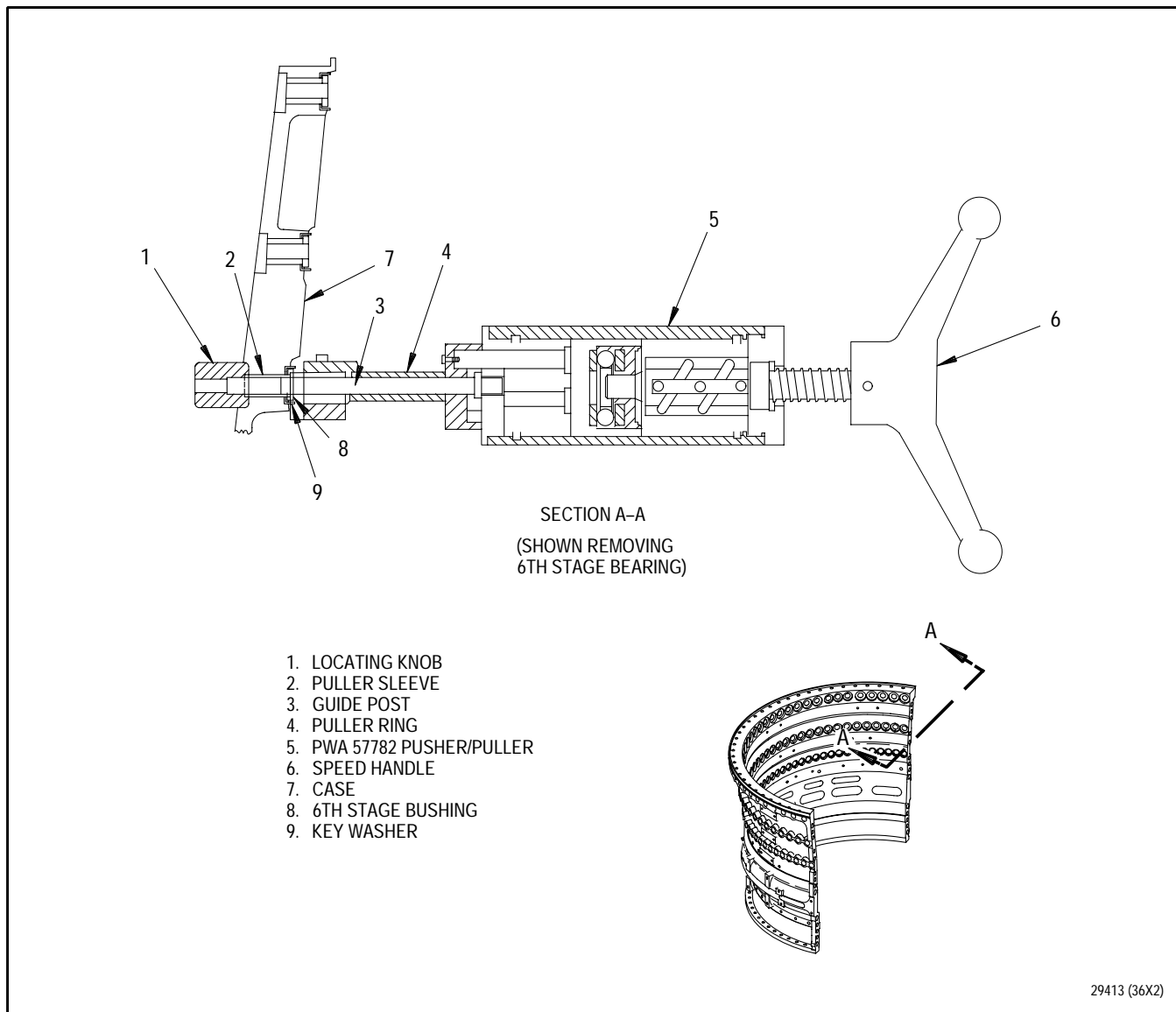


Figure 8. Sixth Stage Compressor Stator Bearing (Bushing) - Removal Using PWA 57782 Pusher/Puller, Detail of PWA 57790

WORK PACKAGE**TECHNICAL PROCEDURES****ROTOR ASSEMBLY, REAR COMPRESSOR -****DISASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 32

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	11	0	19	30
2A - 2C Added	30	12 - 14	30	20	0
2D Blank Added	30	15	0	21	30
3 - 5	30	16	20	22	16
6	16	16A	30	23	20
7	0	16B	16	24	30
8	20	17	16	25 Added	20
9	0	18	0	26 Blank Added	20
10	30				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
PENCIL (CRAYON) , SILVER, METAL	COLORBRITE NO. 2101
MARKING (HARD) (PMC 4059-7)	OR ANADEL NO. 1936
PENETRANT	AEROKROIL, NSN 9150-00-800-7997
TAPE, MASKING (CLOTH BACKING)	CC 150-01B RED
(PMC 4001)	

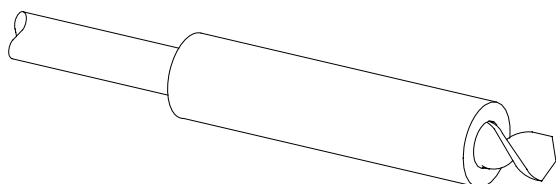
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

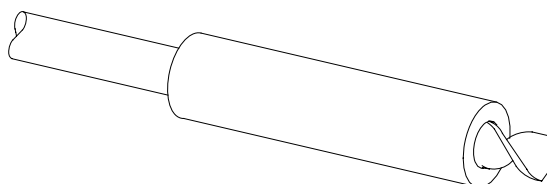
Paragraph	Function - Tool Nomenclature	Tool Number
2	FOURTH AND FIFTH STAGE ROTOR - REMOVAL AND DISASSEMBLY	
	ADAPTER, COMPRESSOR TIEROD - - - - -	PWA 57608
	PUSHER/PULLER, 4TH AND 5TH STAGE COMPRESSOR DISK - -	PWA 57604
	PUMP, HYDRAULIC, DOUBLE ACTING - - - - -	PWA 51946
	HOOK, SAFETY - - - - -	PWA 2388
	FIXTURE, LIFT, 4TH AND 5TH STAGE DISK - - - - -	PWA 57603
	FIXTURE, HOLDING, 4TH STAGE COMPRESSOR BLADE - - - -	PWA 71460
	FIXTURE, HOLDING, 5TH STAGE COMPRESSOR BLADE - - - -	PWA 71461
3	SIXTH STAGE DISK AND HUB - REMOVAL AND DISASSEMBLY	
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 57938
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584
	HOOK, SAFETY - - - - -	PWA 2388
	FIXTURE, HOLDING, 6TH STAGE COMPRESSOR BLADE - - - -	PWA 71462
4	REAR COMPRESSOR REAR ROTOR - DISASSEMBLY	
	FIXTURE, HOLDING, 7TH STAGE COMPRESSOR BLADE - - - -	PWA 71463
	ADAPTER, HPC BLADE LOCK REMOVAL - - - - -	PWA 57838
	DRILL SET, PILOT - - - - -	LM 1023
	DRILL SET, FINISHING - - - - -	LM 1024
	FIXTURE, HOLDING, 8TH STAGE COMPRESSOR BLADE - - - -	PWA 71464
	FIXTURE, HOLDING, 9TH STAGE COMPRESSOR BLADE - - - -	PWA 71465
	FIXTURE, HOLDING, 10TH STAGE COMPRESSOR BLADE - - - -	PWA 71466
	FIXTURE, HOLDING, 11TH STAGE COMPRESSOR BLADE - - - -	PWA 71467
	FIXTURE, HOLDING, 12TH STAGE COMPRESSOR BLADE - - - -	PWA 71468
	FIXTURE, HOLDING, 13TH STAGE COMPRESSOR BLADE - - - -	PWA 71469
	FIXTURE, COMPRESSOR TIEROD REMOVAL - - - - -	PWA 57537
	FIXTURE, LIFTING - - - - -	PWA 57516
	ARM, LIFT AND TURN - - - - -	PWA 26584
	HOOK, SAFETY - - - - -	PWA 2388
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 57937
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 51298
	STAND, TRANSPORTATION, 7TH-13TH STAGE COMPRESSOR DRUM ROTOR - - - - -	PWA 57837

ILLUSTRATED SUPPORT EQUIPMENT



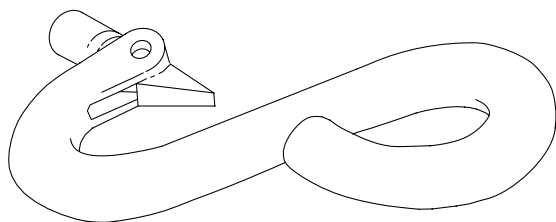
LM 1023 -C

Figure T1. LM 1023 DRILL SET



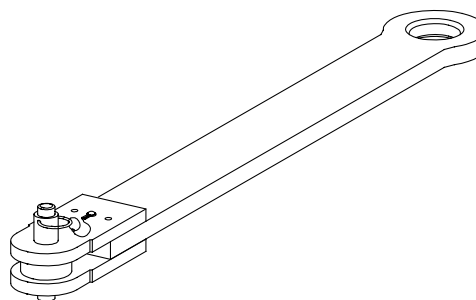
LM 1024 -C

Figure T2. LM 1024 DRILL SET



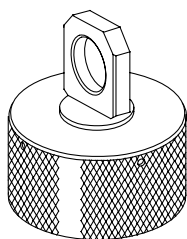
PWA 2388 -C

Figure T3. PWA 2388 HOOK



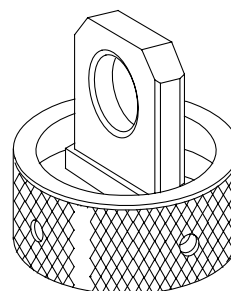
PWA 26584 -C

Figure T4. PWA 26584 ARM



PWA 51298 -C

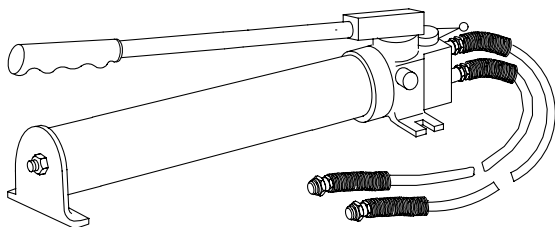
Figure T5. PWA 51298 EYE



PWA 51371 -C

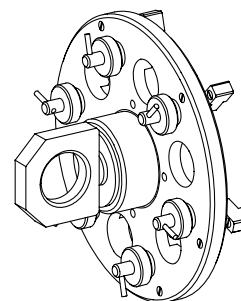
Figure T6. PWA 51371 EYE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



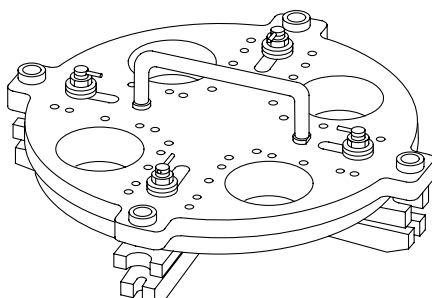
PWA 51946 -C

Figure T7. PWA 51946 PUMP



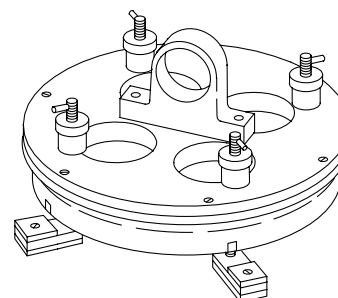
PWA 57516 -C

Figure T8. PWA 57516 FIXTURE



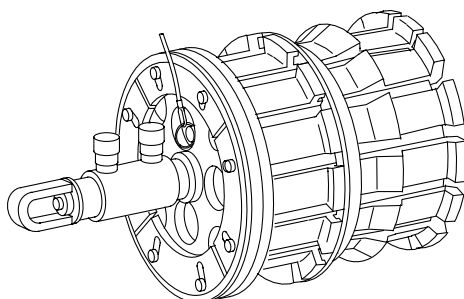
PWA 57537 -C

Figure T9. PWA 57537 FIXTURE



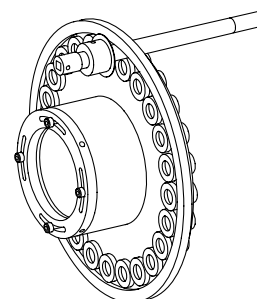
PWA 57603 -C

Figure T10. PWA 57603 FIXTURE



PWA 57604 -C

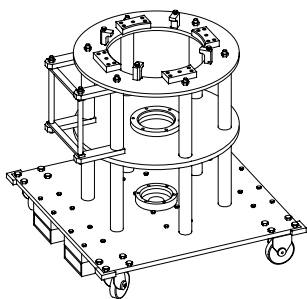
Figure T11. PWA 57604 PUSHER/PULLER



PWA 57608 -C

Figure T12. PWA 57608 ADAPTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



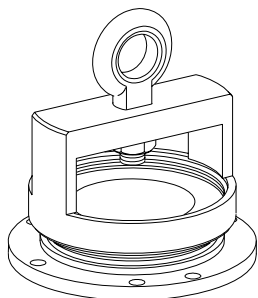
PWA 57837 -C

Figure T13. PWA 57837 STAND



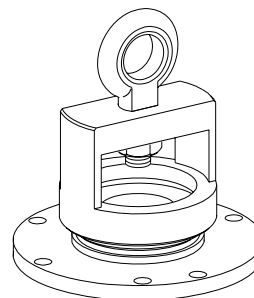
PWA 57838 -C

Figure T14. PWA 57838 ADAPTER



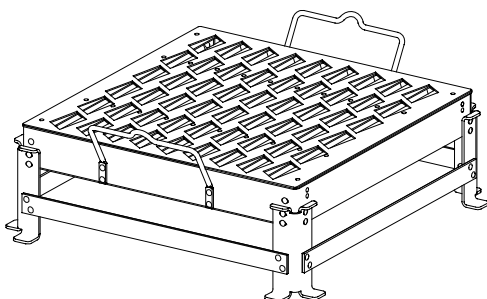
PWA 57937 -C

Figure T15. PWA 57937 FIXTURE



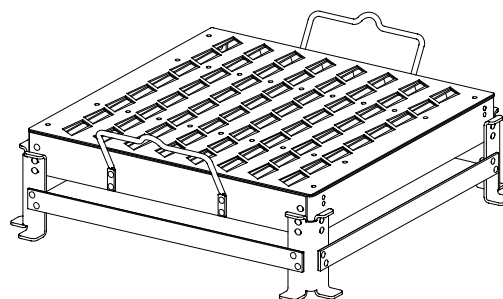
PWA 57938 -C

Figure T16. PWA 57938 FIXTURE



PWA 71460 -C

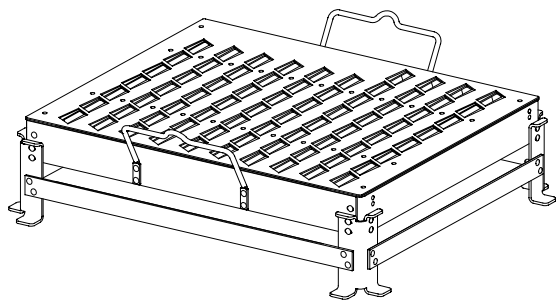
Figure T17. PWA 71460 FIXTURE



PWA 71461 -C

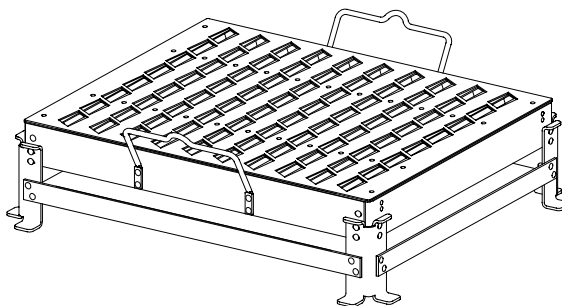
Figure T18. PWA 71461 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



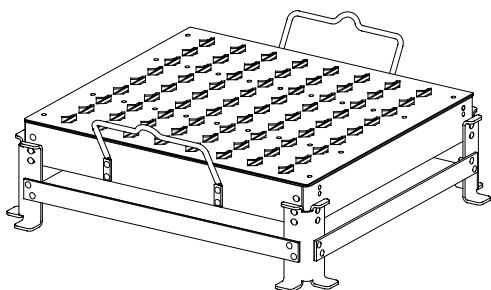
PWA 71462 -C

Figure T19. PWA 71462 FIXTURE



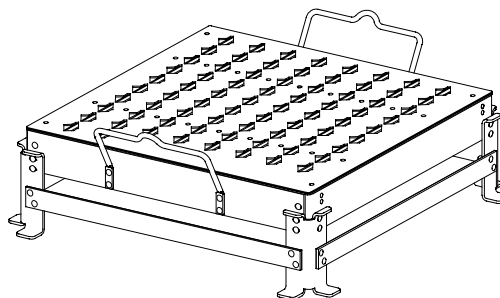
PWA 71463 -C

Figure T20. PWA 71463 FIXTURE



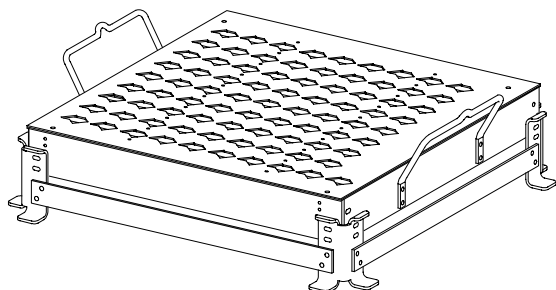
PWA 71464 -C

Figure T21. PWA 71464 FIXTURE



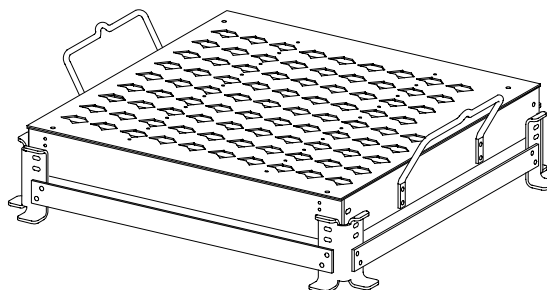
PWA 71465 -C

Figure T22. PWA 71465 FIXTURE



PWA 71466 -C

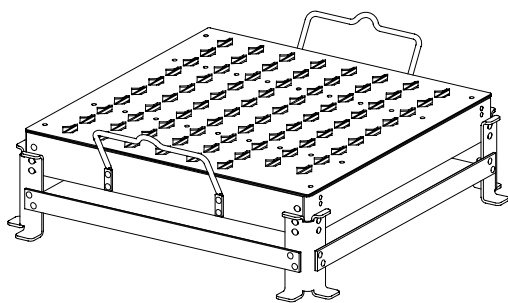
Figure T23. PWA 71466 FIXTURE



PWA 71467 -C

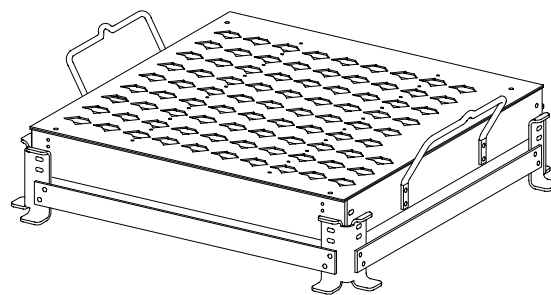
Figure T24. PWA 71467 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 71468 -C

Figure T25. PWA 71468 FIXTURE



PWA 71469 -C

Figure T26. PWA 71469 FIXTURE

1. INTRODUCTION.

- a. This work package provides instructions for disassembly of rear compressor rotor assembly.

2. FOURTH AND FIFTH STAGE ROTOR - REMOVAL AND DISASSEMBLY.

(See Figures 1 through 3.)



Failure to ensure protective wrapping is installed on rotor knife-edge seals can result in seal damage.

- a. Remove tierod nuts(5, figure 1) as follows:

- (1) Install PWA 57608 tierod nut adapter(2) over sixth stage hub(3).
- (2) Loosen tierod nuts(5) in pairs, 180 degrees apart. Use pattern as marked on adapter. Loosen tierod nuts, 1/4 turn at a time until there is no tension on the tierods(4).
- (3) Remove PWA 57608 tierod nut adapter(2).
- (4) Remove tierod nuts(5).

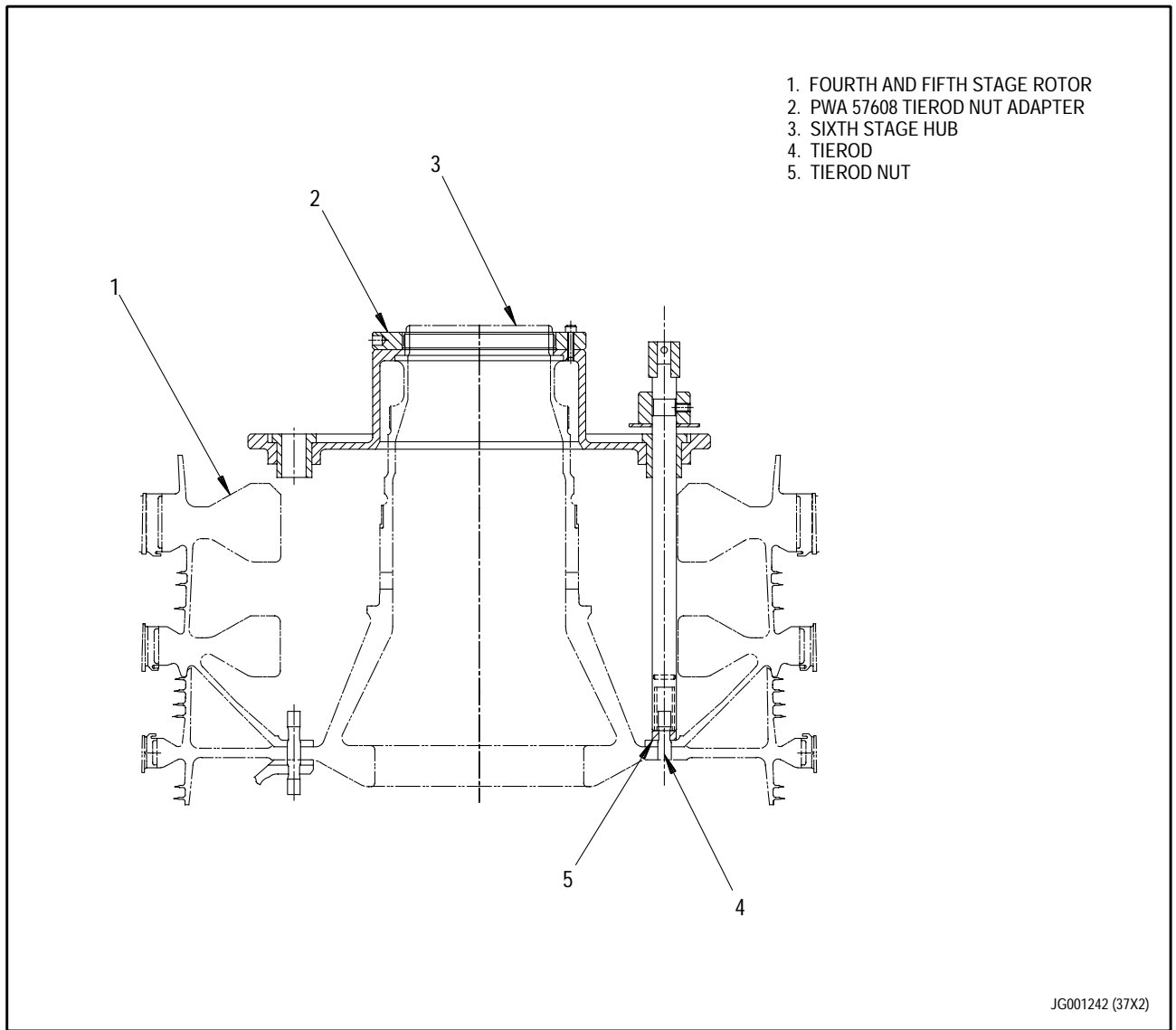


Figure 1. Tierod Nut Removal Using PWA 57608 Adapter

- b. Remove fourth and fifth stage rotor(7, figure 2) using PWA 57604 pusher/puller as follows:
- (1) Install detail-14 nylon protector(8) in ID bore of fourth and fifth stage rotor(7).
 - (2) Install detail-12 collet(10) through center of disk bore until it rests on detail-14 nylon protector(8).
 - (3) Install detail-13 spreader(9) in center of detail-12 collet(10) and tap on upper surface until detail-13 spreader is seated on shoulder of detail-12 collet.
 - (4) Thread detail-8 nut(5) onto sixth stage hub(6).
 - (5) Install hydraulic cylinder(2), detail-16 plate(14) and detail-11 puck(11) and rotate detail-11 puck to engage shoulder bolts(12). Install ball lock pin(3) to prevent rotation.
 - (6) Load detail-7 jaw ring segments(13) inward to capture detail-12 collet(10) and secure with detail-6 ring(4).

NOTE

Hydraulic cylinder couplers are identified as RET and EXT.

- (7) Connect PWA 51946 hydraulic hand pump to couplers of hydraulic cylinder(2).
- (8) Attach hoist and PWA 2388 hook to hoist ring(1).
- (9) Apply hydraulic pressure and unseat fourth and fifth stage rotor(7).
- (10) Remove PWA 51946 hydraulic hand pump.
- (11) Remove ball lock pin(3) and rotate detail-11 puck(11) to disengage shoulder bolts(12).
- (12) Lift fourth and fifth stage rotor(7) and place on workbench.
- (13) Remove PWA 57604 pusher/puller.
- (14) If it is necessary to move fourth and fifth stage rotor around shop, use PWA 57603 lift fixture.

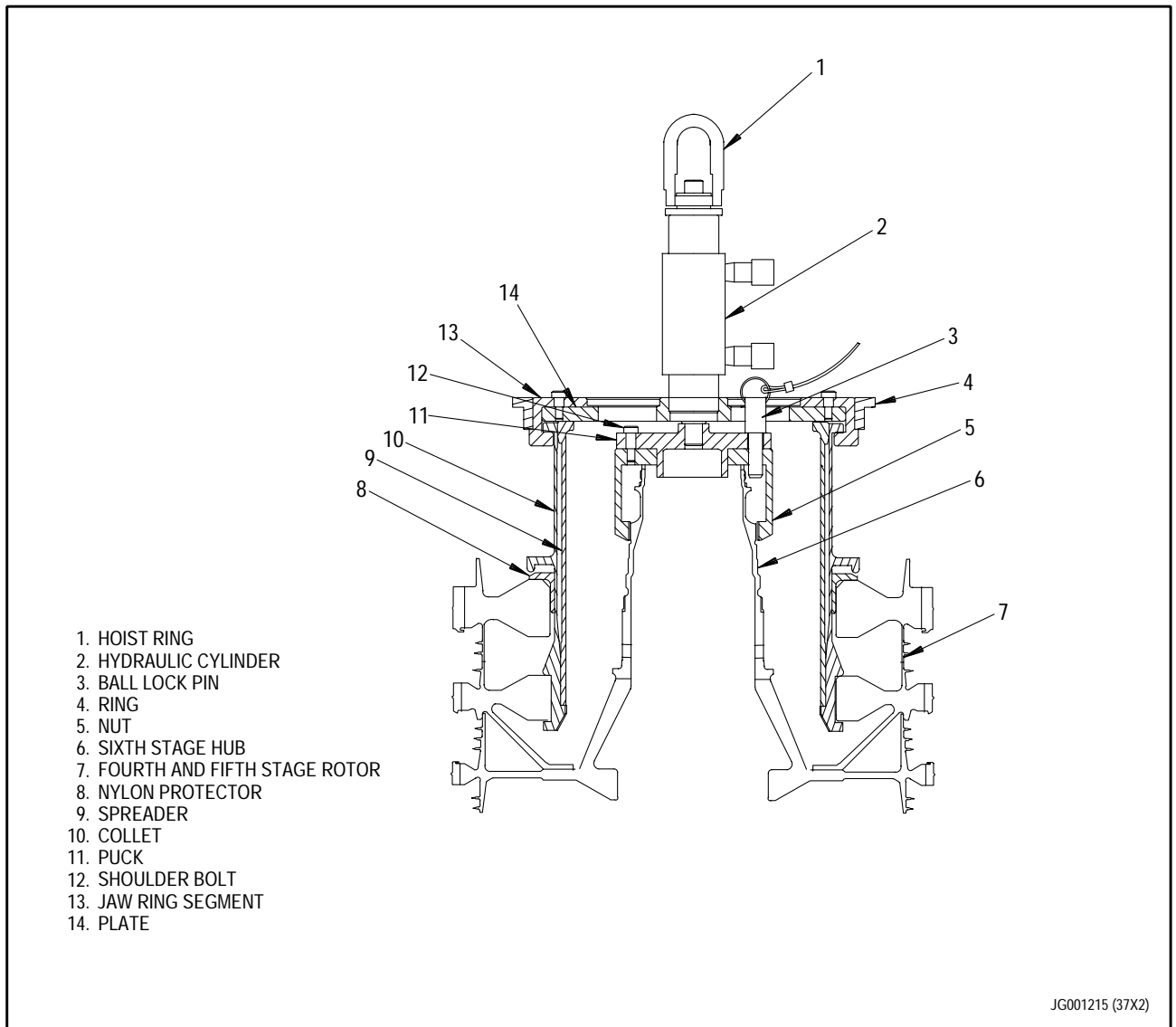


Figure 2. Removal of Fourth and Fifth Stage Rotor with PWA 57604 Pusher/Puller

- c. Remove 4th and 5th stage compressor rotor blades(2, figure 3) as follows:

NOTE

Removal of 4th and 5th stage blades is the same.

- (1) Using a silver pencil, number each compressor rotor blade to indicate position in disk.
- (2) Retain all blades(2) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.
- (3) Compress lockring(3) and remove from groove in rear face of disk.
- (4) Remove rubber bands from blades and slide blades(2) out of disk. Remove counterweights(1), if installed. Place 4th stage blades, blade root up, in PWA 71460 fixture. Place 5th stage blades, blade root up, in PWA 71461 fixture.
- (5) Remove lockring(3) by lifting forward over disk. Discard lockring.

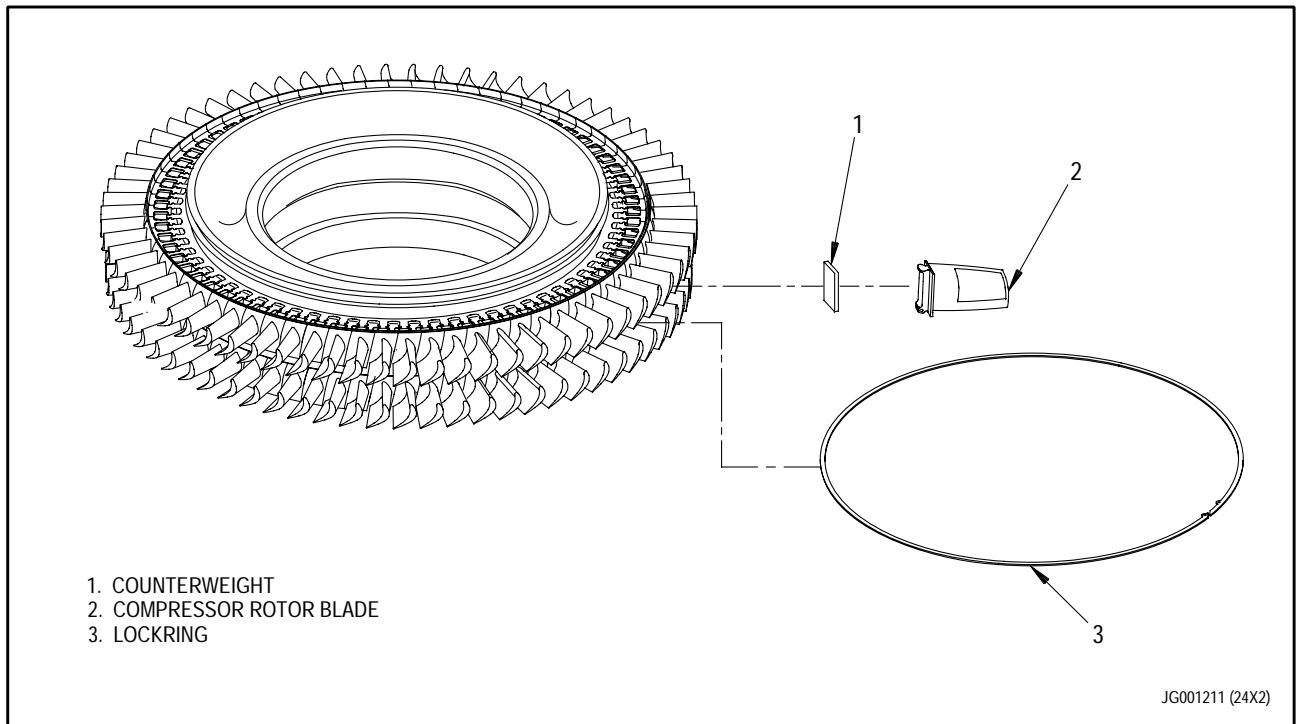


Figure 3. Fourth and Fifth Stage Compressor Rotor Blades - Removal (Typical)

**3. SIXTH STAGE DISK AND HUB - REMOVAL
AND DISASSEMBLY.**

(See Figure 4.)

- a. Thread PWA 57938 fixture(2, figure 4) on hub of 6th stage disk and hub(3).
- b. Attach PWA 26584 arm(1) to hoist with PWA 2388 hook.
- c. Attach PWA 26584 arm(1) to PWA 57938 fixture(2).
- d. Apply lifting tension and separate 6th stage disk and hub(3) from rear rotor. If required, a nonmetallic drift and hammer can be used.
- e. Lift 6th stage disk and hub(3) and place on workbench.
- f. Remove lift tooling.
- g. Remove 6th stage compressor rotor blades(6) as follows:
 - (1) Using silver pencil, number each compressor rotor blade to indicate position in disk.
 - (2) Retain all blades(6) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.
 - (3) Compress lockring(4) and remove from groove in forward face of disk.
 - (4) Remove rubber bands from blades and slide blades(6) out of disk. Remove adhesive backed seal(5) from under root of each blade. Place blades, blade root up, in PWA 71462 fixture.

Legend for figure 4

1. PWA 26584 arm
2. PWA 57938 fixture
3. 6th stage disk and hub
4. Lockring
5. Seal
6. Compressor rotor blade

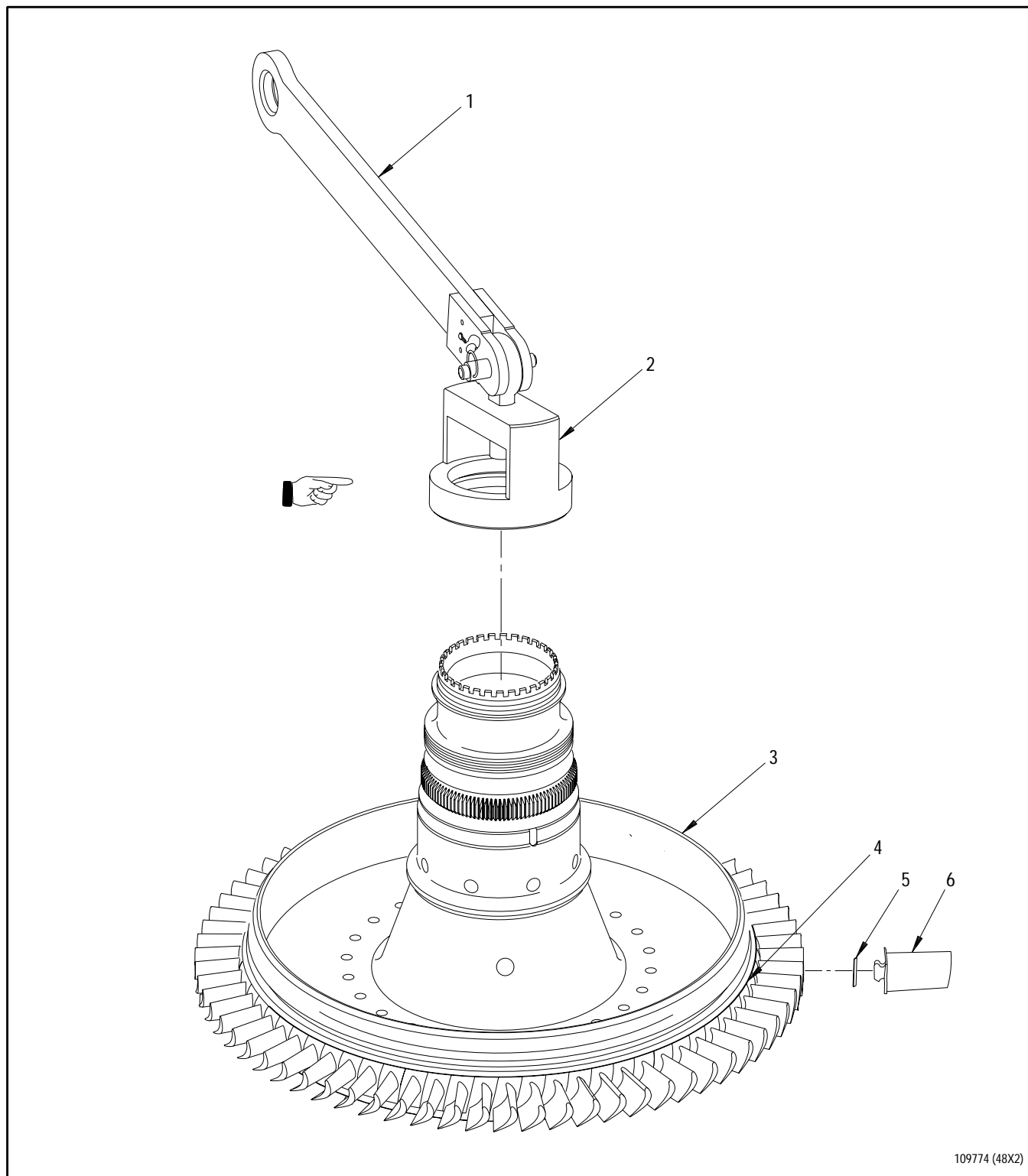


Figure 4. Sixth Stage Disk and Hub - Removal and Disassembly

**4. REAR COMPRESSOR REAR ROTOR -
DISASSEMBLY.**

(See Figures 5, 5A, and 6 through 10.)

- a. Remove 7th stage compressor rotor blades(2, figure 5) as follows:
 - (1) Using silver pencil, number each compressor rotor blade to indicate position in disk.
 - (2) Retain all blades(2) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.
 - (3) Compress lockring(1) and remove from groove in forward face of disk. Discard lockring.
 - (4) Remove rubber bands from blades and slide blades(2) out of disk. Remove adhesive backed seal(3) from under root of each blade. Place blades, blade root up, in PWA 71463 fixture.
- b. Remove 8th through 13th stage compressor rotor blades as follows:

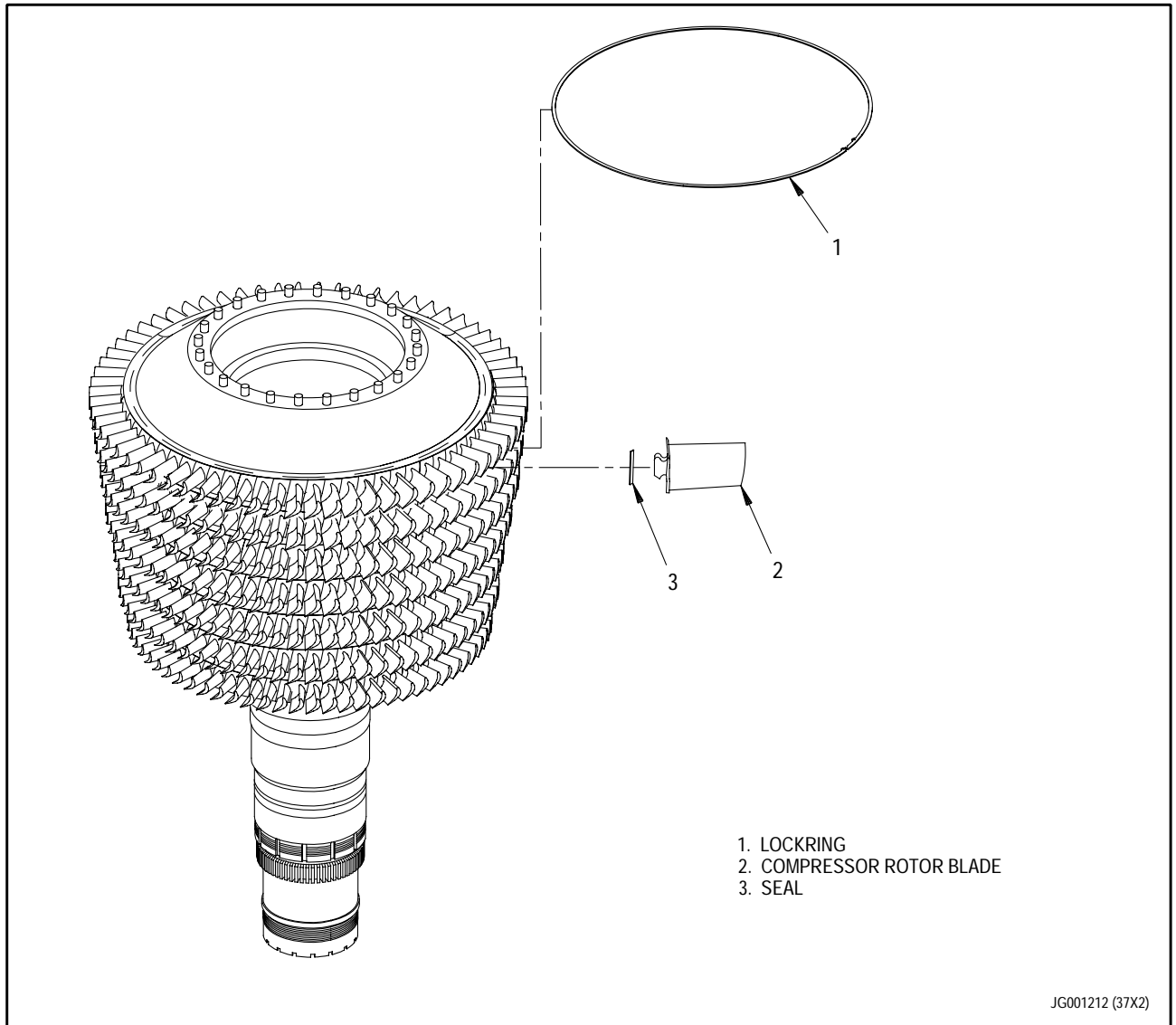


Figure 5. Seventh Stage Compressor Rotor Blades - Removal

NOTE

- Removal of eighth through thirteenth stage blades is the same.
 - For ease of maintenance, blades can be removed from either direction starting at disk loading slot.
- (1) Using a silver pencil, mark compressor rotor blades at each stage as follows:
- (a) Mark location of setscrews(3, figure 5A) on rear face of disk. Setscrew locations indicate disk loading slots.
 - (b) Mark blade edge locations of locking blades(2) on front face of disk.
 - (c) Number blades, in either direction, starting at disk loading slot. See figure 5A for starting point for blade marking.
- (2) Deleted.
- (3) Deleted.
- (4) Deleted.
- (5) Deleted.

NOTE

The two internal head configurations for setscrews in blade lock assemblies are the fluted screw with internal hex drive and the conventional screw with six spline drive. For the conventional screw proceed to step (8d).

- (6) Apply Aerokroil to blade lock assembly and allow to stand for 24 hours.

NOTE

PWA 57838 adapter is used to loosen corrosion on threads of blade lock, so lock can be removed with hex wrench.

- (7) Place PWA 57838 adapter(6, figure 6) over setscrew so adapter rests on blade lock shank(2).



Striking PWA 57838 adapter with excessive force can result in damage to drum rotor.

- (8) Lightly strike PWA 57838 adapter with a metallic mallet.
- (8a) Insert hex drive wrench into screw head and apply load to remove lock. If seizing occurs, torque screw (clockwise), not exceeding 15 pounds-inches, and try to loosen (counterclockwise).
- (8b) If blade lock remains seized, repeat steps (7), (8), and (8a) one time, and then go to step (8c).
- (8c) Discard blade lock assembly.
- (8d) If blade lock remains seized or is damaged, remove blade lock setscrew with drill as follows:



Failure to ensure blade lock is fully and properly installed prior to drilling out setscrew can result in damage to drum rotor.

- (a) Place masking tape on blade tips and airfoils on either side of blade lock.

- (b) Tape blades together with masking tape to ensure blade platforms are contacting during drill out procedure.

NOTE

Setscrew material is AMS 5662 nickel alloy.

- (c) Use sharp drill, low drill speed.



Drilling deeper than Depth A will damage drum rotor.

- (d) Drill pilot hole using LM 1023 drill set, ensure drill bit diameter of 0.125 inch and correct stage marked on stop sleeve.
- (e) Drill setscrew until stop sleeve contacts blade platform. Ensure drill stop sleeve does not go below blade platform. See figure 5A.



Drilling deeper than Depth A will damage drum rotor.

- (f) Follow pilot hole using LM 1024 drill set, ensure drill bit diameter of 0.180 inch and correct stage marked on stop sleeve.
- (g) Drill setscrew until stop sleeve contacts blade platform. Ensure drill stop sleeve does not go below blade platform. See figure 5A.
- (h) If required, tap blade lock inward to loosen blade lock.
- (i) Remove and discard blade lock.

NOTE

It may take several rotations around disk to align locking blade with loading slot.

- (9) Using a nonmetallic drift and hammer, tap blade set around disk approximately 1/2 blade platform width to align a locking blade(2, figure 5A) with disk loading slot.

- (10) Remove locking blades(2) and blade locks(6) from disk loading slot.

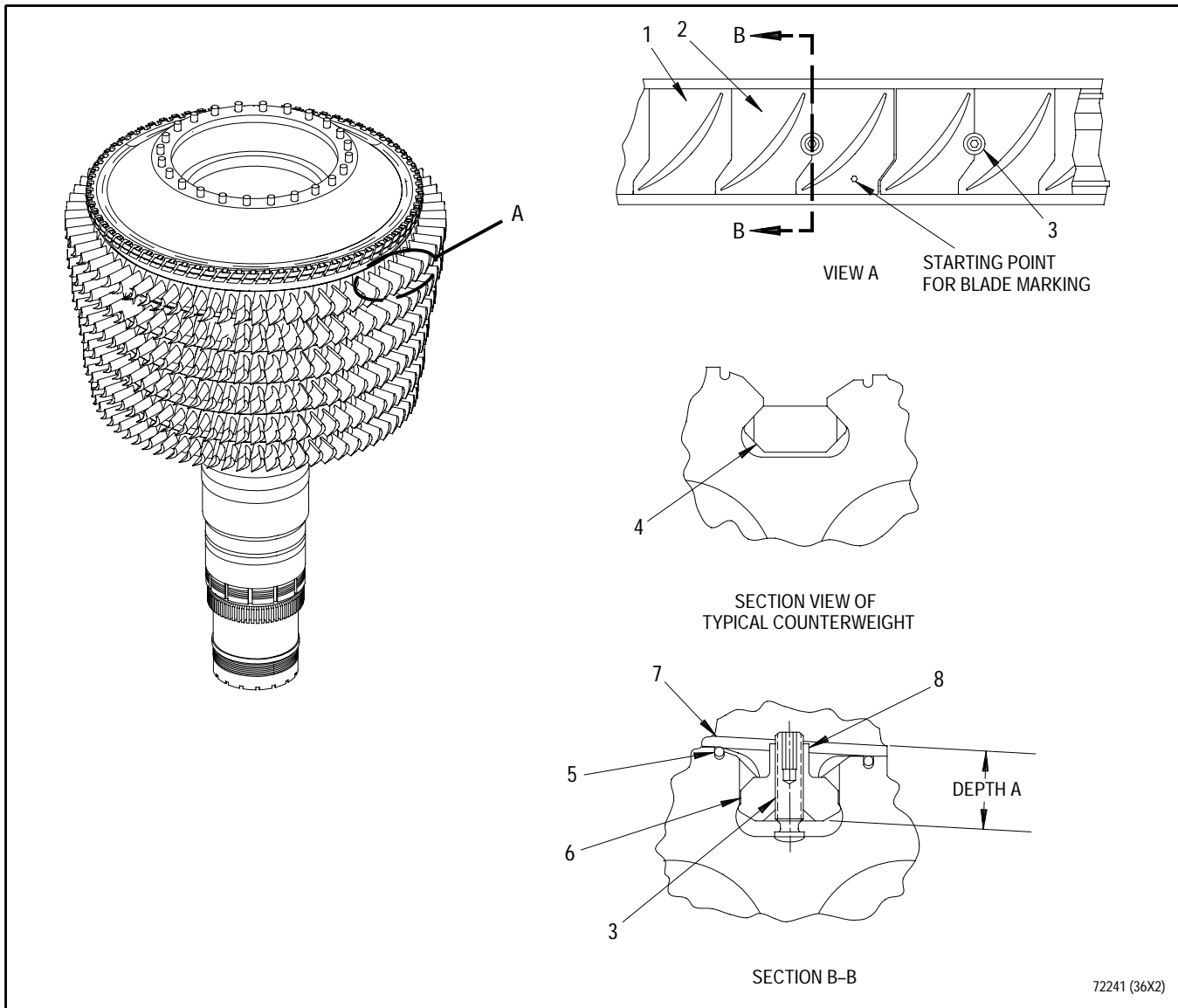
NOTE

Counterweights may be installed underneath 8th, 9th, 12th or 13th stage blade platforms.

- (11) Slide remaining compressor rotor blades(1) and counterweights(4), if installed, out of loading slot. Use care when removing blades to ensure counterweights are not dropped. Place blades, blade root up, in appropriate fixture as follows:

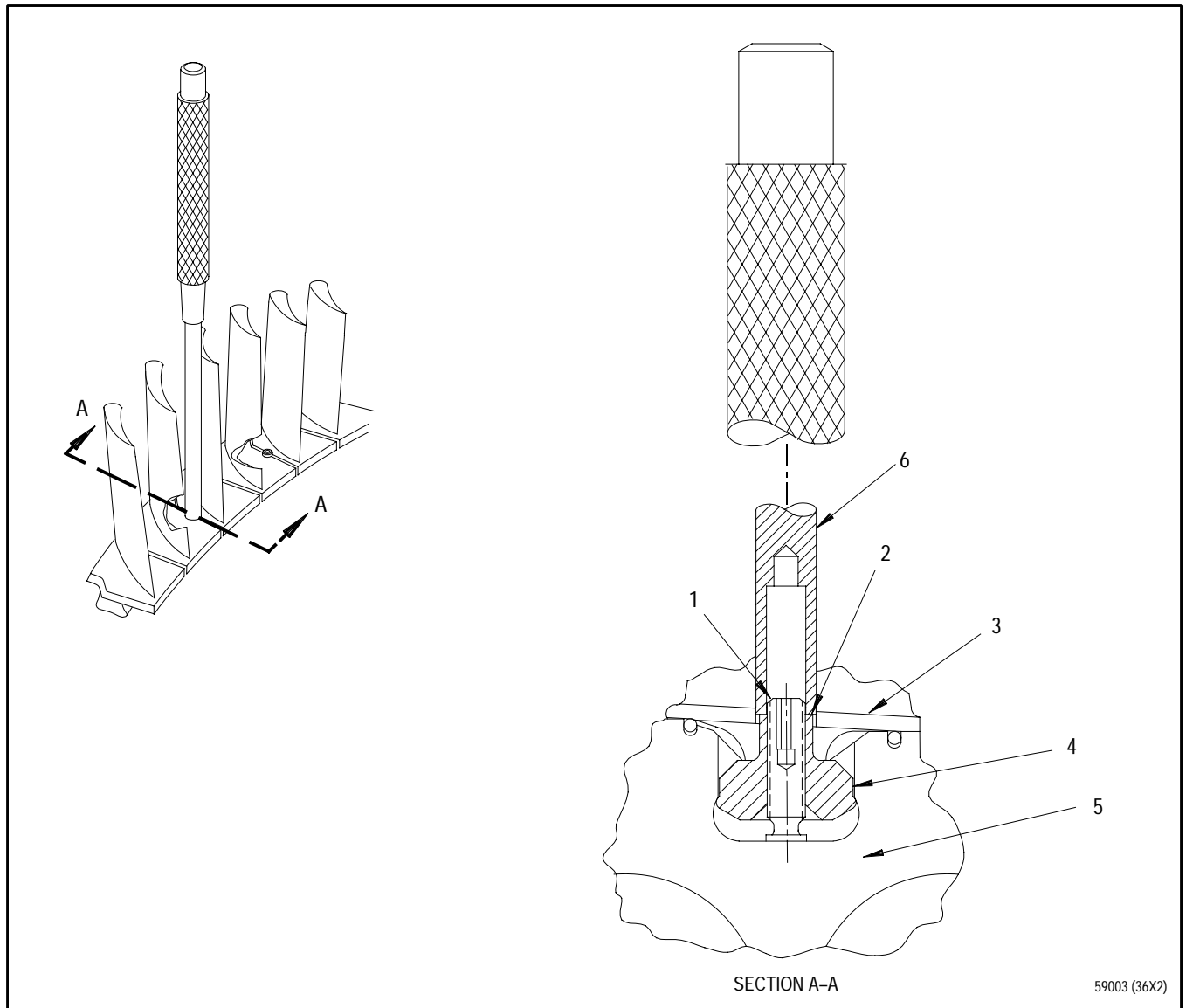
Blades	Fixture
8th stage	PWA 71464
9th stage	PWA 71465
10th stage	PWA 71466
11th stage	PWA 71467
12th stage	PWA 71468
13th stage	PWA 71469

- (12) Remove wire seals(5) from forward and aft grooves in disk. Discard wire seals.



- | | |
|-------------------------------|---------------------------|
| 1. Compressor rotor blade | 5. Wire seal |
| 2. Locking blade (four total) | 6. Blade lock (two total) |
| 3. Setscrew (two total) | 7. Blade platform |
| 4. Counterweight (typical) | 8. Blade lock shank |

Figure 5A. Eighth Through Thirteenth Stage Compressor Rotor Blades - Removal (Typical)



1. Setscrew
2. Blade lock shank
3. Blade platform
4. Blade lock
5. Drum rotor
6. PWA 57838 adapter

Figure 6. Compressor Rotor Blade Lock - Removal

c. Remove tierods(3, figure 7)
using PWA 57537 torque fixture
as follows:

- (1) Move detail-11 slide
assemblies(1) inward prior
to installation of tool.
- (2) Carefully lower PWA 57537
fixture onto rear compressor
rear rotor(5) aligning four
bushings(4) with any four
tierods(3).
- (3) Move detail-11 slide
assemblies(1) to outward
most position.
- (4) Tighten nut on detail-4
swing bolt(2). This will
hold tierod nut(6) square.

(5) Using standard stud remover,
loosen tierod(3) and remove.

(6) Release detail-11 slide
assemblies(1) and remove
nuts(6).

(7) Lift torque fixture and move
to adjacent set of
tierods(3). Continue
procedure until all tierods
are removed.

(8) Remove PWA 57537 torque
fixture.

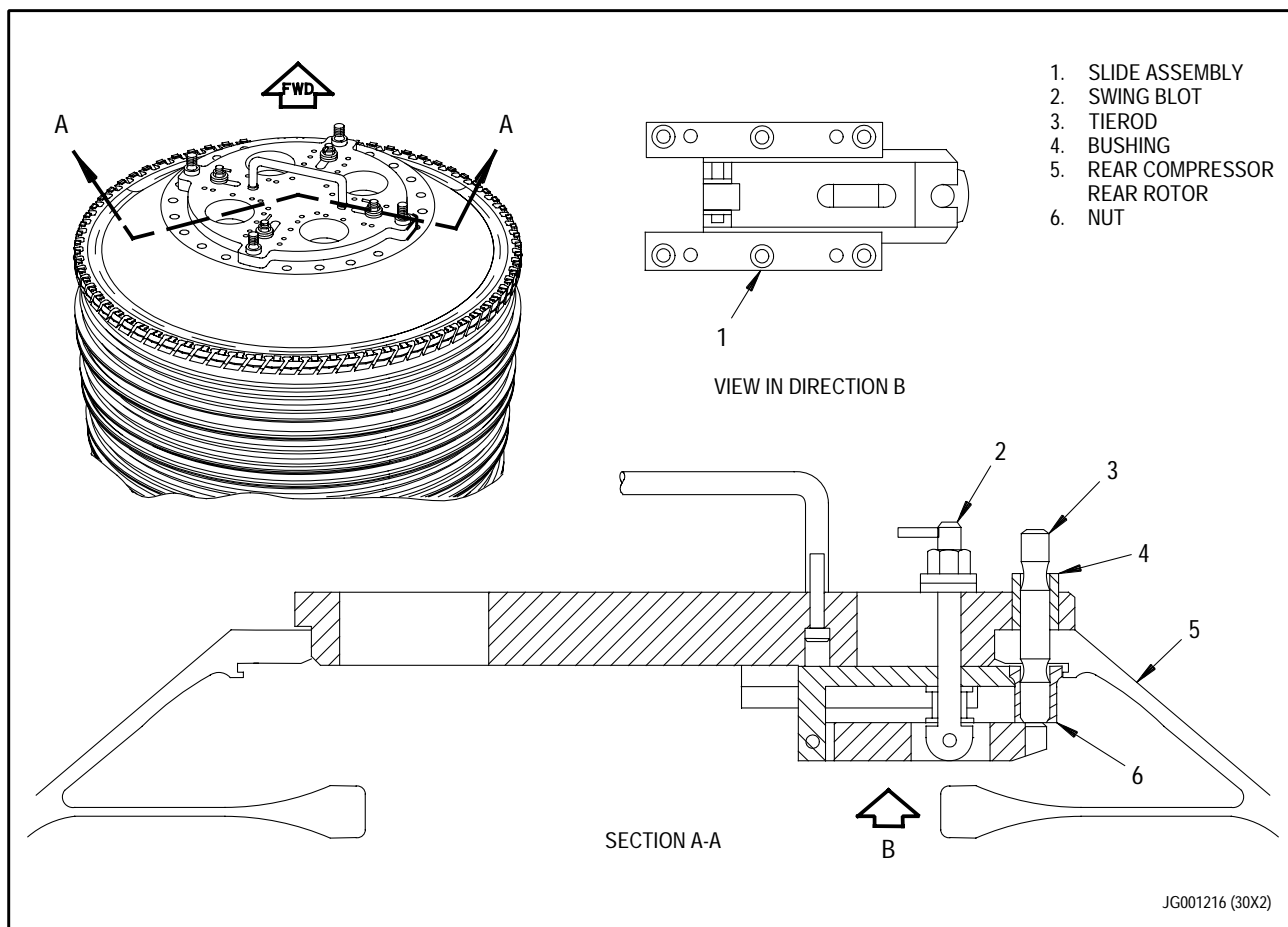


Figure 7. Removal of Tierods Using PWA 57537 Torque Fixture

- d. Rotate rear compressor rear rotor as follows:
- (1) Position PWA 57516 fixture, detail-12 clamp assemblies(4, figure 8) inward prior to installing fixture.
 - (2) Lower fixture into bore of rear compressor rear rotor, aligning dowel pin(2) with any tierod hole in rotor.
 - (3) Turn detail-12 clamp assemblies(4) so feet are under tierod flange and dowel pins(5) are pointing outward. Tighten knurled knobs(3).
 - (4) Attach PWA 26584 arm(1, figure 9) to hoist with PWA 2388 hook.
 - (5) Attach PWA 26584 arm(1) to lifting eye of PWA 57516 fixture(2).
 - (6) Lift rear compressor rear rotor(3) from stand.
 - (7) Install PWA 57937 fixture(4) on driveshaft of rear compressor rear rotor(3).
 - (8) Attach PWA 26584 arm(5) to hoist with PWA 2388 hook.
 - (9) Attach PWA 26584 arm(5) to PWA 57937 fixture(4).
 - (10) Work hoists to rotate rear compressor rear rotor(3) to shaft end up position.
 - (11) Remove PWA 26584 arm(1) and PWA 57516 fixture(2).
 - (12) Lower rear compressor rear rotor(3) onto workbench.
 - (13) Remove PWA 26584 arm(5) and PWA 57937 fixture(4).

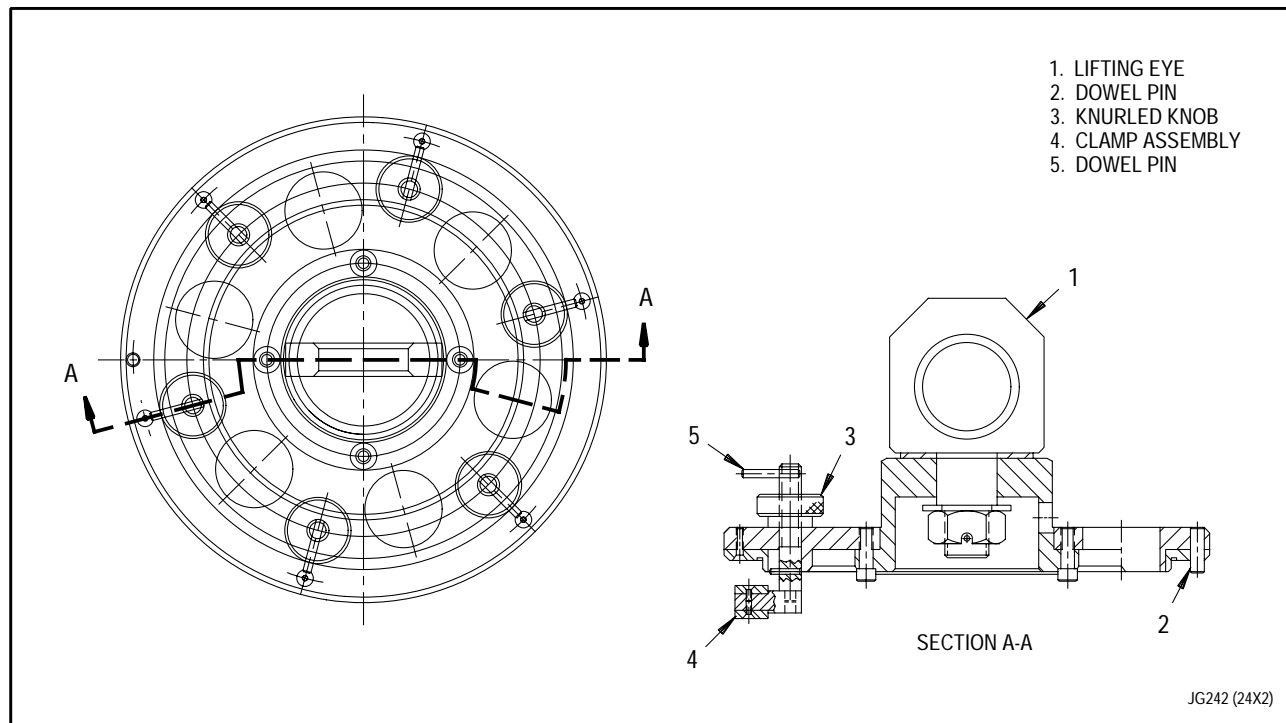
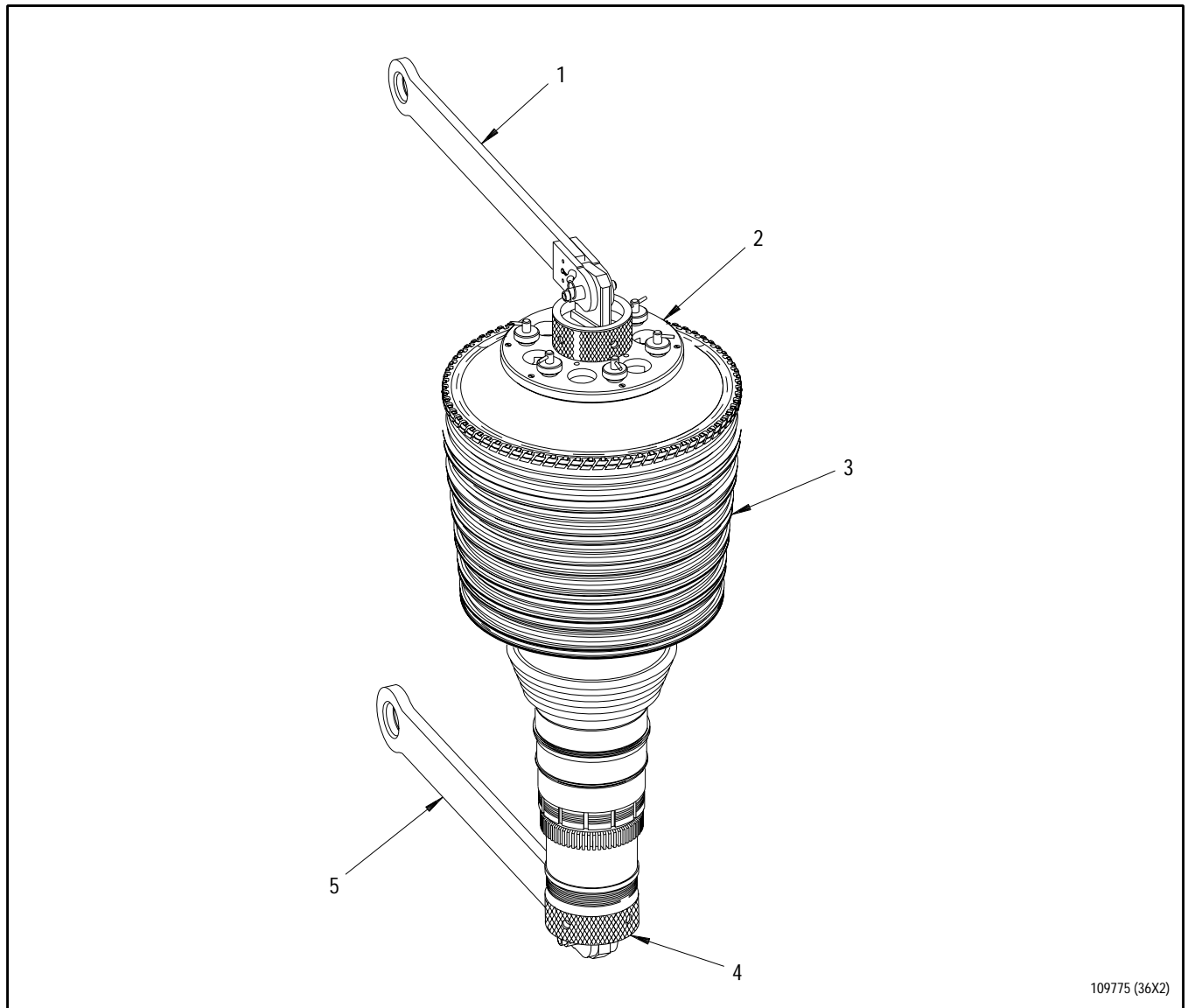


Figure 8. Installation of PWA 57516 Lift Fixture



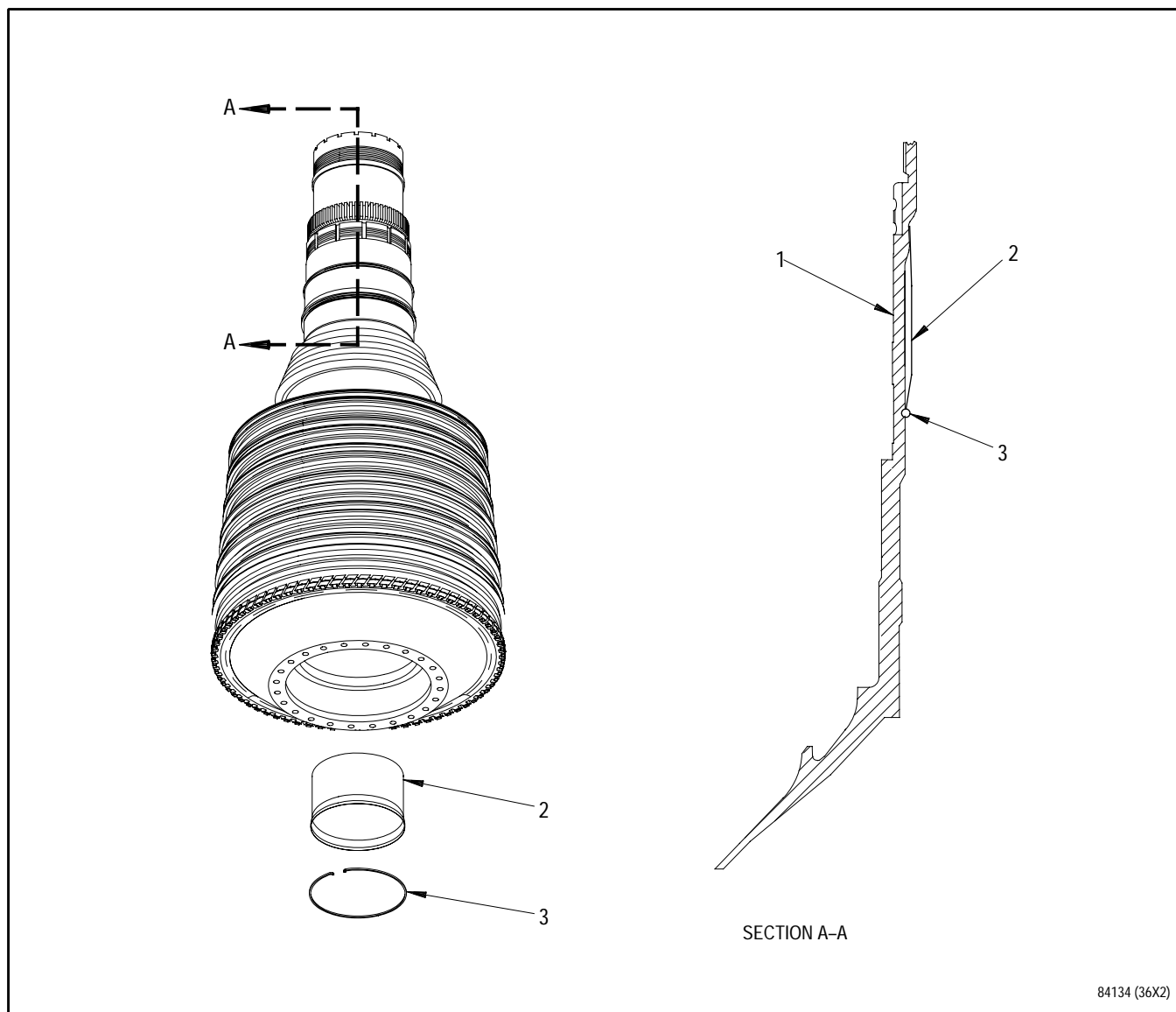
1. PWA 26584 arm
2. PWA 57516 fixture
3. Rear compressor rear rotor
4. PWA 57937 fixture
5. PWA 26584 arm

Figure 9. Rear Compressor Rear Rotor - Rotating To Shaft End Up Position

e. Remove heat shield(2, figure 10)
as follows:

(1) Remove retaining ring(3)
from groove in rear rotor
hub(1).

(2) Tap heat shield(2) forward
and out of shaft using
nonmetallic drift and
hammer. Discard heat shield.



1. Rear rotor hub
2. Heat shield
3. Retaining ring

Figure 10. Rear Rotor Hub Heat Shield - Removal

f. Install rear compressor rear rotor in PWA 57837 transportation stand as follows:

- (1) Install PWA 57937 fixture(4, figure 9) on driveshaft of rear compressor rear rotor(3).
- (2) Attach PWA 26584 arm(5) to hoist with PWA 2388 hook.
- (3) Attach arm(5) to PWA 57937 fixture(4).
- (4) Lift rear compressor rear rotor from workbench.
- (5) Install PWA 57516 fixture(2) as follows:
 - (a) Position detail-12 clamp assemblies(4, figure 8) inward.
 - (b) Install fixture into bore of rear compressor rear rotor(3, figure 9), aligning dowel pin(2, figure 8) with any tierod hole in rotor.
 - (c) Turn detail-12 clamp assemblies(4) so feet are under tierod flange and dowel pins(5) point outward. Tighten knurled knobs(3).
- (6) Attach PWA 26584 arm(1, figure 9) to hoist with PWA 2388 hook.
- (7) Attach arm(1) to lifting eye of PWA 57516 fixture(2).
- (8) Work hoists to rotate rear compressor rear rotor to shaft end down position.
- (9) Remove PWA 26584 arm(5) and PWA 57937 fixture(4).

- (10) Inspect PWA 57837 stand upper guide support blocks(4, figure 11), center support ring(7) and lower guide ring(6) to ensure they are clean and undamaged.
- (11) Loosen knurled knobs and rotate clamps(8) counterclockwise to open position.
- (12) Raise rear compressor rear rotor(3) and position over center of PWA 57837 stand(5).



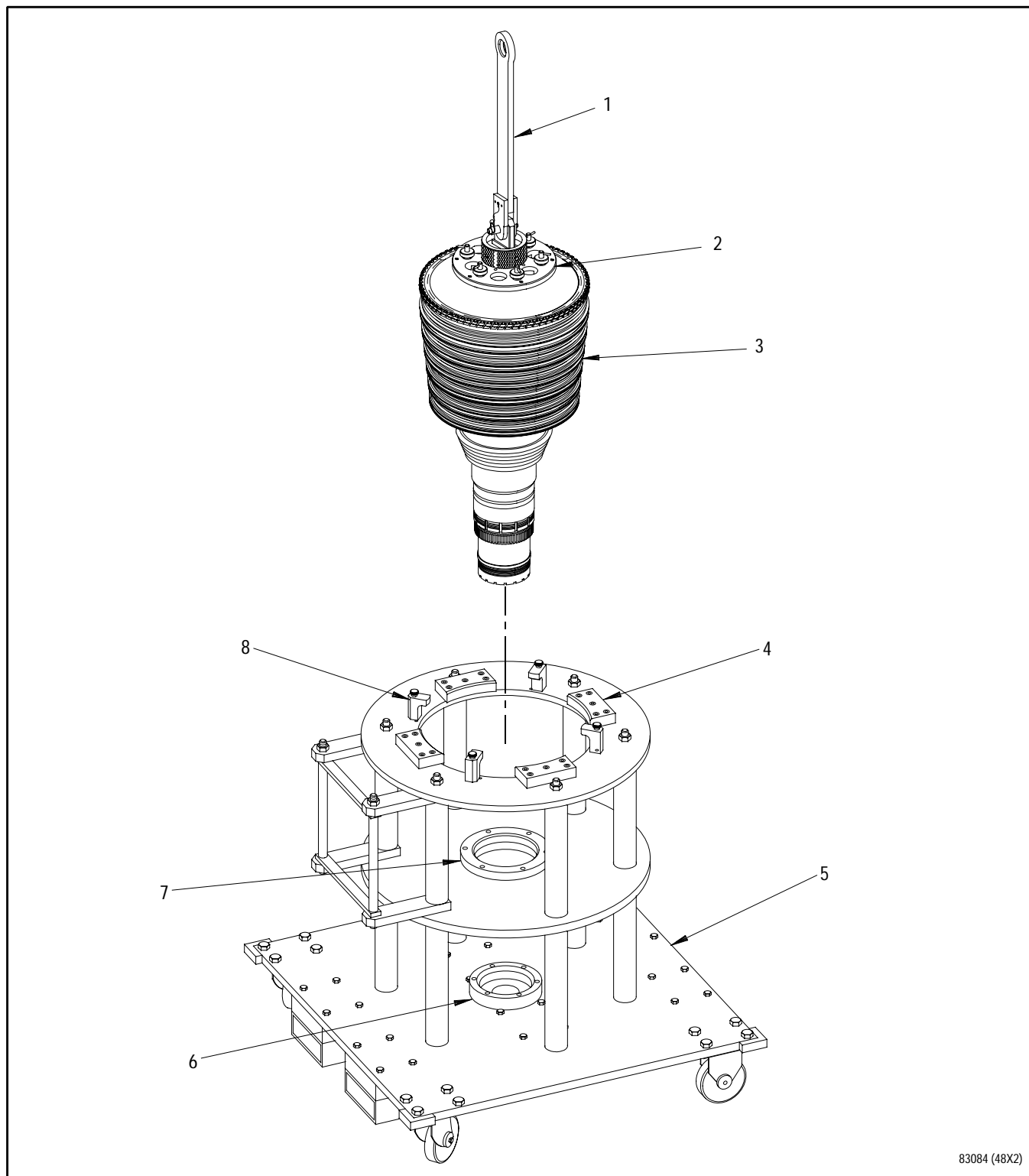
Failure to use care when lowering rear compressor rear rotor into stand can result in damage to rotor knife-edge seals.

- (13) Steady rotor by hand and slowly lower it into PWA 57837 stand. Carefully guide rotor driveshaft through center support ring(7) until it engages lower guide ring(6) and rotor rests securely on center support ring(7). Carefully guide each stage of rotor knife-edge seals as they pass through top plate and upper guide support blocks(4).

NOTE

Clamps hold rotor in position against guides and supports and do not exert downward pressure on rotor.

- (14) Rotate clamps(8) clockwise against rotor OD and secure with knurled knobs.
- (15) Remove PWA 26584 arm(1) and PWA 57516 fixture(2).



83084 (48X2)

1. PWA 26584 lifting arm
2. PWA 57516 lift fixture
3. Rear compressor rear rotor
4. Upper guide support block

5. PWA 57837 transportation stand
6. Lower guide ring
7. Center support ring
8. Clamp

Figure 11. Rear Compressor Rear Rotor - Installation Into PWA 57837 Transportation Stand

INTRODUCTION

CLEANING

EFFECTIVITY: ENGINE MODEL F100-PW-229

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2		14			

1. INTRODUCTION.

- a. This work package introduces the 200 00 through 299 00 series of work packages for core engine module, cleaning. The following work packages are included in this series:

WP No.	Title
201 00	Core Engine Module Parts - Cleaning
202 00	Vane Assemblies - Turbine Stator, First Stage - Volcanic Ash Removal
203 00 through 299 00	Open

WORK PACKAGE

TECHNICAL PROCEDURES

CORE ENGINE MODULE PARTS -

CLEANING

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 90

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	22 - 25	0	47 - 49	0
2	29	26	30	50 - 51	30
3	22	26A Added	30	52 - 55	0
4	26	26B Blank Added	30	56	30
5	29	27	30	57 - 62	0
6 - 8	0	28	0	63	31
9	29	29 - 31	30	64 - 65	0
10 - 12	0	32	26	66 - 67	30
13	31	33 - 36	0	68	0
14	30	37 - 38	30	69 - 70	30
15 - 16	26	39	0	71 - 72	0
16A - 16B Added	26	40	5	73	1
16C - 16D	30	41 - 45	0	74 - 80	0
17 - 18	0	46	30	81 - 83	30
19 - 21	30			84 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, General - - - - -	WP 023 00
Cleaning, Vapor Degreaser (SPOP 3) - - - - -	SWP 031 01
Cleaning, Glass Bead Blast, Dry (SPOP 17) - - - - -	SWP 031 02
Cleaning, Glass Bead Blast, Wet (SPOP 16) - - - - -	SWP 031 03
Cleaning, Carbon Solvent and Paint Stripper, Two Step (SPOP 7) - - - - -	SWP 031 04
Cleaning, Alkaline Rust Remover, Quick Soak (SPOP 18) - -	SWP 031 08
Cleaning, Alkaline Rust Remover, Long Soak (SPOP 203) - -	SWP 031 09
Cleaning, Grit Blast, Dry (SPOP 218) - - - - -	SWP 031 13
Cleaning, Wet Abrasive Blast (SPOP 9) - - - - -	SWP 031 19
Peening, Glass Bead (SPOP 500) - - - - -	SWP 091 07
Fuel Nozzle, Staged, Pure Air Blast - Overhaul Instructions - - - - -	T.O. 6J8-40-3
Fuel Nozzle, Unstaged - Overhaul Instructions - - - - -	T.O. 6J8-41-3

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-552	31 OCT 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229 Engine, F-15/ F-16 Aircraft (ECP 96QA053)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Acetone (PMC 9008)	O-A-51
Alcohol, isopropyl	TT-I-735
Alkali cleaner (heavy duty) (PMC 1256)	Turco ARR-NF
Alkali rust remover (PMC 1269)	Ferlon
Gloves, nylon, lint-free	Wyandotte Chem. Corp. Style No. 4312
Grit, abrasive, dry	Twyman Templeton Co., Inc.
Maskant, thermal spray, water soluble (PMC 1999)	Aluminum oxide (PMC 3046) MBP-100
Methyl ethyl ketone (PMC 1820)	Reagent Grade Fisher Scientific Co.
Nitric acid (PMC 1000)	O-N-350
Oil, corrosion preventive	MIL-C-8188

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Oil, lubricating or Petrolatum	MIL-L-7808 VV-P-236
Potassium hydroxide (PMC 1606)	O-P-566
Pumice (PMC 3001)	Grade FFF
Rust remover, alkali	MIL-C-14460
Rust remover, alkali	PMC 1269
Rust remover, alkali	SPMC 5
Sodium bicarbonate	-
Sodium gluconate	-
Sodium hydroxide (PMC 1601)	O-S-598
Solvent, petroleum	P-D-680, Type II or III
Tape, heat resistant (PMC 4295)	MYSTIC 9710 The Borden Chem. Co. Mystic Tape Div.

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
14	FIRST STAGE TURBINE VANES - PWA 73 COATING CLEANING AND INSPECTION	
	CHART, PHOTOGRAPH, TURBINE BLADE/VANE INSPECTION - -	PWA 31383
22	REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - REMOVAL OF COPPER NICKEL AND ANTIGALLANT DEPOSITS FROM BLADE SLOTS PRIOR TO INSPECTION	
	HOLDER, BASKET, 4TH/5TH DRUM ROTOR - - - - -	PWA 71408

ILLUSTRATED SUPPORT EQUIPMENT

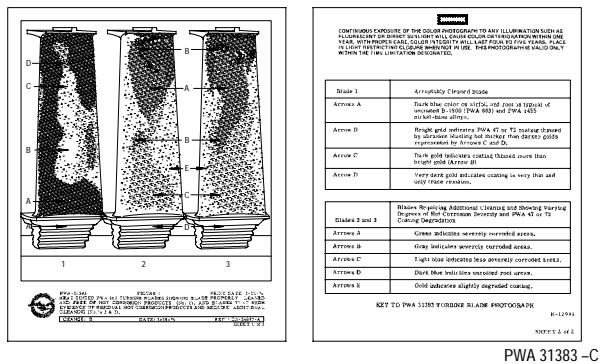


Figure T1. PWA 31383 CHART

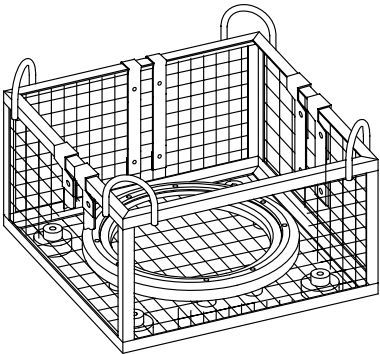


Figure T2. PWA 71408 HOLDER

1. INTRODUCTION.

(See Table 1.)

- a. This work package contains cleaning instructions for all core engine module parts requiring cleaning. Table 1 list parts by name and part number, identifies parent material, illustrates part, lists any special cleaning instructions, and references the WP/SWP or paragraph where cleaning procedures are described.
- b. Recommended cleaning WP/SWP reference (SPOP) options for each part are listed in order of increasing severity. The primary purpose of cleaning is to prepare part for inspection. Select the least severe process for this purpose, based on operator's experience. Proceed to a more severe process only if required for effective results.

2. FUEL NOZZLES - CLEANING.

- a. For specific cleaning procedures, refer to T.O. 6J8-40-3 for staged fuel nozzles and T.O. 6J8-41-3 for unstaged fuel nozzles.

3. ANTIFRICTION BEARINGS.

- a. Clean bearings per SPOP 14 or SPOP 214 in T.O. 2-1-111.
- b. Bearings shall be processed as follows:
 - (1) Mainshaft bearings shall remain assembled during cleaning.
 - (2) No mechanical cleaning allowed. This includes tumbling, grinding, wire brushing, sanding, polishing or any other process that will alter the original surface of bearing.
 - (3) Omit corrosion preventive oil (AMS 3065) dip.
 - (a) Dip mainshaft bearing in MIL-C-8188.

4. TUBES - CLEANING.

(See table 1.)

- a. See table to determine tubing materials, wall thickness, OD, and part number.
- b. See paragraphs 5 through 8 for special cleaning procedures on shielded and unshielded tubing.

5. STAINLESS STEEL TUBES (EXCEPT SHIELDED) - CLEANING.

- a. Flush ID of tube with P-D-680, Type II petroleum solvent.
- b. If necessary, clean OD of tube with P-D-680, Type II petroleum solvent and bristle brush.
- c. Drain tube thoroughly and remove excess fluid with air blast. Ensure no foreign material remains in tube.
- d. If hard to clean soils are encountered, clean as follows:
 - (1) Remove excess oil. Refer to T.O. 2J-F100-53-1, SWP 031 01 (SPOP 3).
 - (2) Clean per T.O. 2J-F100-53-1, SWP 031 09 (SPOP 203).
 - (3) Power flush tube with cold water after alkali dip.
 - (4) Air blast tubes until dry, and cap tube ends.

6. STAINLESS STEEL TUBES (SHIELDED) - CLEANING.



Do not immerse in liquid.

- a. Flush ID of tube with P-D-680, Type II petroleum solvent.
- b. Wipe OD of tube using rag wet with P-D-680, Type II petroleum solvent.

7. TITANIUM TUBES (EXCEPT SHIELDED) - CLEANING.

- a. Soak in alkali (PMC 1269) for two minutes maximum. Refer to T.O. 2J-F100-53-1, SWP 031 08 (SPOP 18).
- b. Flush tube through with cold water.
- c. Air blast dry.

8. TITANIUM TUBES (SHIELDED) - CLEANING.

- a. Flush ID of tube with P-D-680, Type II petroleum solvent. Do not immerse in liquid.
- b. Wipe OD of tube using rag wet with petroleum solvent.

9. FACE-TYPE OIL SEALS - CLEANING.

(Refer to T.O. 2-1-111.)

10. METAL-TYPE SEAL RINGS - CLEANING.

NOTE

Discoloration does not have to be removed.

- a. Clean per T.O. 2J-F100-53-1, SWP 031 09 (SPOP 203) or SWP 031 01 (SPOP 3) until all residue and coking are removed.
- b. Pressure air dry and preserve against corrosion immediately.

11. SEATS FOR FACE-TYPE OIL SEALS - CLEANING.

NOTE

These seal seats require special handling due to importance of not damaging finish of face which contacts carbon seal.

- a. Use only recommended overhaul tools.

- b. Handle seats separately.
- c. Seats may be cleaned by T.O. 2J-F100-53-1, SWP 031 09 (SPOP 203).
- d. Each seat shall be individually boxed with special care taken to protect face which contacts carbon seal.
- e. Do not remove seats from boxes until ready for use.
- f. Seats, once removed from protective containers, shall not be handled. To prevent any possibility of damage to faces which contact carbon seals.
- g. Seats shall not be exposed to foreign materials such as grit, dirt, or lint.

12. BALANCE BEARINGS - CLEANING.

- a. Clean balance bearings. Refer to SPOP 214 in T.O. 2-1-111.

13. DIFFUSER CASE ASSEMBLY - CLEANING.

- a. Protect No. 4 bearing scavenge tube with standard plugs or caps.



Diffuser case is not to be submerged in cleaning liquid.

- b. Clean diffuser case either with wet abrasive blast (refer to T.O. 2J-F100-53-1, SWP 031 19), or clean local areas as follows:

- (1) Locally clean diffuser case per SPOP 208, Method A. Refer to T.O. 2-1-111.

14. FIRST STAGE TURBINE VANES - PWA 73 COATING CLEANING AND INSPECTION.**NOTE**

Clean and inspect first stage turbine vane assemblies having volcanic ash deposits on airfoil surfaces and in cooling holes per WP 202 00.

- a. Heat treat. Refer to steps a.1. or a.2.

- (1) Heat treat using argon atmosphere.

- (a) Place part, with thermocouples, in retort and seal retort.

- (b) Purge retort at approximately 150 CFH argon until dew point reaches -40°F (-40°C) or lower, at retort exhaust.

- (c) Insert retort into furnace.

NOTE

Furnace may initially be set higher than 2000°F (1093°C).

(d) Heat to 1925° ±25°F (1052° ±14°C), using lower thermocouple for controlling. do not exceed 2000°F (1093°C) on higher thermocouple. Hold at temperature for four hours.

(e) Remove retort from furnace and cool with forced argon to 1000°F (538°C) within 23 minutes. Complete cooling with argon or air.

(2) Heat treat using vacuum. Heat cycle must be completed in 0.010 Torr range or lower.

NOTE

Furnace system must provide for argon forced cooling, in order to satisfy cooling rate requirement.

(a) Place part, with thermocouples, in furnace.

(b) Evacuate to 0.009 Torr or lower. Static leak rate must not exceed 50 microns per hour.

(c) Heat to 1975° ±25°F (1080° ±14°C), using lower thermocouple for controlling. Do not exceed 2000°F (1093°C) on higher thermocouple. Hold at temperature for four hours.

NOTE

Furnace may initially be set higher than 2000°F (1093°C).

(d) Cool to 1000°F (538°C) within 23 minutes.

b. Cleaning and inspection.

(1) Vapor degrease per T.O. 2J-F100-53-1, SWP 031 01.

(2) Inspect for presence of sulfidation corrosion products indicated by green to pale blue color.

CAUTION

Avoid excessive cleaning of vanes which are coated with diffused aluminum silicon. Excessive cleaning will result in coating removal.

- (3) Clean per T.O. 2J-F100-53-1, SWP 031 09. If further cleaning is required, refer to step (b.4.).

CAUTION

Nozzle must maintain a distance of at least five inches from surface being cleaned. Coating removal can occur when nozzle is positioned less than five inches from surface being cleaned.

- (4) Clean vanes with heavy residue buildup by using dry grit blast. Refer to T.O. 2J-F100-53-1, SWP 031 13 (SPOP 218). Perform this procedure only if necessary. Do not dwell in one location more than five seconds or blast directly into cooling passages. If dry grit blast is not available, clean per step (b.5.).

- (5) Clean vanes by wet abrasive blast. Refer to T.O. 2J-F100-53-1, SWP 031 19 (SPOP 9). Do not dwell in one location more than five seconds or blast directly into cooling passage. Blast to uniform matte surface until green to pale blue residues are removed.

CAUTION

Turbine blades or vanes airfoil cooling would be impaired if residual cleaning grit is not thoroughly removed.

- (6) If residual abrasive compound is present, clean airfoils with alkali solution (PMC 1601), 66 ounces of sodium hydroxide per gallon of water in ultrasonic tank for 10 to 30 minutes. Refer to T.O. 2-1-111.

WARNING

For the safety of other personnel, use of compressed air at 80 to 100 psig shall be confined to blasting cabinet only. Protect eyes and skin from flying chips or particles, and from air stream. Wear protective clothing and equipment.

- (7) Blow clean with air blast at 80 to 100 psig. Ensure holes and cooling passages are open and clean of grit blast residue.

- (8) If vanes exhibit coating loss or sulfidation corrosion, perform color heat tint check per following steps:

- (a) Transfer clean parts to heat treat trays and place in air circulating furnace at $1075^{\circ} \pm 25^{\circ}\text{F}$ ($1580^{\circ} \pm 14^{\circ}\text{C}$) for 50 to 70 minutes.

- (b) Compare color tints to PWA 31383 turbine blade/vane inspection photograph chart.

- (c) Parts resembling Blade 1 of PWA 31383 photograph chart have been sufficiently cleaned. Parts resembling Blade 2 and 3 of PWA 31383 photograph chart have not been sufficiently cleaned of sulfidation corrosion products and cleaning procedures shall be repeated.

- (d) Inspect for conformance within blend limits.

c. Post cleaning procedure.

- (1) Load furnace for Stress Relief Cycle.

- (2) Stress Relieve per T.O. 2-1-111, SPOP 763, except as follows:

- Temperature - $1975^{\circ}\text{F} \pm 25^{\circ}\text{F}$,
Time - 4 hours, Atmosphere - Vacuum or Argon, Dew Point - $(-40)^{\circ}\text{F}$ or better, Cooling - Cool at a rate equivalent to air cool.

- (3) Unload furnace from Stress Relief Cycle.

15. COMPRESSOR INTERMEDIATE CASE ASSEMBLY - BAKED FLANGE SEALANT REMOVAL AND CLEANING.

- a. Brush flange area lightly, using hand held air motor (2000 to 3000 rpm maximum) and Advance 00485 rotary wire brush (0.006 inch diameter stainless steel wires) or equivalent, to remove silicone rubber residue.

16. NO. 3 BEARING SEAL SUPPORT AND NO. 4 BEARING REAR SEAL SUPPORT ASSEMBLY.

- a. Clean these supports by hand scrubbing with pumice, acetone, methyl ethyl ketone (MEK), or isopropyl alcohol. Submerge parts in alkali chemical cleaning solutions only if necessary for adequate cleaning. Plug all internal cavities to prevent entrapment of cleaning fluids if support is submerged in alkali cleaning solutions.

17. SEVENTH THROUGH TWELFTH STAGE COMPRESSOR STATOR ASSEMBLIES, FOURTH STAGE COMPRESSOR CASE ASSEMBLY, AND COMPRESSOR EXIT STATOR - ALTERNATE CLEANING PROCESS.

- a. Mask to protect all abradable material and honeycomb where present on 7th through 12th stage compressor stator assemblies. Mask to protect all coated surfaces on 10th through 12th stage compressor stator assemblies. If vane bushings are installed in 4th stage compressor case, remove or protect vane bushings.
- b. Clean parts per SPOP 9 except use No. 240-325 abrasive compound at 30 to 70 psig. Refer to T.O. 2J-F100-53-1, SWP 031 19.
- c. Steam clean.
- d. Inspect leading and trailing edges of vanes for proper radius and appearance.
- e. Inspect all cases for hardcoating symbol. If case has been hardcoated, then mask the repaired snap diameters before cleaning. Refer to T.O. 2J-F100-53-1, SWP 031 19 (SPOP 9).

**18. NO. 2 BEARING SUPPORT ASSEMBLY -
ALTERNATE CLEANING PROCEDURE.**

- a. Remove sealant and antigalling compound from flanges by wet glass bead blasting per SPOP 16 except do not degrease prior to blasting. Refer to T.O. 2J-F100-53-1, SWP 031 03.

**19. REAR COMPRESSOR STATOR INLET
VARIABLE VANE - ALTERNATE CLEANING
PROCEDURE.**

- a. Clean vane using a clean cloth and isopropyl alcohol, methyl ethyl ketone (MEK), or acetone.

**20. REAR COMPRESSOR STATOR LINKAGE
ARM BRACKET ASSEMBLY - CLEANING.**

- a. Clean bracket assembly using a clean cloth and isopropyl alcohol, methyl ethyl ketone (MEK), or acetone. No acid or alkali cleaning solutions permitted.
- b. Rinse bracket assembly in clean water. Water shall have chloride content of 10ppm maximum.

**20A. COMPRESSOR STATOR BEARING -
CLEANING.**

- a. Clean bearing using clean cloth and isopropyl alcohol, methyl ethyl ketone (MEK), or acetone. No acid or alkali cleaning solutions permitted.
- b. Outside diameter of bearings with metal shells may be scrubbed with plastic or soft metal (copper or equivalent) brush to remove built up residue.
- c. Wash bearing in clean water.

**20B. REAR COMPRESSOR STATOR ARM
ASSEMBLIES, RING ASSEMBLY, LINK
ASSEMBLIES, AND SYNCHRONIZING
BRACKETS - CLEANING.**

- a. Clean parts using clean cloth and isopropyl alcohol, methyl ethyl ketone (MEK), or acetone. No acid or alkali cleaning solutions permitted.
- b. Wash parts in clean water. Water shall have chloride content of 10 ppm maximum.
- c. Optional method: steam clean, no soap permitted.

21. STAGES FOUR THROUGH THIRTEEN REAR COMPRESSOR ROTOR BLADES - ALTERNATE CLEANING PROCESS.

NOTE

- This procedure is optional to SPOP specified in table 1. Blades shall be removed from disks before cleaning.
- This procedure may also be used to polish variable compressor vanes when directed in repair paragraphs only.
 - a. This process shall be accomplished in Huston Model H2025 vibratory machine or equivalent.
 - b. Prepare solution as follows:
 - (1) Fill tank of machine with water. Record number of gallons.
 - (2) Slowly add MIL-C-14460 alkaline rust remover to water in concentration of two pounds per gallon of water.
 - (3) Add cleaning media of 50% polyester resin with 50% virgin aluminum oxide, either cone or pyramid in shape, in concentration of eight cubic feet per gallon of water.
 - c. Load blades in ratio of 1/3 blades to 2/3 media.
 - d. Cycle stages four through seven blades for maximum cycle time of 1 to 4 minutes.
 - e. Cycle stages eight through thirteen for maximum cycle time of 1 1/2 hour.

22. REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - REMOVAL OF COPPER NICKEL AND ANTIGALLANT DEPOSITS FROM BLADE SLOTS PRIOR TO INSPECTION.

(See Figures 1 and 2.)

WARNING

Entrapped contaminant such as fluorescent penetrant inspection fluids and oil will react violently with alkali solution if not removed prior to immersion of disk-drum rotor and may result in injury to personnel.

- a. Clean disk-drum rotor assembly using steam or hot soap and water. Pay particular attention to cleaning bore area.
- b. Mask using PWA masking per SPOP 36, except use PMC 1999 maskant instead of PMC 1835 strippable coating. Refer to T.O. 2-1-111. See figure 1.
- c. Place disk-drum rotor assembly(1, figure 2), tierod flange up, into PWA 71408 holder(2) using nylon lift straps and hoist. Ensure forward surface of rotor rests securely on locator ring(3).

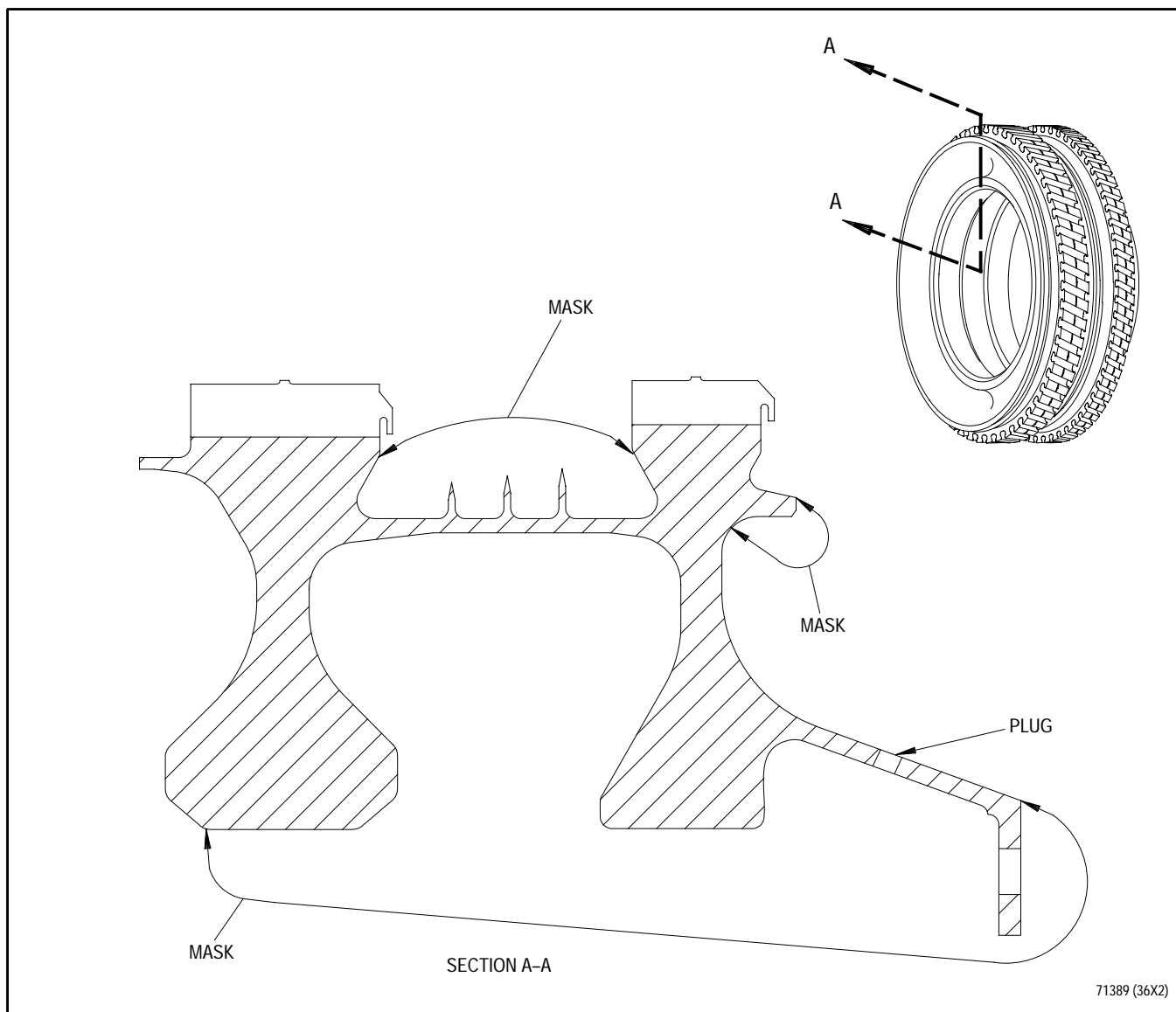
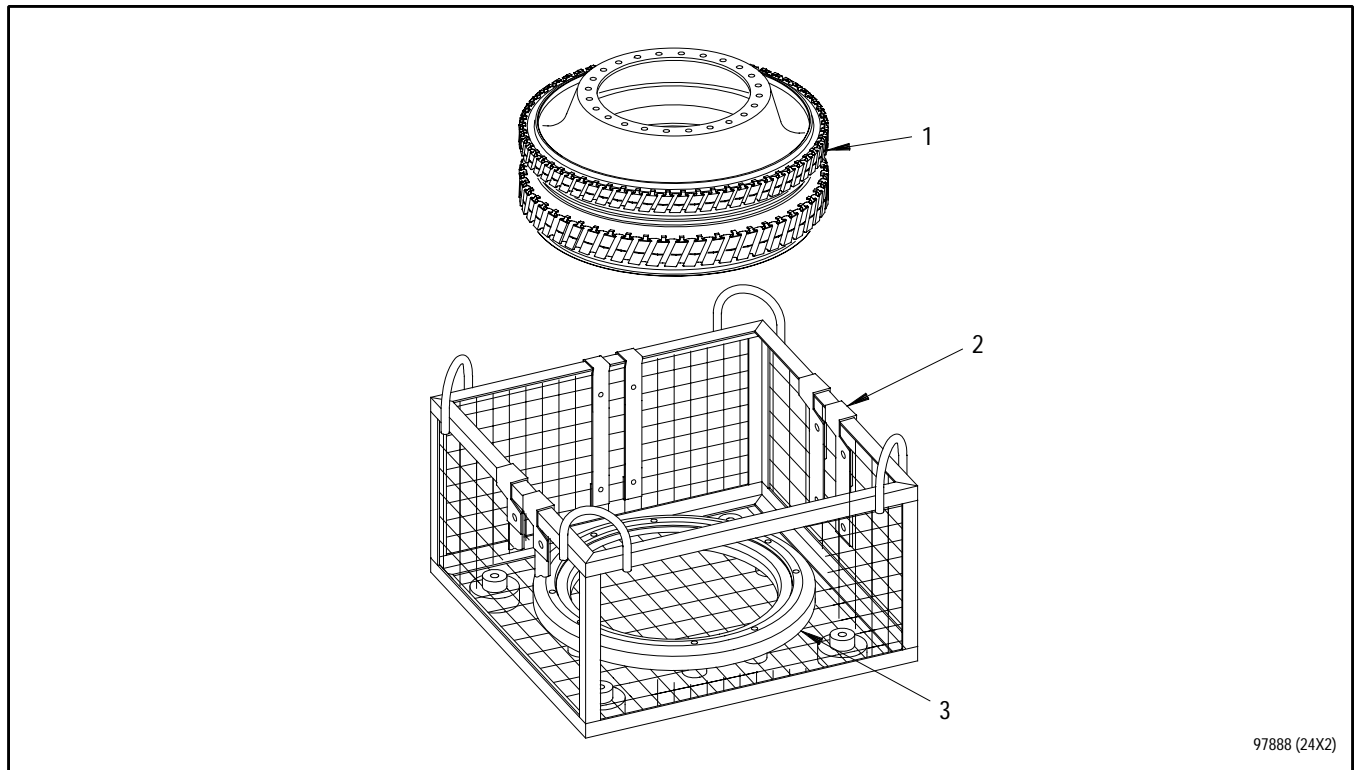


Figure 1. Rear Compressor Front Disk-Drum Rotor Assembly - Masking



1. Rear compressor front disk-drum rotor assembly
2. PWA 71408 holder
3. Locator ring

Figure 2. Rear Compressor Front Disk-Drum Rotor Assembly - Installation Into PWA 71408 Holder

- d. Immerse holder and disk-drum rotor assembly in alkali solution, PS110 or equivalent, for 20 to 35 minutes. Temperature of solution shall be 180° to 200°F (82° to 93°C). Handle carefully to avoid splashing of solution. Part may be immersed for periods of four to five minutes, followed by rinse, up to maximum allowable time as required to ensure complete removal of antigallant coating.
- e. Immerse holder and disk-drum rotor assembly in room temperature water to rinse for 30 to 90 seconds. Chloride/chlorine content of water shall not exceed 25 parts per million.
- f. Immerse holder and disk-drum rotor assembly in PS11 stripping solution for 10 to 15 minutes. Temperature of solution shall be 70° to 90°F (21° to 32°C). Handle carefully to avoid splashing of solution.
- g. Immerse holder and disk-drum rotor assembly in room temperature water to rinse for 30 to 90 seconds. Chloride/chlorine content of water shall not exceed 25 parts per million.
- h. Remove disk-drum rotor assembly from PWA 71408 holder.
- i. Visually inspect for complete removal of coating using white light and 10X magnifying glass. If required, residues may be dislodged using nonabrasive, nonmetallic, stiff bristle brush followed by water rinse. If necessary, repeat steps f. through i. until deposits have been removed.
- j. Remove masking.
- k. Pressure rinse entire disk-drum rotor assembly using steam or hot water. Chloride/chlorine content of water shall not exceed 25 parts per million.

Table 1. Core Engine Module

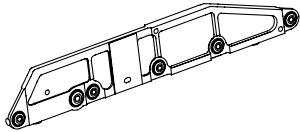
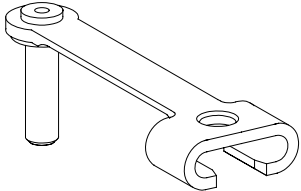
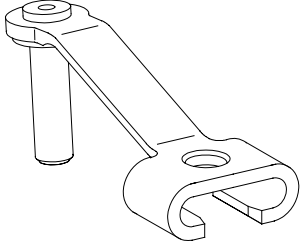
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
1. Arm assembly, rear compressor, stator, synchronizing	 <p>PN 4075473 -C PN 4079528</p>	See paragraph 20B.	
1A. Arm, compressor stator, assembly	 <p>PN 4075759 -C PN 4075759 Nickel Alloy</p>		SWP 031 01 SWP 031 09
1B. Arm, compressor stator, assembly	 <p>PN 4075665 -C PN 4075665 Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

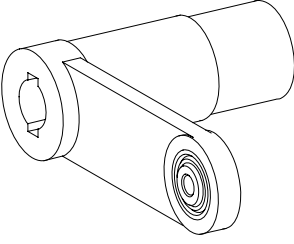
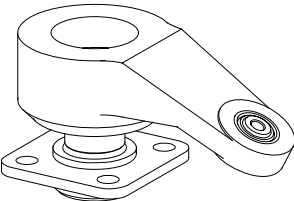
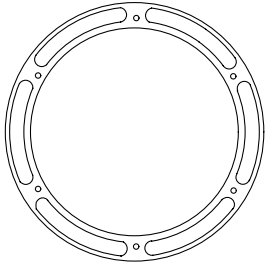
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
1C. Arm, compressor stator linkage, assembly (External bellcrank, left and right)	 <p>PN 4066803 -C</p> <p>PN 4066803</p> <p>PN 4066831</p> <p>Nickel Alloy, Cobalt Alloy, and Fabric Lined Bearings</p>	See paragraph 20B.	
1D. Arm, compressor stator linkage, assembly (Internal bellcrank)	 <p>PN 4079921 -C</p> <p>PN 4079921</p> <p>Nickel Alloy, Cobalt Alloy, and Fabric Lined Bearings</p>	See paragraph 20B.	
2. Baffle, No. 3 bearing	 <p>PN 4075540 -C</p> <p>PN 4075540</p> <p>PWA 1215</p> <p>Titanium Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

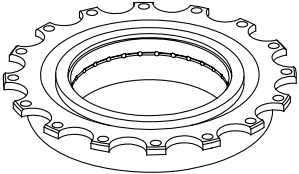
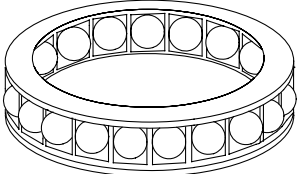
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
3. Bearing, No. 2 annular flanged ball	 <p>PN 4075346 -C</p> <p>PN 4075346 PWA 793 Steel</p>	See paragraph 3 T.O. 2-1-111 SPOP 14 and SPOP 214	
4. Bearing, No. 3, flanged ball	 <p>PN 4075315 -C</p> <p>PN 4075315 PWA 793 Steel</p>	See paragraph 3 T.O. 2-1-111 SPOP 14 and SPOP 214	

Table 1. Core Engine Module (continued)

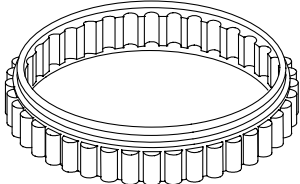
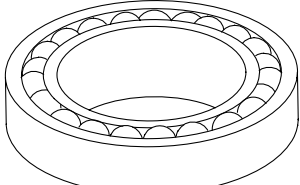
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
5. Bearing, No. 4 cylindrical ball	 <p>PN 4059297 -C</p> <p>PN 4059297 PWA 725 Steel</p>	See paragraph 3 T.O. 2-1-111 SPOP 14 and SPOP 214	
6. Bearing, ball, towershaft annular	 <p>PN 4000609 -C</p> <p>PN 4000609 PWA 725 Steel</p>	See paragraph 3 T.O. 2-1-111 SPOP 14 and SPOP 214	

Table 1. Core Engine Module (continued)

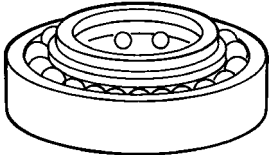
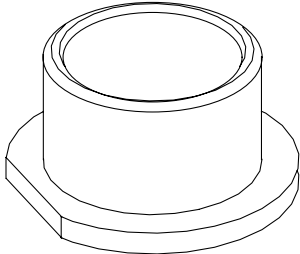
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
7. Bearing, towershaft, cylindrical roller	 <p>PN 4030963 -C</p> <p>PN 4030963 PWA 725 Steel</p>	See paragraph 3 T.O. 2-1-111 SPOP 14 SPOP 214	
8. Bearing, compressor stator OD inlet	 <p>PN 4066810 -C</p> <p>PN 4074448 AMS 5666 Nickel Alloy and Fabric Liner</p>	See paragraph 20A.	

Table 1. Core Engine Module (continued)

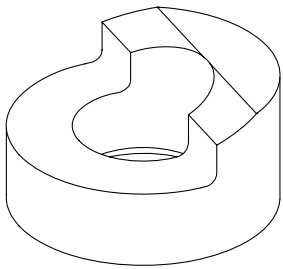
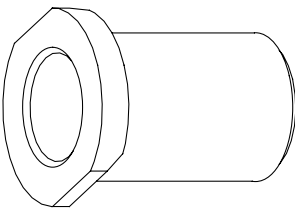
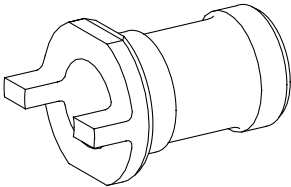
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
9. Bearing, compressor stator ID inlet	 <p>PN 4076924 -C</p> <p>PN 4076924 Braided Carbon Fabric</p>	See paragraph 20A.	
10. Bearing, compressor stator, 6th stage	 <p>PN 4066860 -C</p> <p>PN 4074432 AMS 5666 Nickel Alloy and Carbon Fabric Liner</p>	See paragraph 20A.	
10A. Bearing, compressor stator, 6th stage	 <p>PN4079117 -C</p> <p>PN 4079117 AMS 4928 Titanium Alloy</p>		WP 036 00

Table 1. Core Engine Module (continued)

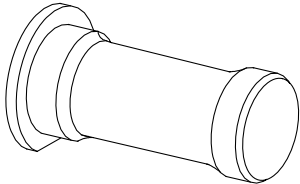
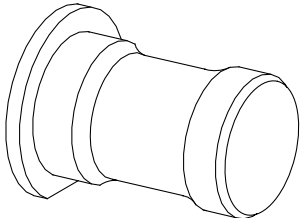
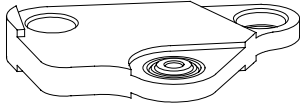
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
11. Bearing, 4th stage, compressor stator vane	 <p>PN 4071288 -C</p> <p>PN 4071383 AMS 5666 Nickel Alloy and Fabric Liner</p>	See paragraph 20A.	
12. Bearing, 5th stage, compressor stator vane	 <p>PN 4071285 -C</p> <p>PN 4074428 AMS 5666 Nickel Alloy and Fabric Liner</p>	See paragraph 20A.	
12A. Bellcrank assembly, compressor stator linkage	 <p>PN 4079028 -C</p> <p>PN 4079028 Titanium Alloy and Fabric Lined Bearings</p>	See paragraph 20B.	

Table 1. Core Engine Module (continued)

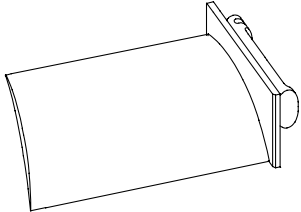
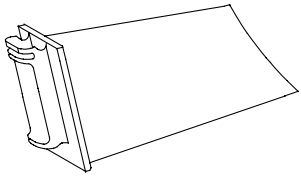
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
13. Blade, 4th stage, compressor rotor	 <p>PN 4075104 -C</p> <p>PN 4075104 PWA 1224 Ti Alloy</p>		SWP 031 08
14. Blade, 5th stage, compressor rotor	 <p>PN 4075105 -C</p> <p>PN 4075105 PWA 1224 Ti Alloy</p>		SWP 031 08

Table 1. Core Engine Module (continued)

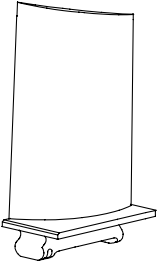
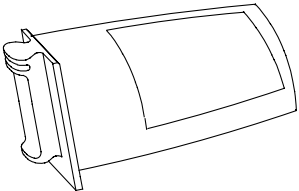
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
15. Blade, 6th stage, compressor rotor	 <p>PN 4075506 -C</p> <p>PN 4075506 PWA 1224 Ti Alloy</p>		SWP 031 08
16. Blade, 7th stage, compressor rotor	 <p>PN 4075107 -C</p> <p>PN 4075107 PWA 1209 Ti Alloy</p>		SWP 031 08

Table 1. Core Engine Module (continued)

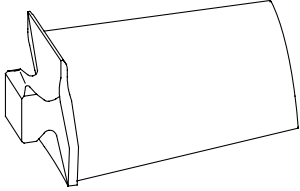
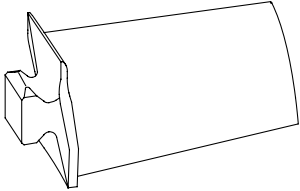
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
17. Blade, 8th stage, compressor rotor	 <p>PN 4077508 -C</p> <p> PN 4077508 PN 4075608 PWA 1010 Ni Alloy </p>		SWP 031 09
18. Blade, 9th stage, compressor rotor	 <p>PN 4077509 -C</p> <p> PN 4077509 PN 4075609 PWA 1010 Ni Alloy </p>		SWP 031 09

Table 1. Core Engine Module (continued)

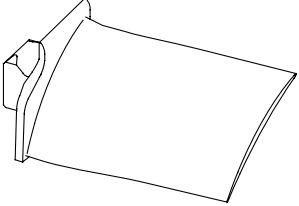
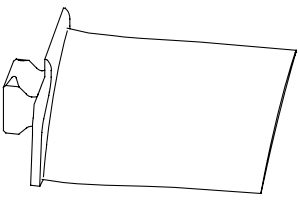
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
19. Blade, 10th stage, compressor rotor	 <p>PN 4077510 -C</p> <p>PN 4077510</p> <p>PN 4075610</p> <p>PWA 1010</p> <p>Ni Alloy</p>		SWP 031 09
20. Blade, 11th stage, compressor rotor	 <p>PN 4077511 -C</p> <p>PN 4077511</p> <p>PN 4075611</p> <p>PWA 1010</p> <p>Ni Alloy</p>		SWP 031 09

Table 1. Core Engine Module (continued)

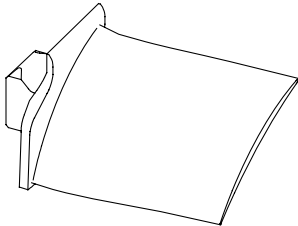
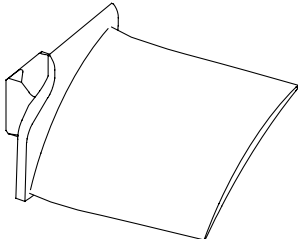
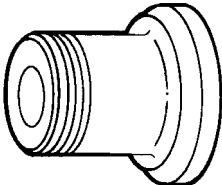
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
21. Blade, 12th stage, compressor rotor	 <p>PN 4077512 -C</p> <p>PN 4077512 PN 4075612 PWA 1005 Nickel Alloy</p>		SWP 031 09
22. Blade, 13th stage, compressor rotor	 <p>PN 4075613 -C</p> <p>PN 4075613</p>		SWP 031 09
23. Bolt, internally relieved body	 <p>PN 4001882 -C</p> <p>PN 4001882 AMS 6304 Steel</p>		SWP 031 01 SWP 031 09 SWP 031 03

Table 1. Core Engine Module (continued)

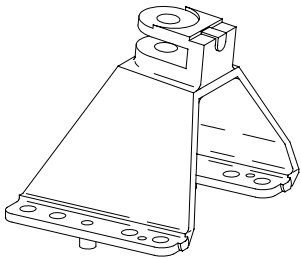
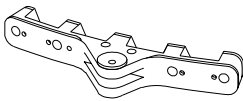
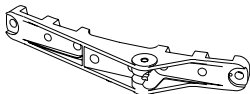
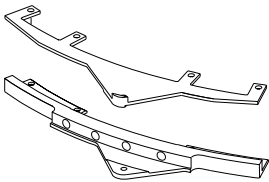
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
23A. Bracket, compressor stator linkage arm, assembly	 <p>PN 4078415 -C PN 4078415 Titanium Alloy</p>		SWP 031 08 or steam clean
23B. Bracket, compressor stator synchronizing ring, inlet	 <p>PN 4075695 -C PN 4075695 Titanium Alloy</p>	See paragraph 20B.	
23C. Bracket assembly, compressor stator synchronizing ring, 4th stage	 <p>PN 4080007 -C PN 4080007 Titanium Alloy</p>	See paragraph 20B.	
23D. Bracket assembly, compressor stator synchronizing ring, 5th stage	 <p>PN 4078411 -C PN 4078411 Titanium Alloy</p>	See paragraph 20B.	

Table 1. Core Engine Module (continued)

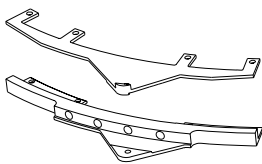
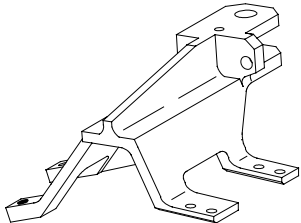
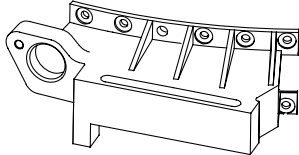
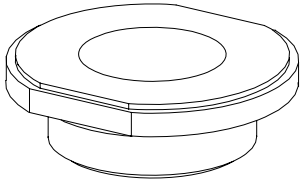
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
23E. Bracket assembly, compressor stator synchronizing ring, 6th stage	 <p>PN 4075684 -C PN 4075684 Titanium Alloy</p>	See paragraph 20B.	
23F. Bracket assembly, rear compressor stator linkage arm (5th stage)	 <p>PN 4078407 -C PN 4079745 Titanium Alloy</p>		SWP 031 08 or steam clean
24. Bracket assembly, rear compressor stator linkage arm	 <p>PN 4074492 -C PN 4078345 Titanium Alloy</p>	See paragraph 20.	
24A. Bushing, compressor stator bellcrank	 <p>PN 4079029 -C PN 4079029 AMS 5666 Nickel Alloy and Carbon Fabric Liner</p>	See paragraph 20A.	

Table 1. Core Engine Module (continued)

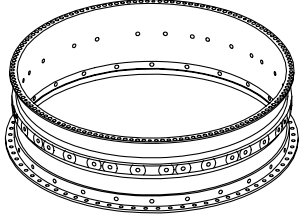
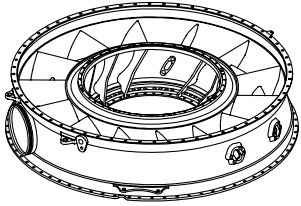
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
25. Case, compressor 10th through 12 stage	 <p>PN 4076723 -C</p> <p>PN 4076723 AMS 5662 Ni Alloy</p>	Steam, petroleum solvent	
26. Case, compressor intermediate	 <p>PN 4069079 -C</p> <p>PN 4069079</p>	Steam, petroleum solvent	

Table 1. Core Engine Module (continued)

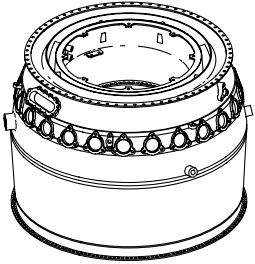
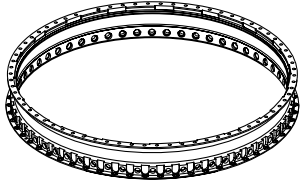
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
27. Case, diffuser	 <p>PN 4075716 -C</p> <p>PN 4075716 Nickel Alloy</p>	See paragraph 13.	
28. Case assembly, compressor 4th stage	 <p>PN 4075420 -C</p> <p>PN 4075420 Titanium Alloy</p>	Steam clean, no soap permitted	

Table 1. Core Engine Module (continued)

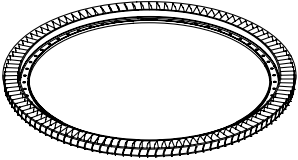
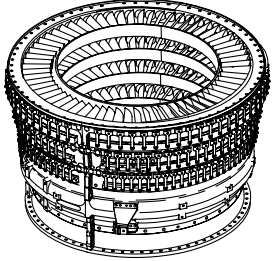
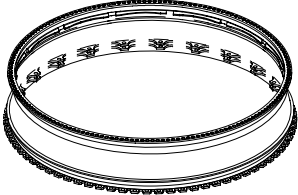
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
29. Case and stator, fan exit	 <p>PN 4070947 -C</p> <p>PN 4070947 Titanium Alloy</p>	Steam, petroleum solvent	
30. Case and stator, 4th through 9th stage compressor	 <p>PN 4075471 -C</p> <p>PN 4080302 Titanium Alloy</p>	Steam clean, no soap permitted	
30A. Case, turbine, front	 <p>PN 4083210 -C</p> <p>PN 4083210 AMS 5663 Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

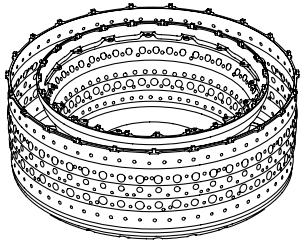
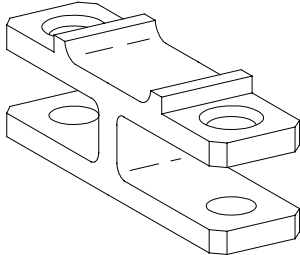
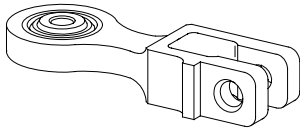
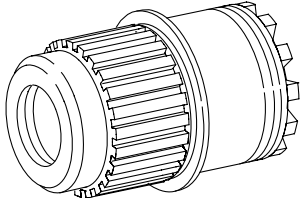
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
31. Chamber, combustion	 <p>PN 4074765 -C PN 4074765</p>		SWP 031 01
31A. Connecting link, rigid, compressor stator	 <p>PN 4079041 -C PN 4079041 Titanium Alloy</p>		SWP 031 08 or steam clean
31B. Connecting link, rigid, compressor stator, assembly	 <p>PN 4078355 -C PN 4078355 Titanium Alloy and Fabric Lined Bearing</p>	See paragraph 20B.	
32. Coupling, turbine shaft	 <p>PN 4071085 -C PN 4071085 PWA 1228 Titanium Alloy</p>		SWP 031 04 SWP 031 08

Table 1. Core Engine Module (continued)

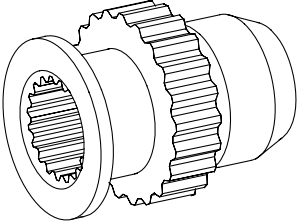
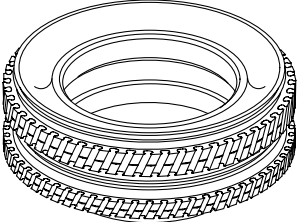
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
33. Coupling, gearbox driveshaft	 <p>PN 4025445 -C</p> <p>PN 4025445 AMS 6260 Steel</p>		SWP 031 01 SWP 031 09
34. Disk-drum rotor assembly, rear compressor front	 <p>PN 4074700 -C</p> <p>PN 4074700 AMS 1227 Ti Alloy</p>	See paragraph 22.	SWP 031 08

Table 1. Core Engine Module (continued)

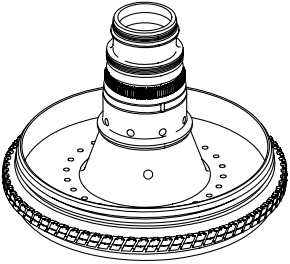
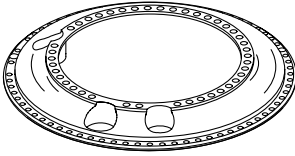
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
35. Disk and hub assembly, 6th stage compressor	 <p>PN 4070846 -C</p> <p>PN 4070846 PWA 1227 Ti Alloy</p>		SWP 031 08
36. Flange - No. 4 bearing air sealing ring	 <p>PN 4074896 -C</p> <p>PN 4074896</p>		SWP 031 01

Table 1. Core Engine Module (continued)

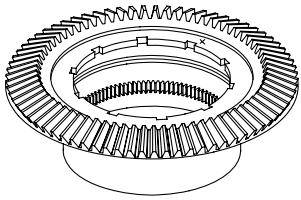
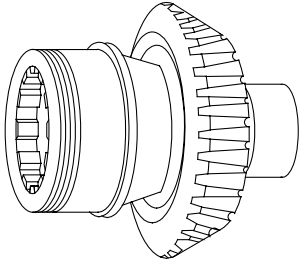
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
37. Gearshaft, bevel, gearbox drive, 73 tooth	 <p>PN 4069346 -C</p> <p>PN 4069346 AMS 6265 Steel</p>		SWP 031 01 SWP 031 09
38. Gearshaft, bevel, gearbox drive, 38 tooth	 <p>PN 4068119 -C</p> <p>PN 4068119 AMS 6265 Steel</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

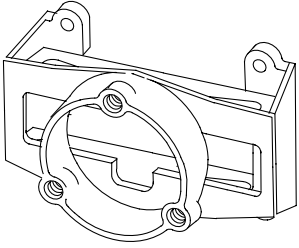
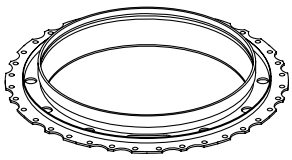
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
39. Guide assembly, bleed valve strap carriage	 <p>PN 4076798 -C</p> <p>PN 4076798</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
40. Housing, No. 4 bearing	 <p>PN 4035897 -C</p> <p>PN 4035897</p> <p>AMS 5662</p> <p>Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

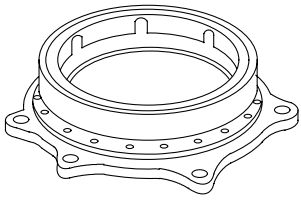
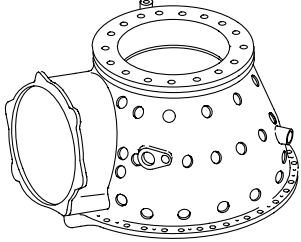
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
41. Housing, gearbox drive bearing	 <p>PN 4028827 -C</p> <p>PN 4028827 AMS 4728 Ti Alloy</p>		SWP 031 08
42. Housing, No. 2 bearing	 <p>PN 4038606 -C</p> <p>PN 4038606 PWA 1262-3 Ti Alloy</p>		SWP 031 04 SWP 031 08

Table 1. Core Engine Module (continued)

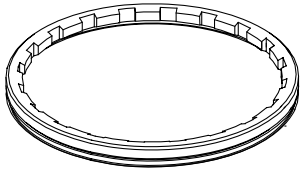
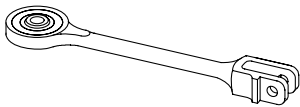
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
43. Inverted nut, spanner	 <p>PN 4001878 -C</p> <p>PN 4001878 AMS 5616 Stainless Steel</p>		<p>SWP 031 01</p> <p>SWP 031 09</p> <p>SWP 031 19</p> <p>SWP 031 03</p>
44. Link assembly, connecting, rigid, compressor stator	 <p>PN 4073157 -C</p> <p>PN 4073157 Titanium Allow and Fabric Lined Bearing</p>	See paragraph 20B.	

Table 1. Core Engine Module (continued)

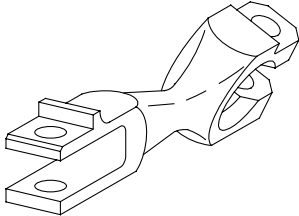
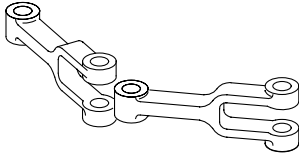
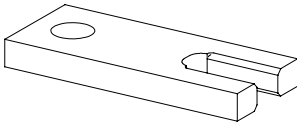
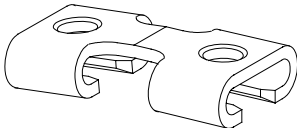
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
45. Link, connecting rigid, compressor stator	 <p>PN 4066827 -C PN 4066827 AMS 4928 and PWA S-5928 Titanium Alloy</p>		SWP 031 08 or steam clean
46. Link, connecting, rigid, bleed valve strap	 <p>PN 4059359 -C PN 4059359 AMS 5663 Nickel Alloy</p>	Steam clean	
46A. Lock, compressor stator bellcrank	 <p>PN 4079017 -C PN 4079017 Nickel Alloy</p>		SWP 031 01 SWP 031 09
46B. Lock, compressor stator vane, 6th stage	 <p>PN 4079610 -C PN 4079610 Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

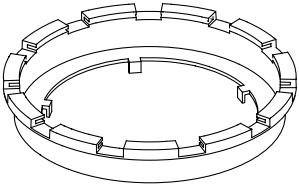
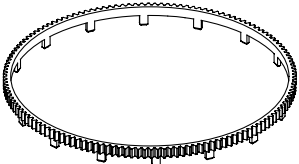
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
47. Lock, No. 3 bearing	 <p>PN 4037897 -C</p> <p>PN 4037897 AMS 6415 Nickel Alloy</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
48. Lock, rear compressor driveshaft nut	 <p>PN 4026825 -C</p> <p>PN 4026825 PWA 1022 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

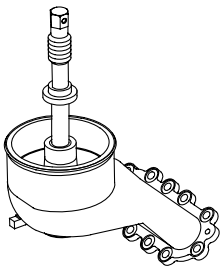
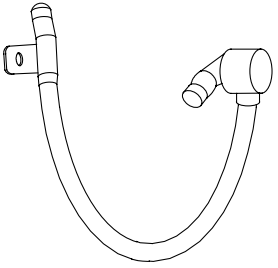
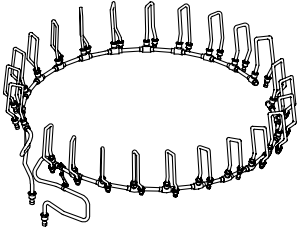
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
48A. Manifold assembly, compressor discharge	 <p>PN 4074151 -C</p> <p>PN 4074151 (Left) PN 4074152 (Right) PWA 1469 Nickel Alloy</p>	May be disassembled before cleaning	SWP 031 09
49. Manifold assembly, No. 4 bearing, internal pressure	 <p>PN 4035859 -C</p> <p>PN 4035859</p>	Perchloroethylene	
50. Manifold assembly, fuel supply	 <p>PN 4074245 -C</p> <p>PN 4074245 PN 4074246 PWA 770 Stainless Steel</p>	Refer to SPOP 220 in T.O. 2-1-111	

Table 1. Core Engine Module (continued)

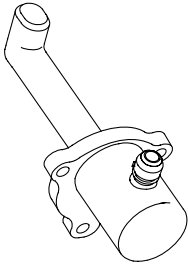
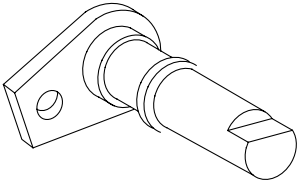
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
51. Nozzle fuel (staged and nonstaged)	 <p>PN 4075217 -C PN 4075217 PN 4075218</p>	See paragraph 2	
52. Nozzle assembly, No. 2 and 3 bearing	 <p>PN 4039917 -C PN 4039917</p>	Refer to SPOP 255 in T.O. 2-1-111	

Table 1. Core Engine Module (continued)

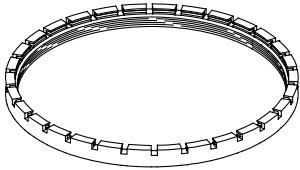
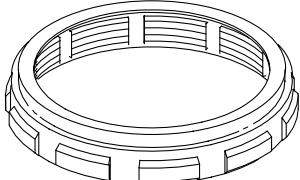
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
53. Nut, bearing retaining, internally threaded	 <p>PN 4001860 -C</p> <p>PN 4001860 AMS 5616 Stainless Steel</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
54. Nut, bearing retaining internally threaded	 <p>PN 4001863 -C</p> <p>PN 4001863 AMS 5616 Stainless Steel</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03

Table 1. Core Engine Module (continued)

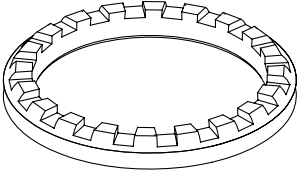
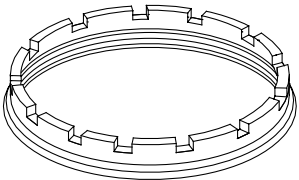
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
55. Nut, bearing retaining, internally threaded	 <p>PN 4001874 -C PN 4001874 AMS 6322 Steel</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
56. Nut bearing retaining, internally threaded	 <p>PN 4007568 -C PN 4007568 AMS 5709 Nickel Alloy</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03

Table 1. Core Engine Module (continued)

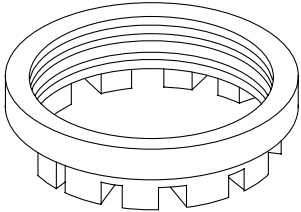
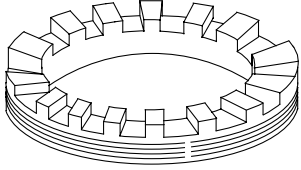
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
57. Nut bearing retaining, internally threaded	 <p>PN 4010237 -C</p> <p>PN 4010237 AMS 5616 Stainless Steel</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
58. Nut bearing retaining, externally threaded	 <p>PN 4001885 -C</p> <p>PN 4001885 AMS 5616 Stainless Steel</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03

Table 1. Core Engine Module (continued)

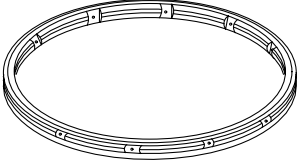
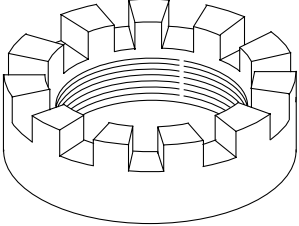
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
59. Nut bearing retaining, externally threaded	 <p>PN 4002513 -C</p> <p>PN 4002513 AMS 5671 Nickel Alloy</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03
60. Nut, plain round	 <p>PN 4001883 -C</p> <p>PN 4001883 AMS 6515 Nickel Alloy</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03

Table 1. Core Engine Module (continued)

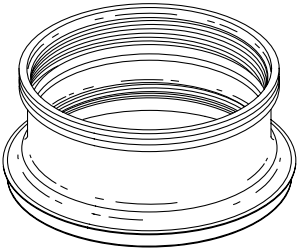
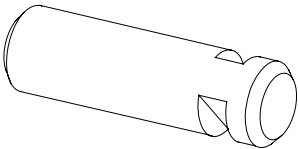
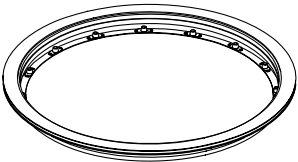
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
61. Nut, rear compressor driveshaft	 <p>PN 4069335 -C PN 4069335 PWA 1022 Nickel Alloy</p>		SWP 031 01 SWP 031 08 SWP 031 19
61A. Pin, grooved, headless	 <p>PN 4079019 -C PN 4079019 Nickel Alloy</p>		SWP 031 01 SWP 031 09
62. Ring, air sealing, 1st stage turbine outer	 <p>PN 4070011 -C PN 4070011 AMS 5599 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

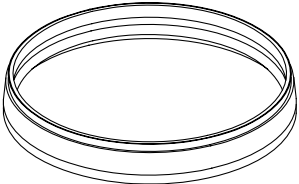
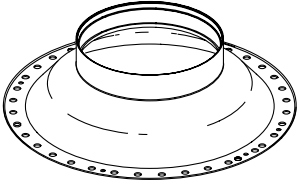
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
63. Ring, air sealing, No. 3 bearing	 <p>PN 4061536 -C</p> <p>PN 4061536 AMS 5627 Stainless Steel</p>		SWP 031 04
64. Ring, air sealing, 1st stage turbine inner	 <p>PN 4070980 -C</p> <p>PN 4070980 AMS 5606 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
65. Ring assembly, air sealing No. 4 bearing, front	 <p>PN 4075867 -C</p> <p>PN 4075867</p>		SWP 031 09 SWP 031 19 SWP 031 03
66. Ring assembly, air sealing, No. 4 bearing front	 <p>PN 4074894 -C</p> <p>PN 4074894 PWA 1469-2 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

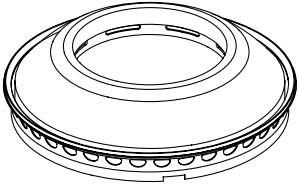
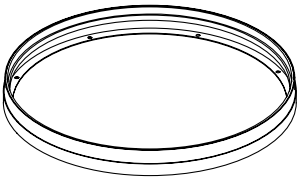
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
67. Ring assembly, air sealing, No. 4 bearing rear	 <p>PN 4075870 -C</p> <p>PN 4075870</p>		SWP 031 01 SWP 031 04
68. Ring assembly, air sealing, 1st stage turbine, inner	 <p>PN 4070004 -C</p> <p>PN 4070004-02</p>		SWP 031 01

Table 1. Core Engine Module (continued)

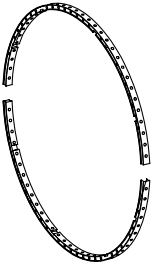
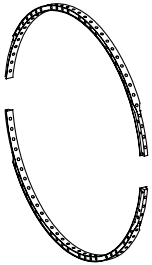
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
69. Ring half, synchronizing, compressor stator, 4th stage	 <p>PN 4075661 -C</p> <p>PN 4075698 PN 4075699 Titanium Alloy with Fabric Lined Bushings</p>	See paragraph 20B.	
70. Ring half, synchronizing, compressor stator, 5th stage	 <p>PN 4075662 -C</p> <p>PN 4075668 PN 4075669 Titanium Alloy with Fabric Lined Bushings</p>	See paragraph 20B.	

Table 1. Core Engine Module (continued)

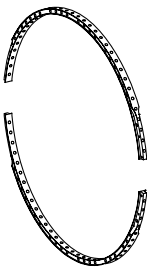
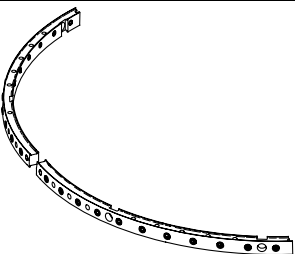
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
71. Ring half, synchronizing, compressor stator, 6th stage	 <p>PN 4075663 -C</p> <p>PN 4075670</p> <p>PN 4075671</p> <p>Titanium Alloy with Fabric Lined Bushings</p>	See paragraph 20B.	
72. Ring half, synchronizing, rear compressor inlet	 <p>PN 4075696 -C</p> <p>PN 4075696</p> <p>PN 4075697</p> <p>Titanium Alloy with Fabric Lined Bushings</p>	See paragraph 20B.	

Table 1. Core Engine Module (continued)

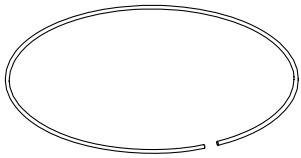
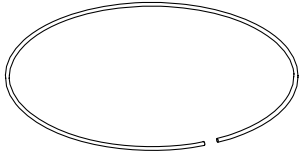
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
73. Ring retaining	 <p>PN 4010239 -C</p> <p>PN 4010239 AMS 5698 Nickel Alloy</p>		SWP 031 01
74. Ring, retaining	 <p>PN 4001862 -C</p> <p>PN 4001862 AMS 5698 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

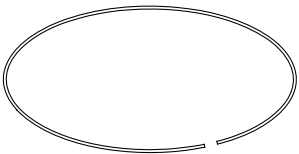
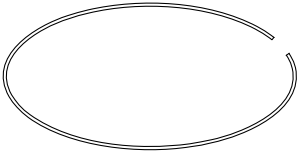
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
75. Ring, retaining	 <p>PN 4001865 -C</p> <p>PN 4001865 AMS 5698 Nickel Alloy</p>		SWP 031 01
76. Ring, retaining	 <p>PN 4026826 -C</p> <p>PN 4026826 AMS 5699 Nickel Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

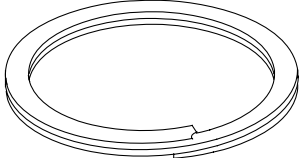
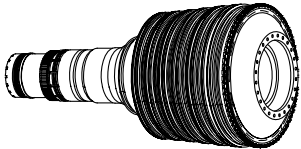
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
77. Ring, retaining	 <p>PN 494624 -C</p> <p>RRN 187-5 (PW PN 494624) ASI 302 Stainless Steel</p>		SWP 031 01
78. Rotor assembly 7th through 13th stage, drum	 <p>PN 4073123 -C</p> <p>PN 4073123 PW 1106 Nickel Alloy</p>		SWP 031 09

Table 1. Core Engine Module (continued)

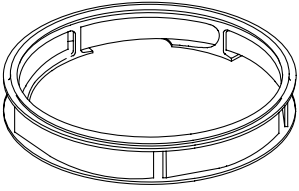
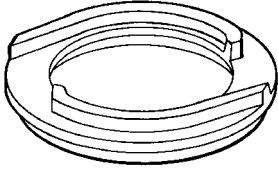
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
79. Scoop, No. 4 bearing	 <p>PN 4032667 -C</p> <p>PN 4032667 AMS 6322 Steel</p>		<p>SWP 031 01</p> <p>SWP 031 04</p> <p>SWP 031 09</p>
80. Scoop, No. 2 bearing, front	 <p>PN 4001798 -C</p> <p>PN 4001798 AMS 6322 Low Alloy Steel</p>		<p>SWP 031 01</p> <p>SWP 031 09</p>

Table 1. Core Engine Module (continued)

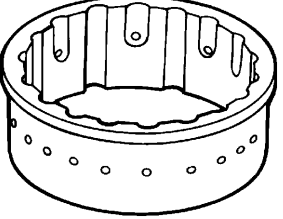
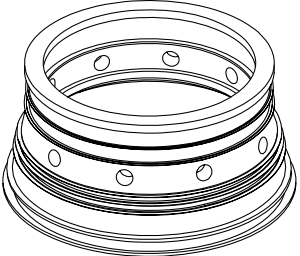
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
81. Scoop, No. 2 bearing, rear	 <p>PN 4001857 -C</p> <p>PN 4001857 AMS 6322 Low Alloy Steel</p>		SWP 031 01 SWP 031 04 SWP 031 09
82. Seal, air, No. 3 bearing	 <p>PN 4075035 -C</p> <p>PN 4080811 PWA 1202 Titanium Alloy</p>		SWP 031 08 SWP 031 09

Table 1. Core Engine Module (continued)

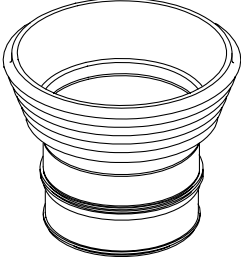
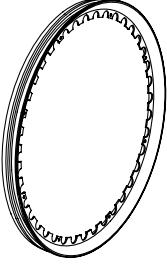
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
83. Seal, air, No. 4 bearing	 <p>PN 4074870 -C</p> <p>PN 4074870 PWA 1016 Ni Alloy</p>		SWP 031 01 SWP 031 09
84. Seal, air, 1st stage turbine	 <p>PN 4069949 -C</p> <p>PN 4069949 PWA 1106 Ni Alloy</p>		SWP 031 01

Table 1. Core Engine Module (continued)

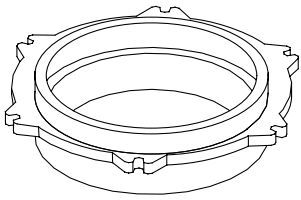
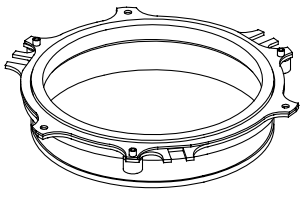
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
85. Seal face assembly, No. 2 bearing, front	 <p>PN 4033286 -C</p> <p>PN 4033286</p>		SWP 031 01 SWP 031 09
86. Seal face assembly, No. 2 bearing, rear	 <p>PN 4033283 -C</p> <p>PN 4033283</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

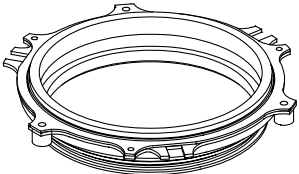
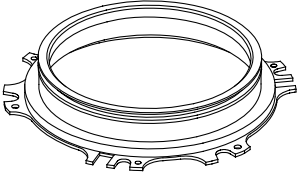
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
87. Seal face assembly, No. 3 bearing, front	 <p>PN 4012501 -C</p> <p>PN 4012501 AMS 5613 Stainless steel</p>		SWP 031 01 SWP 031 09
88. Seal face assembly, No. 3 bearing, rear	 <p>PN 4036993 -C</p> <p>PN 4036993 AMS 5613 Stainless Steel</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

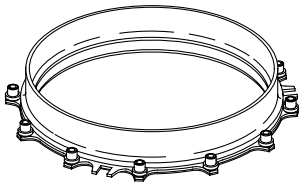
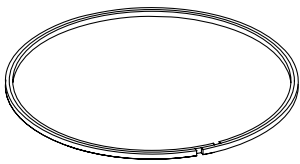
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
89. Seal face assembly, No. 4 bearing	 <p>PN 4035886 -C</p> <p>PN 4035886</p>		SWP 031 01 SWP 031 09
90. Seal ring, metal	 <p>PN 4001629 -C</p> <p>PN 4001629</p> <p>PN 4001642</p> <p>PN 4002454</p> <p>AMS 7310</p> <p>Iron Alloy</p>	See paragraph 10.	

Table 1. Core Engine Module (continued)

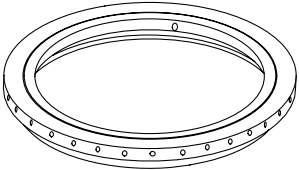
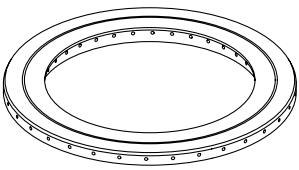
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
91. Seat, No. 2 bearing seal, front	 <p>PN 4001528 -C</p> <p>PN 4001528 AMS 6322 Steel</p>		SWP 031 01 SWP 031 04 SWP 031 09
92. Seat, No. 2 bearing seal, rear	 <p>PN 4001529 -C</p> <p>PN 4001529 AMS 6322 Steel</p>		SWP 031 09

Table 1. Core Engine Module (continued)

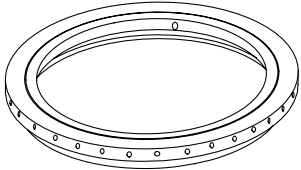
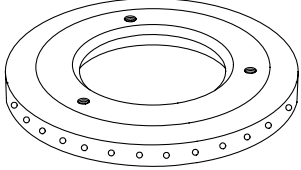
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
93. Seat, No. 3 bearing seal, front	 <p>PN 4001530 -C</p> <p>PN 4001530 AMS 6322 Nickel Alloy</p>	See paragraph 11.	SWP 031 09
94. Seat, No. 3 bearing seal, rear	 <p>PN 4022668 -C</p> <p>PN 4022668 AMS 5599 Nickel Alloy</p>	See paragraph 11.	SWP 031 09

Table 1. Core Engine Module (continued)

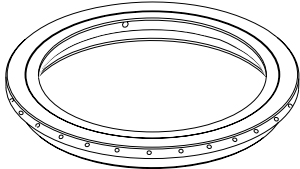
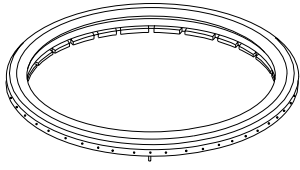
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
95. Seat, No. 4 bearing seal, front	 <p>PN 4022669 -C</p> <p>PN 4022669</p>		SWP 031 09
96. Seat, No. 4 bearing seal, rear	 <p>PN 4083144 -C</p> <p>PN 4083144</p>	See paragraph 11.	SWP 031 09

Table 1. Core Engine Module (continued)

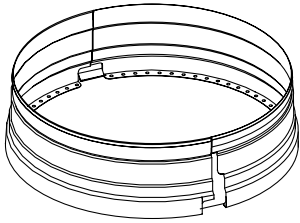
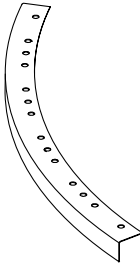
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
97. Shield, heat, compressor stator	 <p>PN 4077646 -C</p> <p>PN 4077646</p>		SWP 031 01
98. Shield segment, heat, compressor stator	 <p>PN 4077647 -C</p> <p>PN 4077647</p>		SWP 031 01

Table 1. Core Engine Module (continued)

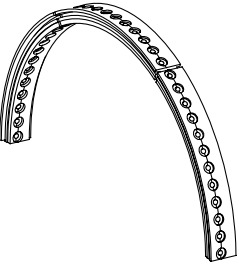

Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
99. Shroud segment set, compressor 4th stage	 <p>PN 4077434-01 -C</p> <p>PN 4077434-01</p>	Acetone	
100. Shroud segment set, compressor 5th stage	 <p>PN 4076475-01 -C</p> <p>PN 4076475-01</p>	Acetone	

Table 1. Core Engine Module (continued)


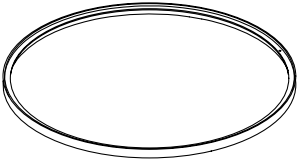
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
101. Shroud segment set, compressor stator, 6th stage	 <p>PN 4076826 -C</p> <p>PN 4076826-01 PN 4076826-02 Nickel Alloy</p>		SWP 031 01 SWP 031 08 SWP 031 09
102. Shroud, rear compressor stator, inlet	 <p>PN 4077350 -C</p> <p>PN 4077350 Titanium Alloy</p>		SWP 031 08 or steam clean

Table 1. Core Engine Module (continued)

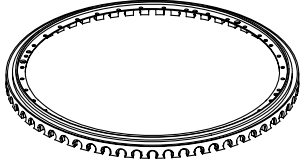
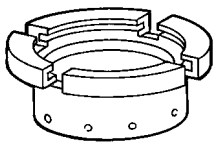
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
103. Shroud, rear compressor stator inlet	 <p>PN 4077450 -C</p> <p>PN 4077450 Titanium Alloy</p>		SWP 031 08 or steam clean
104. Sleeve, gearbox gearshaft drive	 <p>PN 4025446 -C</p> <p>PN 4025446 AMS 6322 Steel</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

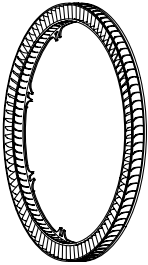
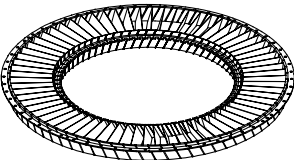
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
105. Stator, compressor exit	 <p>PN 4077213 -C</p> <p>PN 4077213</p>	Steam Petroleum Solvent	
106. Stator, compressor, 3rd stage	 <p>PN 4075983 -C</p> <p>PN 4075983</p>	Steam Petroleum Solvent	

Table 1. Core Engine Module (continued)

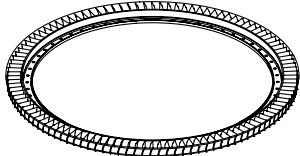
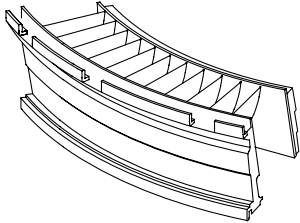
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
107. Stator, fan exit	 <p>PN 4070947 -C</p> <p>PN 4070947 Titanium Alloy</p>	Steam Petroleum solvent	
108. Stator compressor 7th stage	 <p>PN 4070837 -C</p> <p>PN 4070837 Nickel Alloy</p>	See paragraph 17.	SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

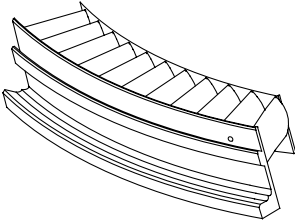
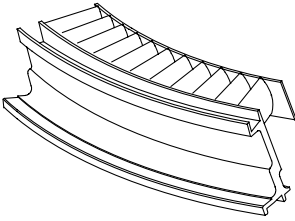
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
109. Stator compressor 8th stage	 <p>PN 4077078 -C</p> <p>PN 4077078 Nickel Alloy</p>	See paragraph 17.	SWP 031 01 SWP 031 09
110. Stator compressor 9th stage	 <p>PN 4077079 -C</p> <p>PN 4077079 Nickel Alloy</p>	See paragraph 17.	SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

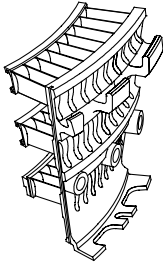
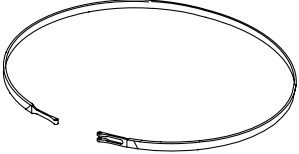
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
111. Stator segment, compressors, 10th through 12th stage	 <p>PN 4077080 -C</p> <p>PN 4077080</p>	Steam, solvent (P-D-680, Type II). See paragraph 17 for alternate cleaning procedure.	SWP 031 01 SWP 031 09
112. Strap, bleed valve	 <p>PN 4069280 -C</p> <p>PN 4069280 AMS 5596 Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

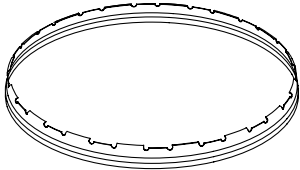
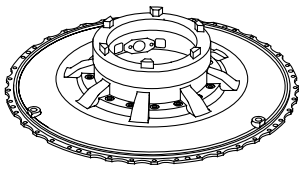
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
113. Support air, sealing ring, 1st stage turbine	 <p>PN 4070702 -C</p> <p>PN 4070702</p>		SWP 031 01
114. Support assembly No. 2 bearing	 <p>PN 4072840 -C</p> <p>PN 4072840</p>	Steam or AMS 3160 solvent (P-D-680, type II). Refer to paragraph 18 for alternate cleaning procedure for removal of sealant and antigalling compound.	

Table 1. Core Engine Module (continued)

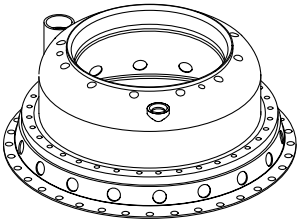
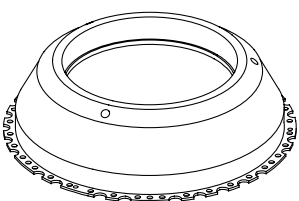
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
115. Support assembly, No. 4 bearing seal, front	 <p>PN 4074881 -C</p> <p>PN 4080081</p>		SWP 031 01 SWP 031 09
116. Support assembly, No. 4 bearing seal, rear	 <p>PN 4067914 -C</p> <p>PN 4067914</p>	See paragraph 16.	SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

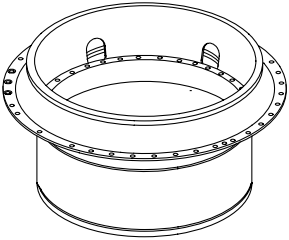
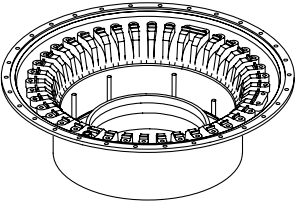
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
117. Support assembly, No. 3 bearing	 <p>PN 4075135 -C</p> <p>PN 4075135 AMS 4928 Titanium Alloy</p>		SWP 031 04 SWP 031 08
118. Support assembly, No. 3 bearing seal	 <p>PN 4070045 -C</p> <p>PN 4070045</p>	See paragraph 16.	

Table 1. Core Engine Module (continued)

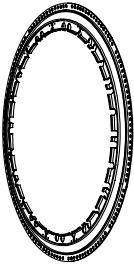
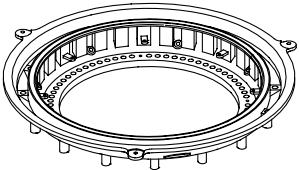
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
119. Support assembly compressor stator	 <p>PN 4076490 -C</p> <p>PN 4076490</p>		SWP 031 01 SWP 031 09
120. Support assembly, turbine stator, 1st stage (TOBI)	 <p>PN 4068672 -C</p> <p>PN 4068672</p>	Refer to SPOP 9 in T.O. 2-1-111	SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

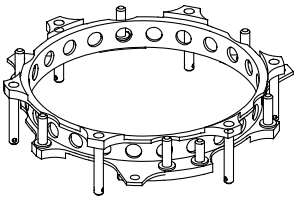
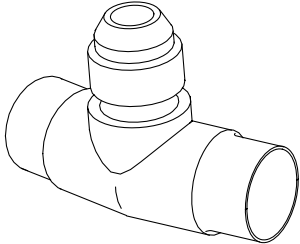
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
121. Support, No. 2 and 3 bearing seal	 <p>PN 4060815 -C</p> <p>PN 4060815 AMS 5350 Stainless steel</p>		SWP 031 01 SWP 031 04 SWP 031 09
122. Tee, fuel supply manifold	 <p>PN 4074147 -C</p> <p>PN 4074147 Stainless Steel</p>		SWP 031 01

Table 1. Core Engine Module (continued)

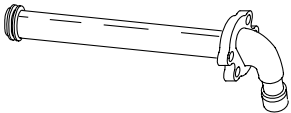
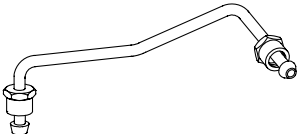
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
123. Tube assembly, No. 2 and 3 bearing internal pressure	 <p>PN 4070030 -C</p> <p>PN 4070030</p>		SWP 031 01
124. Tube assembly, No. 3 bearing seal support damper	 <p>PN 4069241 -C</p> <p>PN 4069241</p>		SWP 031 01

Table 1. Core Engine Module (continued)

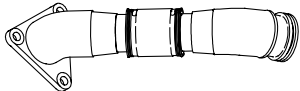
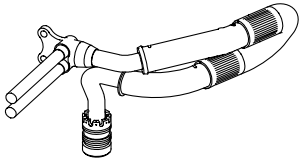
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
125. Tube assembly, No. 4 bearing seal air supply	 <p>PN 4070082 -C</p> <p>PN 4070082 PWA 1069 Nickel Alloy</p>		SWP 031 01
126. Tube assembly, No. 4 bearing, internal scavenge	 <p>PN 4072991 -C</p> <p>PN 4072991 PWA 770 Stainless Steel</p>		SWP 031 01

Table 1. Core Engine Module (continued)

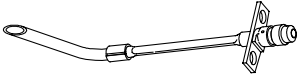
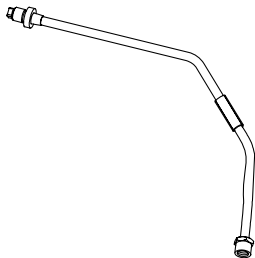
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
127. Tube assembly, air vent, No. 4 bearing, internal (0.250 inch OD) 0.028 inch wall thickness	 <p>PN 4074872 -C</p> <p>PN 4074872</p>	Refer to SPOP 255 in T.O. 2-1-111	
128. Tube assembly, air vent, No. 4 bearing, internal (0.250 inch OD) (0.028 inch wall thickness).	 <p>PN 4069897 -C</p> <p>PN 4069897</p>	Refer to SPOP 255 in T.O. 2-1-111	

Table 1. Core Engine Module (continued)

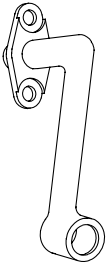
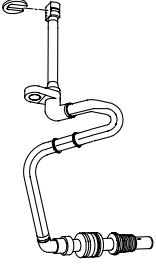
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
129. Tube static pressure probe connector	 <p>PN 4076957 -C</p> <p>PN 4076957</p>		SWP 031 01 SWP 031 09
130. Tube, No. 4 bearing internal pressure	 <p>PN 4069160 -C</p> <p>PN 4069160</p>	Perchloroethylene See paragraph 6.	

Table 1. Core Engine Module (continued)

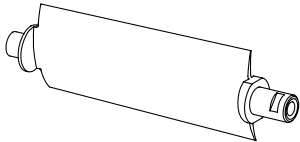
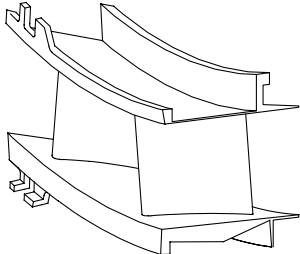
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
131. Vane, compressor stator rear variable, inlet	 <p>PN 4077250 -C</p> <p>PN 4077250 Titanium Alloy</p>		SWP 031 08 or steam clean
132. Vane, 1st stage turbine stator	 <p>PN 4069391 -C</p> <p>PN 4069391 Nickel Alloy</p>	See paragraph 14.	SWP 031 09 SWP 031 19

Table 1. Core Engine Module (continued)

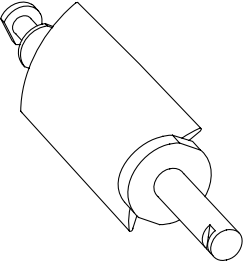
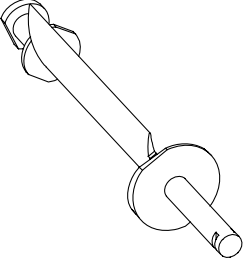
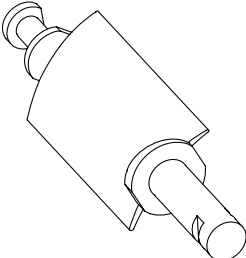
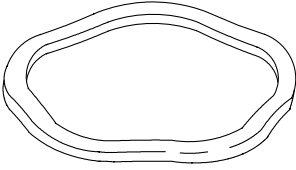
Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
133. Vane, 4th stage compressor stator	 <p>PN 4075974 -C</p> <p>PN 4075974 AMS 5663 Nickel Alloy</p>		SWP 031 01 SWP 031 09
134. Vane, 5th stage compressor stator	 <p>PN 4075975 -C</p> <p>PN 4080325 AMS 5663 Nickel Alloy</p>		SWP 031 01 SWP 031 09

Table 1. Core Engine Module (continued)

Part Name	Illustration Typical Part Number and Parent Material	Special Cleaning Instructions	Cleaning WP/SWP Reference T.O. 2J-F100-53-1
135. Vane, 6th stage compressor stator	 <p>PN 4075976 -C</p> <p>PN 4079696 AMS 5663 Nickel Alloy</p>		SWP 031 01 SWP 031 09
136. Washer, spring tension	 <p>PN 4035878 -C</p> <p>PN 4035878 AMS 5596 Nickel Alloy</p>		SWP 031 01 SWP 031 09 SWP 031 19 SWP 031 03

WORK PACKAGE

TECHNICAL PROCEDURES

VANE ASSEMBLIES - TURBINE STATOR, FIRST STAGE -

VOLCANIC ASH REMOVAL

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	14	6 Blank	14		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Cleaning Procedure - Cleaning, Grit Blast, Dry (SPOP 218) - - - - -	SWP 031 13
Approved Source List - - - - -	WP 608 00
Rear Compressor Drive Turbine - - - - -	T.O. 2J-F100-53-7
Vane Assemblies, Turbine Rotor, First Stage - Inspection - - - - -	WP 360 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

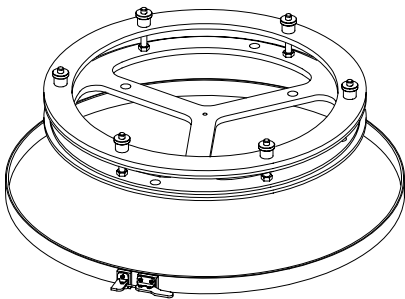
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	First Stage Turbine Vane Assemblies- PWA 73 Coating Cleaning and Inspection	
	Fixture, Holding, 1st stage turbine vane assemblies - - - - -	PWA 70789

ILLUSTRATED SUPPORT EQUIPMENT



PWA 70789 -C

Figure T1. PWA 70789 Fixture

1. INTRODUCTION.

- a. This work package contains special cleaning and inspection instructions for 1st stage turbine vane assemblies having volcanic ash deposits on airfoil surfaces and in cooling holes.

2. FIRST STAGE TURBINE VANE ASSEMBLIES-PWA 73 COATING CLEANING AND INSPECTION.

(See Figure 1.)

- a. Clean vane assemblies per SPOP 209. Refer to T.O. 2-1-111.
- b. Visually inspect vane assemblies to verify volcanic ash deposits on airfoil surfaces or in cooling holes.

NOTE

Water jet cleaning of turbine airfoils is a SA-ALC source qualified procedure. Refer to T.O. 2J-F100-53-1, WP 608 00 for SA-ALC procedure numbers and additional qualified sources.

- c. Water jet clean vane assemblies as follows:
 - (1) Install vane assemblies into PWA 70789 holding fixture.
 - (2) Perform water jet cleaning operations using parameters as controlled by approved procedures.
 - (3) Remove vane assemblies from PWA 70789 holding fixture.
 - (4) Blow dry using compressed air.



Do not dwell blast on any surface or damaging coating loss will result.

NOTE

After grit blast and heat tint, blades shall be handled using clean gloves.

- d. Dry grit blast airfoil surfaces lightly per SPOP 218 using 240 mesh grit or finer. Refer to T.O. 2J-F100-53-1, SWP 031 13.

- e. Heat tint and inspect vane assemblies as follows:

- (1) Load grit blasted vane assemblies into clean air circulating furnace and heat tint at 1050 to 1100°F (566 to 593°C) for 50 to 70 minutes.
- (2) Allow vane assemblies to cool and compare coating results to those on PWA 31383 in T.O. 2-1-111 and the following special inspection criteria:
 - (a) Visual inspection shall occur within 14 hours after heat tint operation.
 - (b) Golden or pewter color indicates presence of aluminide coating.
 - (c) Blue or purple color indicates absence of coating and is not permitted on airfoil surfaces.
 - (d) Residual volcanic ash is denoted by dark brown colored areas that appear to be slightly raised above surrounding surfaces. Volcanic ash deposits on airfoil surfaces and trailing edge slots are permissible provided they do not block airfoil cooling passages. See figure 1.

(3) If residual ash remains in cooling holes, water jet clean one additional cycle beginning at step c. Two complete cleaning cycles allowed for each vane assembly.

f. Inspect all other vane assembly areas per WP 360 00.

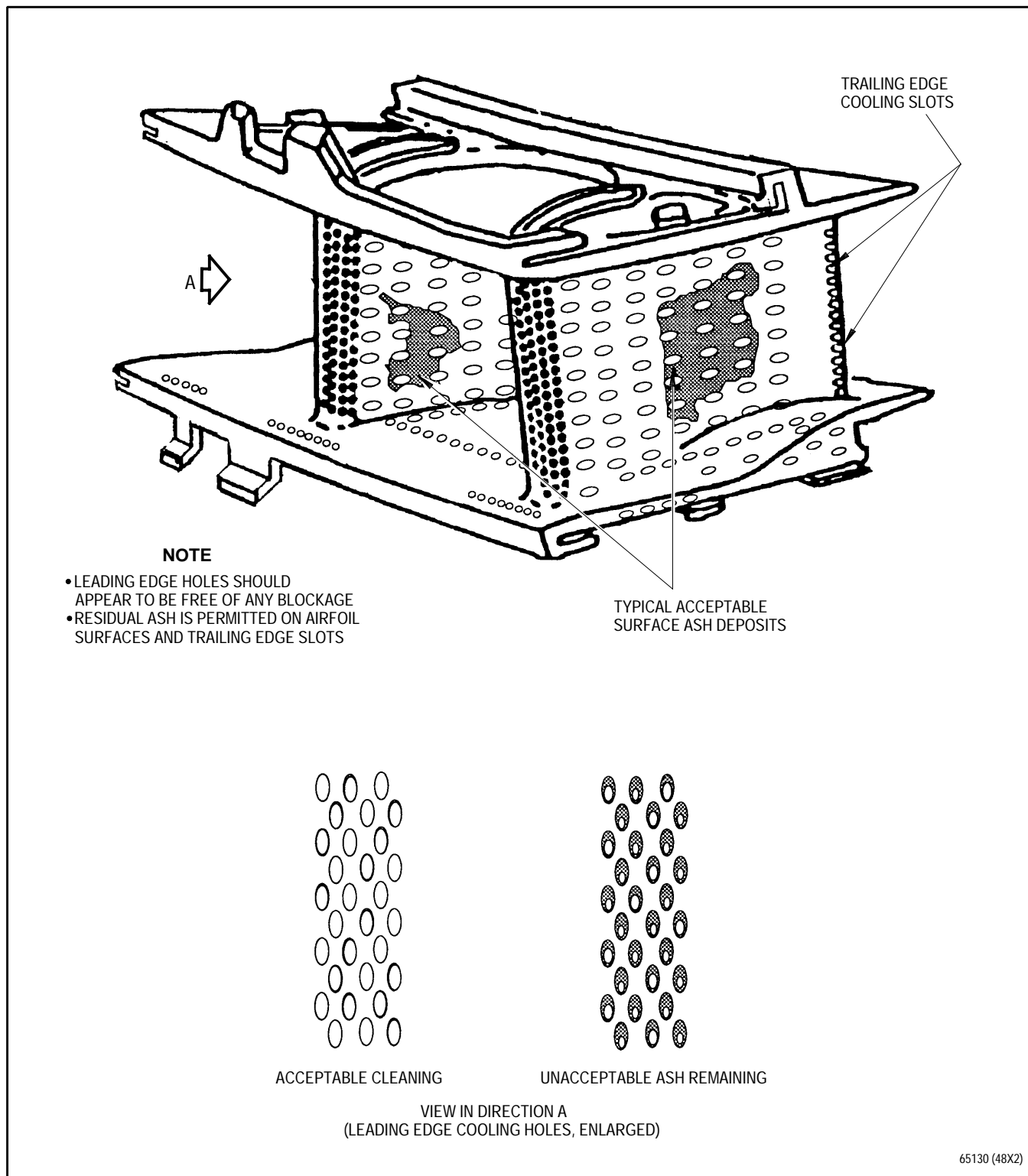


Figure 1. First Stage Turbine Vane Assembly- Water Jet Cleaning

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3 - 4	29	5	25
2	8			6 Blank	0

1. INTRODUCTION.

- a. This work package introduces the 300 00 through 399 00 series of work packages for inspection of core module parts. The following work packages are included in this series.

WP/SWP No.	Title
301 00	Tube-Pressure, No. 3 Bearing Damper Seal Support - Inspection
302 00	Disk-Drum Rotor, Rear Compressor, Front, Assembly (Fourth And Fifth Stage) - Inspection
303 00	Nuts, Bearing Retaining - Inspection
304 00	Lock, Rear Compressor Driveshaft Nut - Inspection
305 00	Disk and Hub, Compressor, Sixth Stage - Inspection
306 00	Seats, No. 2, 3, and 4 Bearing Seal - Inspection
306 01	Seats, No. 2, 3, and 4 Bearing Seal - Inspection After Volcanic Ash Ingestion
307 00	Support Assembly, No. 3 Bearing Seal - Inspection
308 00	Tube Assembly, No. 2 and 3 Bearing Internal Pressure - Inspection
309 00	Support Assembly, No. 2 Bearing Seal - Inspection
309 01	Support Assembly, No. 2 Bearing Seal - Inspection After Volcanic Ash Ingestion
310 00	Housing, Gearbox Drive Bearing - Inspection
311 00	Gear and Gearshaft, Bevel, Gearbox Drive - Inspection
312 00	Coupling, Turbine Shaft - Inspection
313 00	Scoop Assembly, No. 2 Bearing, Front - Inspection
314 00	Scoop, No. 2 Bearing, Rear - Inspection
315 00	Housing Assembly, No. 2 Bearing - Inspection
316 00	Seal Support Assembly, No. 2 and 3 Bearing - Inspection
317 00	Seal Assemblies, Face, No. 2 Bearing, Front and Rear - Inspection
317 01	Seal Assemblies, Face, No. 2 Bearing, Front and Rear - Inspection After Volcanic Ash Ingestion
318 00	Seal Assembly, Face, No. 3 Bearing, Front - Inspection
319 00	Seal Assembly, Face, No. 3 Bearing, Rear - Inspection
320 00	Seal Assembly, Face, No. 4 Bearing (Front and Rear) - Inspection
320 01	Seal Assembly, Face, No. 4 Bearing (Front and Rear) - Inspection After Volcanic Ash Ingestion
321 00	Stator, Compressor, Third Stage - Inspection
322 00	Lock, No. 3 Bearing - Inspection
323 00	Support Assembly, No. 3 Bearing - Inspection
324 00	Baffle, No. 3 Bearing - Inspection
325 00	Ring Assembly, Air Sealing, No. 4 Bearing, Rear - Inspection
326 00	Support Assembly, No. 4 Bearing Rear Seal - Inspection
326 01	Support Assembly, No. 4 Bearing Rear Seal - Inspection After Volcanic Ash Ingestion
327 00	Housing, No. 4 Bearing - Inspection
327 01	Housing, No. 4 Bearing - Inspection After Volcanic Ash Ingestion

WP/SWP No.	Title
328 00	Scoop, No. 4 Bearing - Inspection
328 01	Scoop, No. 4 Bearing - Inspection After Volcanic Ash Ingestion
329 00	Ring Segment, Compressor Stator Support, Tenth Through Twelfth Stage - Inspection
330 00	Shroud, Compressor Stator, Third Stage - Inspection
331 00	Shroud Set, Rear Compressor Stator, Inlet - Inspection
332 00	Support Assembly, No. 4 Bearing Front Seal - Inspection
333 00	Ring Assembly, Air Sealing, No. 4 Bearing, Front (Single Land) - Inspection
333 01	Flange - No. 4 Bearing Air Sealing Ring - Inspection
334 00	Seal, Air, No. 4 Bearing, Front - Inspection
335 00	Synchronizing Linkage, Rear Compressor Variable Stator Vanes - Inspection
336 00	Seal, Air, No. 3 Bearing - Inspection
337 00	Support Assembly, Compressor Stator - Inspection
338 00	No. 4 Bearing Inner Race and Rear Compressor Driveshaft Bearing Journal Diameter - Interference Fit Measurement Using PWA 57856 Gage
339 00	Bearings - Inspection
340 00	Manifold Assemblies, Fuel Supply, Left and Right - Inspection
341 00	Seal Ring, Metal (PN 4036929 and 4036955) - Inspection
342 00	Seal Rings, No. 2, 3 and 4 Bearing Metal - Inspection
342 01	Seal Rings, No. 2, 3 and 4 Bearing Metal - Inspection After Volcanic Ash Ingestion
343 00	Bolt, Internally Relieved - Inspection
344 00	Coupling, Gearbox Driveshaft - Inspection
345 00	Sleeve, Gearbox Drive Gearshaft - Inspection
346 00	Ring, Retaining - Inspection
347 00	Washer, Seal Assembly, No. 3 Bearing, Rear - Inspection
348 00	Stator, Fan Exit - Inspection
349 00	Support Bracket, Strap and Actuating Linkage, Bumper and Carriage, Bleed Valve; Elbow and Sleeve, Air Supply Manifold - Inspection
350 00	Nut, Rear Compressor Driveshaft - Inspection
351 00	Case Set, Compressor, Fourth Through Ninth Stage - Inspection
352 00	Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Inspection
352 01	Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Inspection After Volcanic Ash Ingestion
353 00	Tip Shrouds, Compressor Blade, Fourth Through Thirteenth Stage - Inspection Using PWA 57832 Inspection Gage
354 00	Shroud, Compressor Stator, Seventh Through Twelfth Stage - Inspection

WP/SWP No.	Title
355 00	Stator Segment Assemblies, Compressor, Seventh Through Ninth Stage - Inspection
355 01	Stator Segment Assemblies, Compressor, Seventh Through Ninth Stage - Inspection After Volcanic Ash Ingestion
356 00	Bearings, Rear Compressor, Variable Inlet Vane - Inspection
357 00	Vanes, Rear Compressor, Variable Inlet - Inspection
358 00	Chamber Assembly, Combustion - Inspection
359 00	Support Assembly, First Stage Turbine Stator - Inspection
360 00	Vane Assemblies, Turbine Stator, First Stage - Inspection
361 00	Disk-Drum Rotor Assembly, Rear Compressor (Seventh Through Thirteenth Stage) - Inspection
362 00	Shield, No. 3 Bearing - Inspection
363 00	Heat Shield and Heat Shield Segments, Compressor Stator - Inspection
364 00	Case Assembly, Compressor, Fourth Stage - Inspection
365 00	Shroud Segment Sets, Compressor Stator, Fourth, Fifth, and Sixth Stage - Inspection
366 00	Ring Segments, Fourth Through Sixth Stage - Inspection
367 00	Compressor Stator, Exit - Inspection
368 00	Case Assembly, Compressor, Tenth Through Twelfth Stage - Inspection
369 00	Case Assembly, Compressor Intermediate - Inspection
370 00	Case Assembly, Diffuser - Inspection
371 00	Tierod and Tierod Nuts, Rear Compressor - Inspection
372 00	Tubing, Diffuser Case - Inspection
373 00	Ring Assembly, Air Sealing, No. 4 Bearing, Front (Multiple Lands) - Inspection
374 00	Blades, Compressor Rotor, Fourth Through Thirteenth Stage - Inspection
374 01	Blades, Compressor Rotor, Fourth Through Thirteenth Stage - Inspection After Volcanic Ash Ingestion
375 00	Vanes, Compressor Stator, Fourth, Fifth, and Sixth Stage - Inspection
376 00	Bearings, Compressor Stator Vane, IGV, Fourth, Fifth, and Sixth Stage - Inspection
377 00	Deleted
378 00	Insert, Screw Thread (Igniter Plug Boss Insert) - Inspection
379 00	Baffle, Gearbox - Inspection
380 00	Tube Assembly, No. 2 and 3 Bearing Internal Pressure - Inspection

WP/SWP No.	Title
381 00	Tube, Pressure, No. 2 and 3 Bearing - Inspection
382 00	Tube Assembly, Compressor Bleed - Inspection
383 00	Seat, Bleed Valve Strap - Inspection
384 00	Bumper - Inspection
385 00	Insert, Screw Thread - Inspection
386 00	Bearing Half, Compressor Stator, Fourth and Fifth Stage - Inspection
387 00	Open
388 00	Duct Segments, Compressor, Fourth, Fifth, Sixth and Seventh Stage - Inspection
388 01	Duct Segments, Compressor, Fourth, Fifth, Sixth and Seventh Stage - Inspection After Volcanic Ash Ingestion
388 02	Duct Segments, Compressor, Fourth Through Seventh Stage, Bond of Plasma Sprayed (PWA 279) Abradable Seal - Laser Holographic Inspection
389 00	Key, Compressor, Duct, Fifth, Sixth and Seventh Stage - Inspection
390 00	Rail, Compressor Stator, Seventh Stage and Eighth and Ninth Stage - Inspection
391 00	Washer, Spring Tension, No. 2 Front Seal - Inspection
392 00	Nozzle, No. 2 Bearing - Inspection
393 00	Key Washer, No. 2 Bearing Coupling - Inspection
394 00	Retaining Ring, Gearbox Driveshaft Coupling - Inspection
395 00	Retaining Ring, Gearbox Drive Bevel Gearshaft - Inspection
396 00	Compressor Discharge Manifold Assembly - Inspection
397 00	Ring, Segment, Compressor Stator Support, Tenth Through Twelfth Stage - Inspection
398 00	Bellcrank Assembly, Compressor Stator Linkage - Inspection
399 00	Open

WORK PACKAGE

TECHNICAL PROCEDURES

TUBE-PRESSURE, NO. 3 BEARING DAMPER SEAL SUPPORT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

T.O. 2J-F100-53-7

WP 301 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 3 bearing damper seal support pressure tube assembly.

b. Nick: slight depression or hollow on surface made by mechanical injury.

c. Chafe: wear or blemish caused by rubbing.

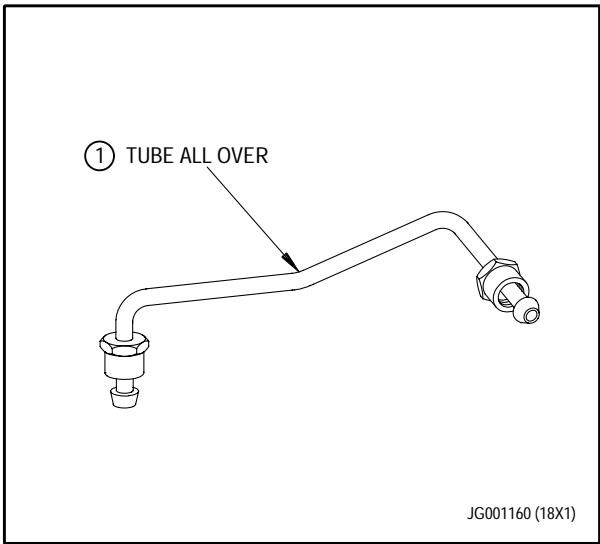
2. TUBING - DEFINITIONS.

- a. Dent: surface depression normally having rounded edges, corners, and bottom caused by the impact of some object.

3. NO. 3 BEARING DAMPER SEAL SUPPORT
PRESSURE TUBE ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Inspect tube assembly. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Tube all over -			
Dents	Maximum depth 5% of nominal tube OD, minimum radius 0.060 inch, no sharp edges	See corrective action.	Replace tube.
Flattening	Maximum 10% of nominal tube OD	See corrective action.	Replace tube.
Nicks, gouges	0.004 inch depth	See corrective action.	Replace tube.

NOTE

Pointed micrometer is required for chafing inspection. Measure tube OD with point of micrometer in cavity or chafed area. Measure tube OD with point of micrometer on tube outer wall immediately adjacent to chafed area. The difference between two dimensions equals depth of chafe.

Chafing	0.003 inch depth, no sharp edges, 180° maximum around tube	See corrective action.	Replace tube.
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Figure 1. No. 3 Bearing Damper Seal Support Pressure Tube Assembly - Inspection

WORK PACKAGE**TECHNICAL PROCEDURES**

**DISK-DRUM ROTOR, REAR COMPRESSOR,
FRONT, ASSEMBLY (FOURTH AND FIFTH STAGE) -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7	29	8A - 8C Added	18	9	29
8	26	8D Blank Added	18	10 Blank	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Disk-Drum Rotor, Rear Compressor, Front, Assembly (Fourth and Fifth Stage) - Repair - - - - -	WP 402 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th and 5th stage rear compressor front disk-drum rotor assembly.

**2. FOURTH AND FIFTH STAGE REAR
COMPRESSOR FRONT DISK-DRUM ROTOR
ASSEMBLY - INSPECTION.**

(See Figures 1, 1A, 1B, and 3.)

- a. Ensure 4th and 5th stage rear compressor front disk-drum rotor assembly has been cleaned per WP 201 00.
- b. Inspect snap diameter for wear or growth at eight equally spaced locations. Calculate average dimension of each snap diameter.
 - (1) Deleted.
 - (2) Replace any disk with growth greater than limits in inspection figure.
- c. Dimensionally inspect assembly per figure 1.
- d. Visually inspect assembly per figure 1.
- e. Fluorescent penetrant inspect assembly for cracks on a system with capability defined in figure 1A. Refer to T.O. 2J-F100-9. No cracks allowed. All crack indications observed are cause for rejection and require Material Review Board (MRB) evaluation.
- f. Eddy current inspect assembly per figure 1B. Refer to T.O. 2J-F100-9.

3. Deleted.

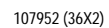


Figure 1. Fourth and Fifth Stage Rear Compressor Front Disk-Drum Rotor Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Knife-edge seals -			
Small upsets and bends	0.050 inch maximum displacement from radial center plane. 0.500 inch in length per knife-edge.	Reparable if final blend meets blend limits per WP 402 00.	Blend repair per WP 402 00.

NOTE

Imbedded honeycomb material appears as smooth, shiny, often raised surface in discrete and/or continuous length. Material is usually confined to knife-edge tip and adjacent corners, and is not separated from adjacent coating by defined lines of demarcation. See figure 3.

Imbedded honeycomb material	Any amount	None	None
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Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Knife-edge seals (continued) -			
Chipped or missing coating	Visible as lost top coating separated from bond coat layer by defined lines of demarcation. See figure 3.	Any amount	Strip and recoat per WP 402 00.
	a. Eight places per knife-edge up to 0.500 inch long separated by two times length of longer chipped area		
	b. Any amount per knife-edge up to 0.100 inch long each separated by two times length of longer chipped area		

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Knife-edge seals (continued) -			
Nicks and dents	Not serviceable	Reparable if final blend meets blend limits per WP 402 00.	Blend repair per WP 402 00.
Cracks	Not serviceable	Not reparable	Replace assembly.
Wear	Average minimum serviceable diameters: Dia C 17.174 inches Dia D 17.274 inches	Average minimum reparable diameters: Dia C 17.158 inches Dia D 17.258 inches	Strip and recoat per WP 402 00.
2. Locking tangs -			
Cracked, bent or damaged	Not serviceable	Not reparable	Replace assembly.
Dents and scratches	0.001 inch depth	0.003 inch depth after blend resulting in wall thickness of 0.053 inch minimum.	Blend repair per WP 402 00.
3. Rear snap diameter -			
Wear	16.628 inches diameter maximum per WP 801 00, Reference 2941.	16.640 inches diameter maximum	Repair per WP 402 00.
Fretting or galling	Acceptable provided limits for growth and wear are met.	See wear limits.	See wear corrective action.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. In tierod holes - Pits, nicks, dents, and scratches	Minor machining imperfections from original manufacture. Refer to T.O. 2-1-111, PWA 362.	Not reparable	Replace assembly.
5. Around tierod holes - Raised metal and circumferential scratches from tierod nut	Not serviceable	0.002 inch deep blends after repair	Remove raised metal and/or blend scratches per WP 402 00.
6. In blade slots - Pits, nicks, scratches, and dents	Not serviceable	Not reparable	Replace assembly.
Fretting	0.001 inch depth	Not reparable	Replace assembly.
7. All over (except in and around tierod holes, in blade slots, and knife-edge seals) - Pits, nicks, and dents	0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 402 00
Scratches	0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 402 00

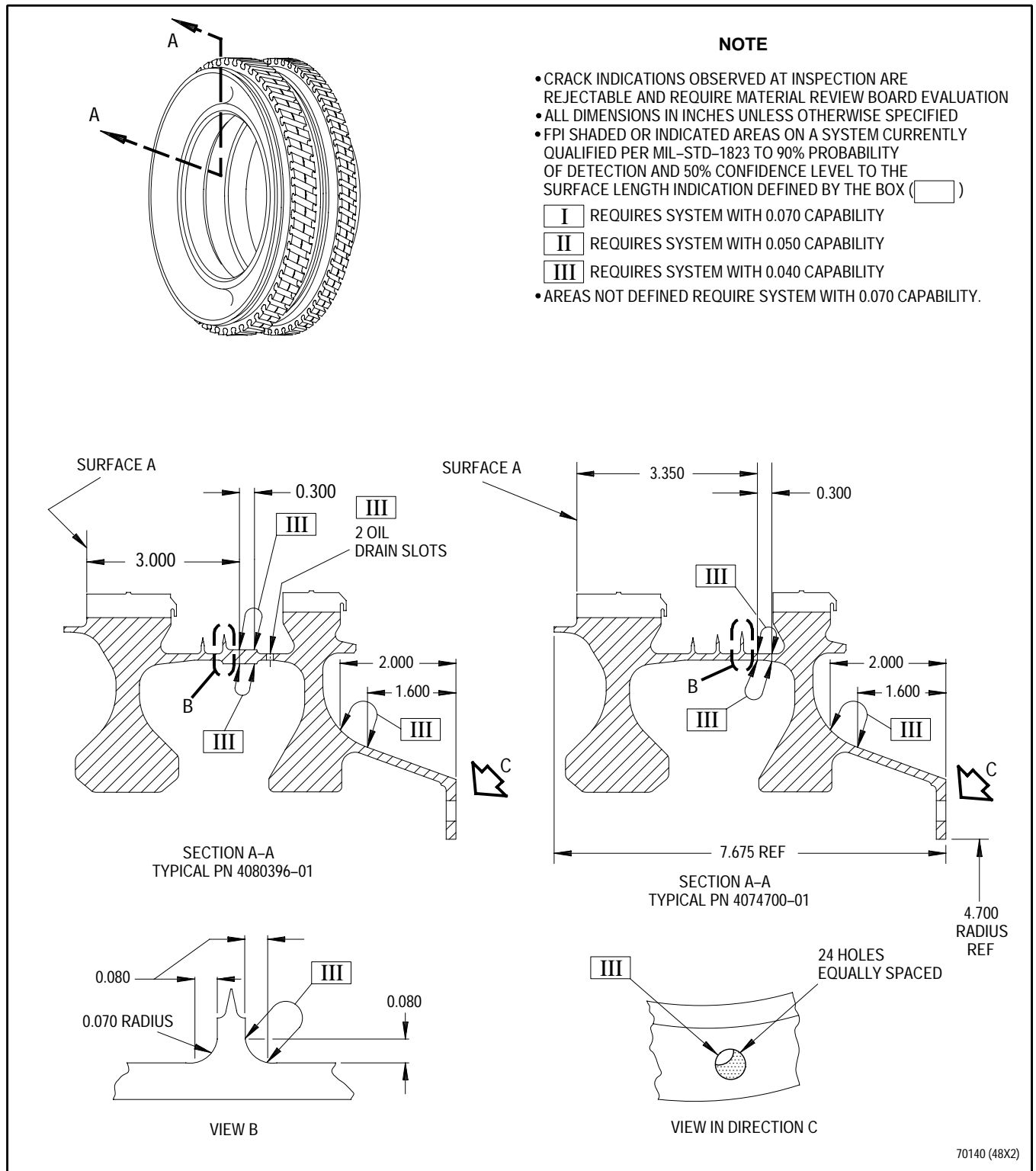


Figure 1A. Fourth and Fifth Stage Rear Compressor Front Disk-Drum Rotor Assembly - Required Fluorescent Penetrant System Capability

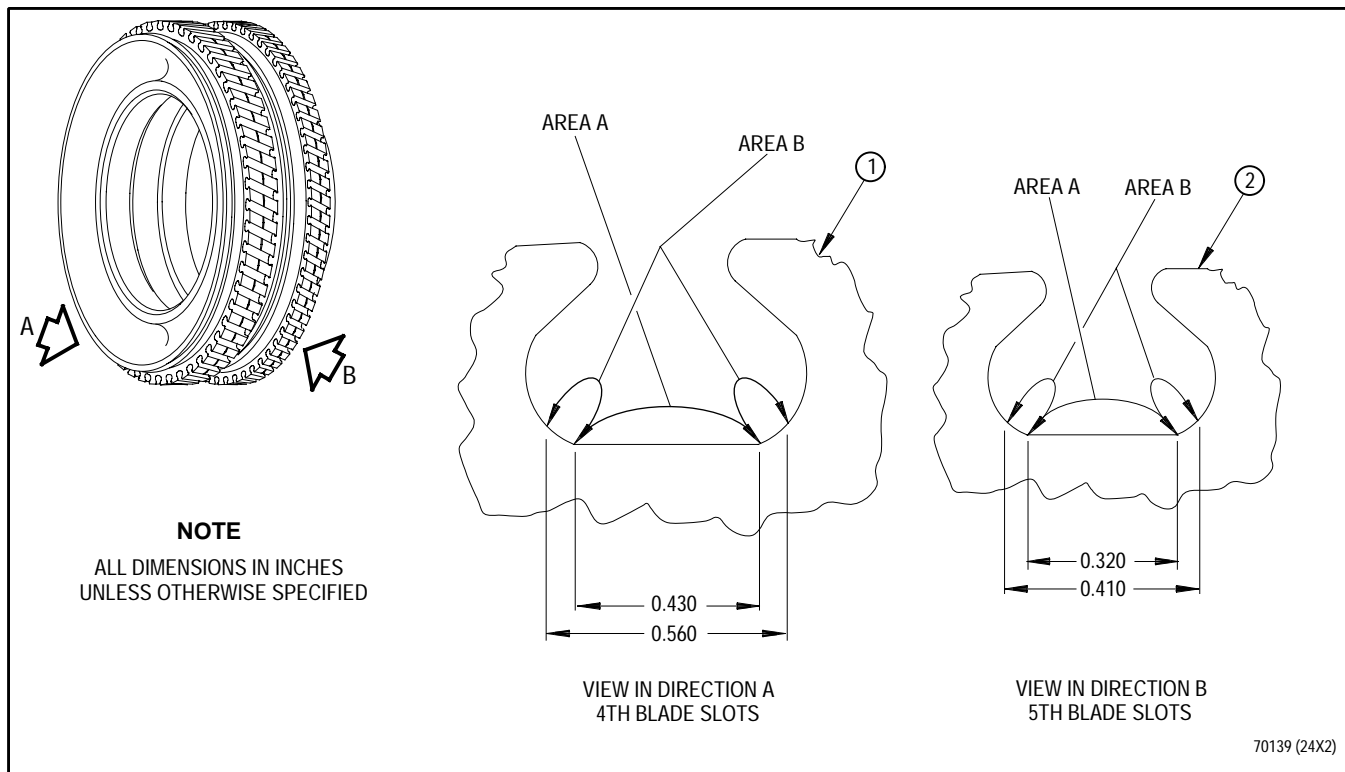


Figure 1B. Fourth and Fifth Stage Rear Compressor Front Disk-Drum Rotor Assembly - Eddy Current Inspection

Legend for figure 1B

Inspection Area	*Maximum Flaw Depth (Inch)	Flaw Surface Orientation	SRL System Rejection Limit		Corrective Action
			(Counts)	(A50-inch)	
1. Fourth blade slots -					
Area A	0.008	Axial	TBD	TBD	Replace front disk-drum rotor assembly.
Area B	0.015	Axial	TBD	TBD	Replace front disk-drum rotor assembly.
2. Fifth blade slots -					
Area A	0.010	Axial	TBD	TBD	Replace front disk-drum rotor assembly.
Area B	0.015	Axial	TBD	TBD	Replace front disk-drum rotor assembly.

*Eddy current inspect on system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level for required flaw depth.

Figure 2. Deleted.

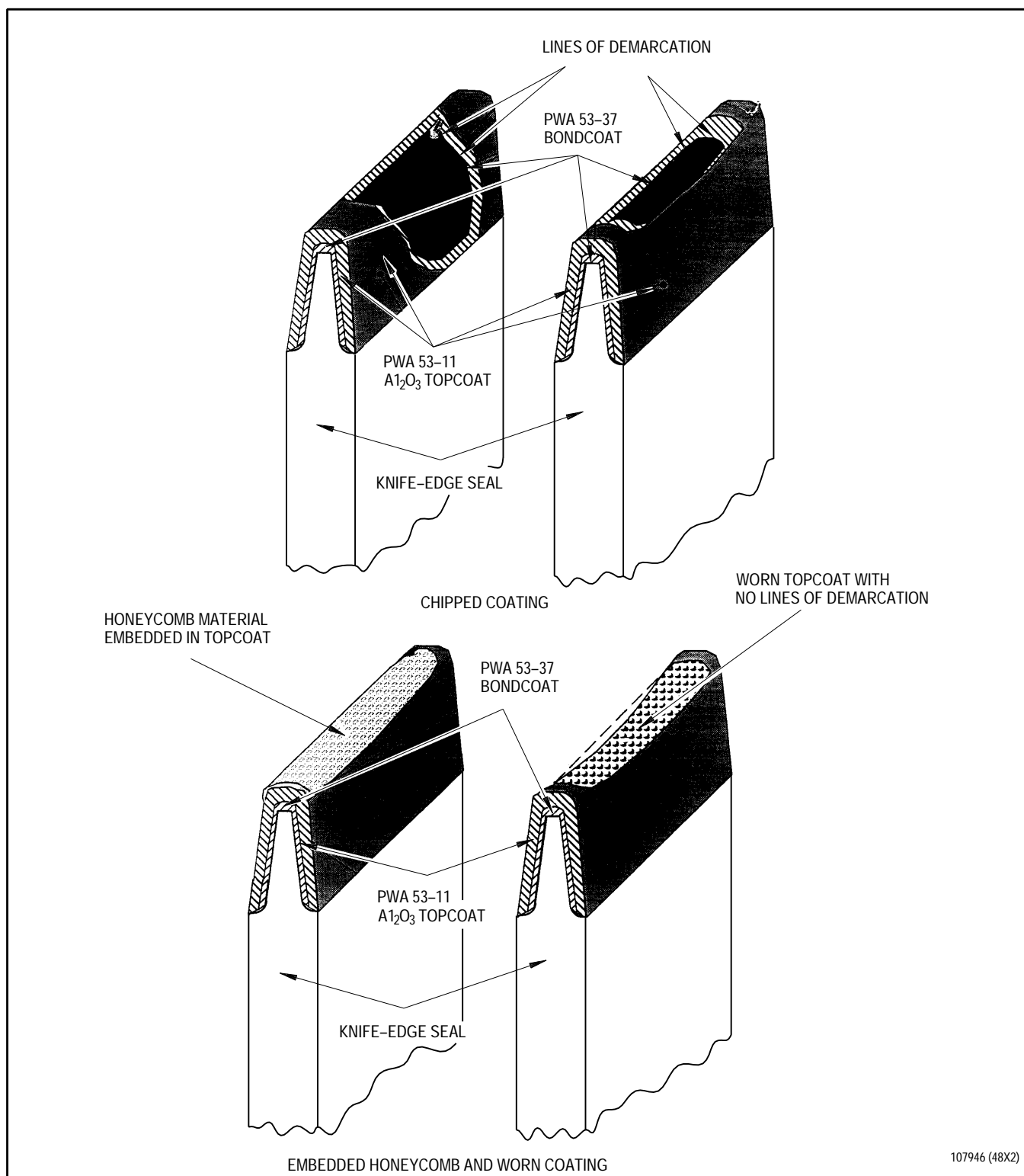


Figure 3. Fourth and Fifth Stage Rear Compressor Front Disk-Drum Rotor Assembly - Chipped Coating, Embedded Honeycomb and Worn Coating

WORK PACKAGE

TECHNICAL PROCEDURES

NUTS, BEARING RETAINING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	4 - 6	7
2	7				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Nuts, Bearing Retaining - Repair - - - - -	WP 403 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of bearing retaining nuts (PN 4001860, 4001863, 4001874, 4001878, 4001883, 4001885, 4002513, 4007568, and 4010237).

2. BEARING RETAINING NUT - INSPECTION.

(See Figures 1 through 9.)

- a. Ensure bearing retaining nuts have been cleaned per WP 201 00.
- b. Magnetic particle inspect nuts for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect nuts using white light and 3X magnifying glass for burrs, galling, scoring, and tool damage. Blend damaged areas per WP 403 00.
- d. Inspect threaded areas for damage. Replace unserviceable nuts.
- e. Inspect all surfaces of PN 4001860 and 4010237 nuts for damage to nickel cadmium plating. Replace plating as required per WP 403 00.
- f. Inspect PN 4001883, 4002513, and 4007568 nuts for damage to silver plating. (See figures 5, 7, and 8.) Replace plating as required per WP 403 00.
- g. Inspect antigalling compound on PN 4001863, 4001874, 4001878, 4001885, and 4010237 nuts. Replace antigalling compound as required.

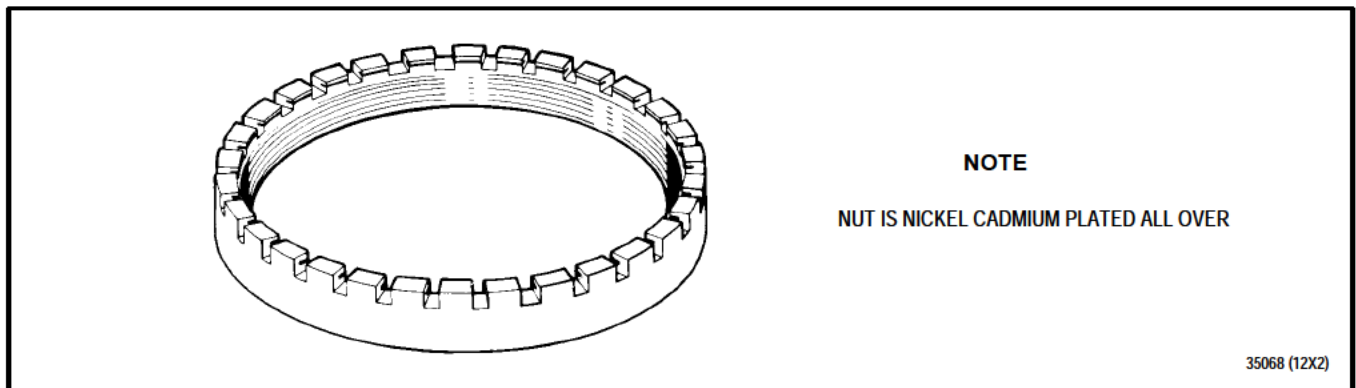
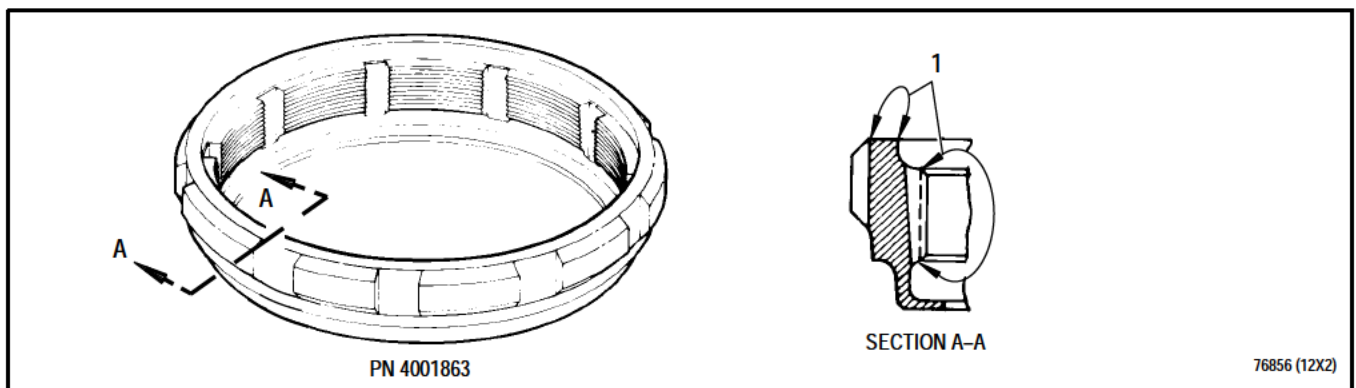


Figure 1. Bearing Retaining Nut (PN 4001860) - Inspection



1. Antigalling compound

Figure 2. Bearing Retaining Nut (PN 4001863) - Inspection

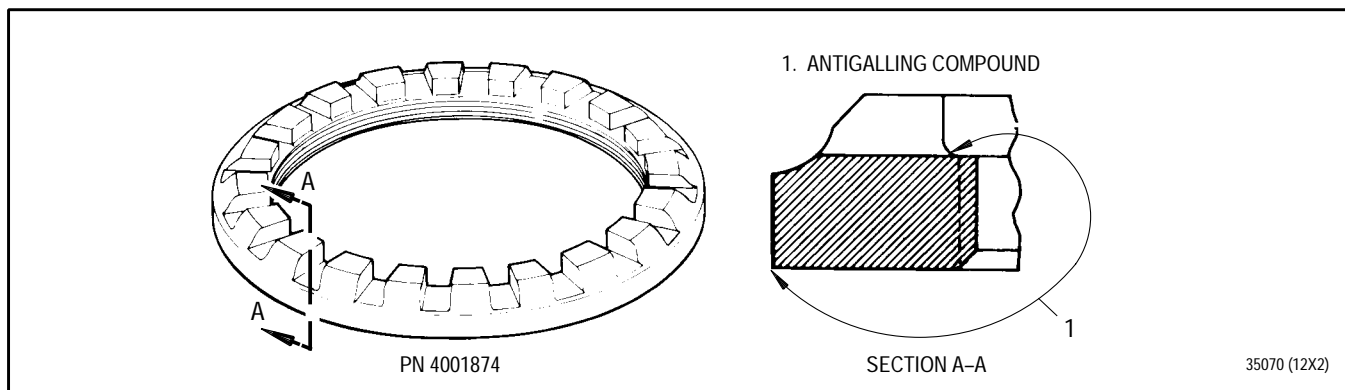


Figure 3. Bearing Retaining Nut (PN 4001874) - Inspection

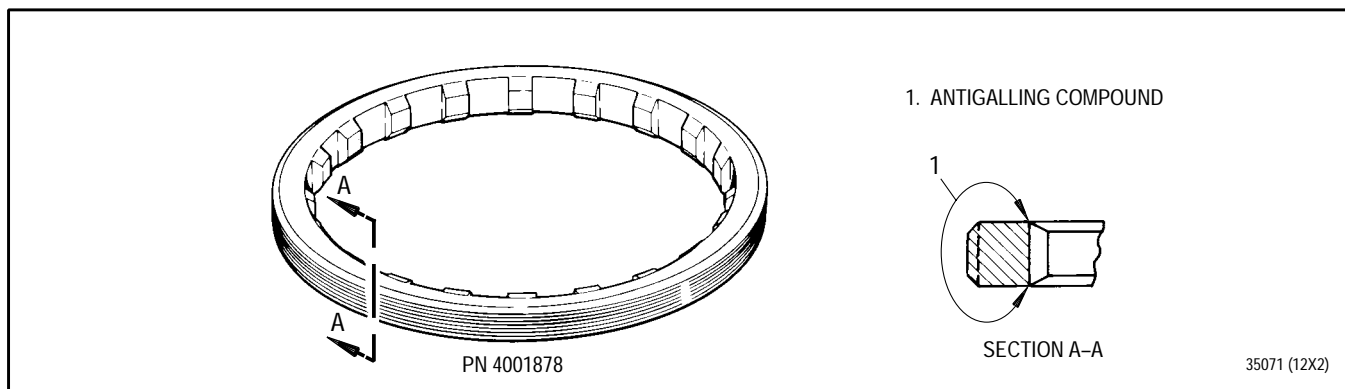


Figure 4. Inverted Spanner Nut (PN 4001878) - Inspection

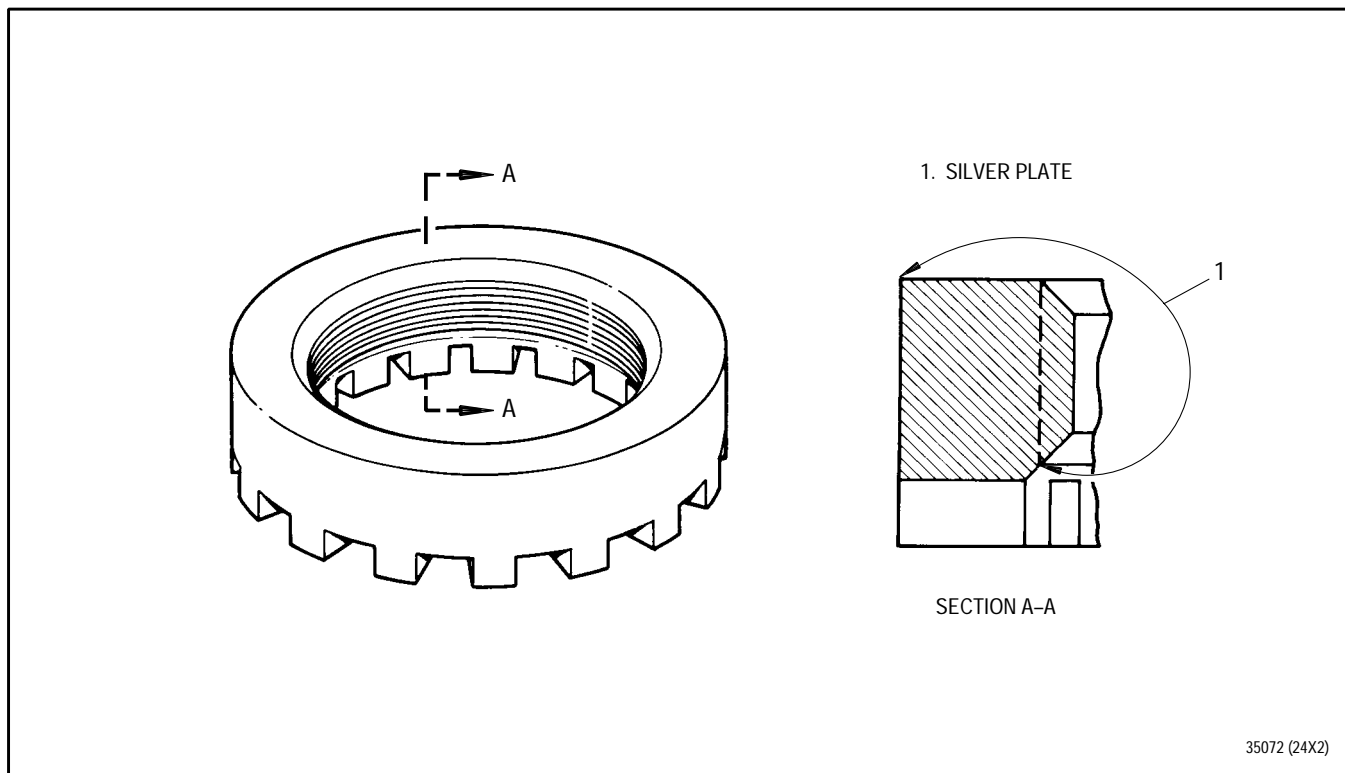


Figure 5. Plain Round Nut (PN 4001883) - Inspection

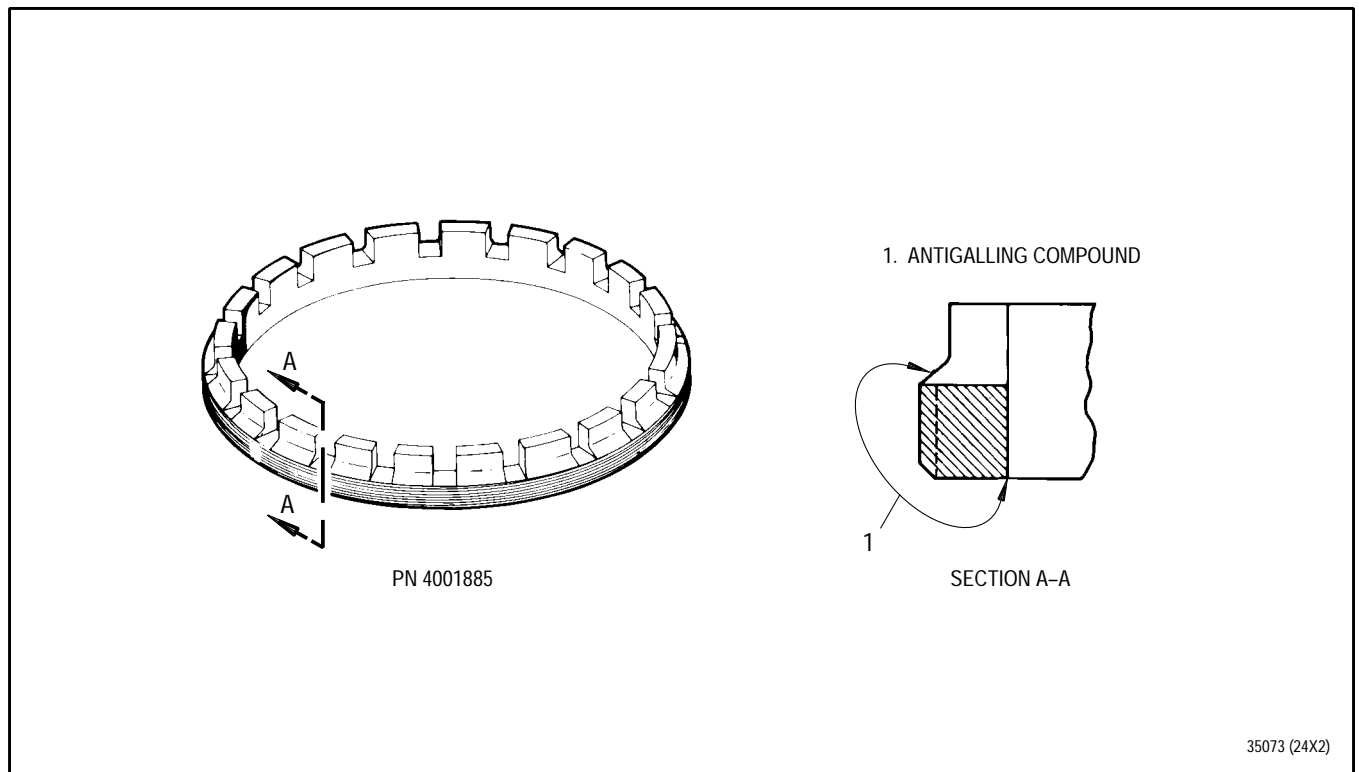


Figure 6. Bearing Retaining Nut (PN 4001885) - Inspection

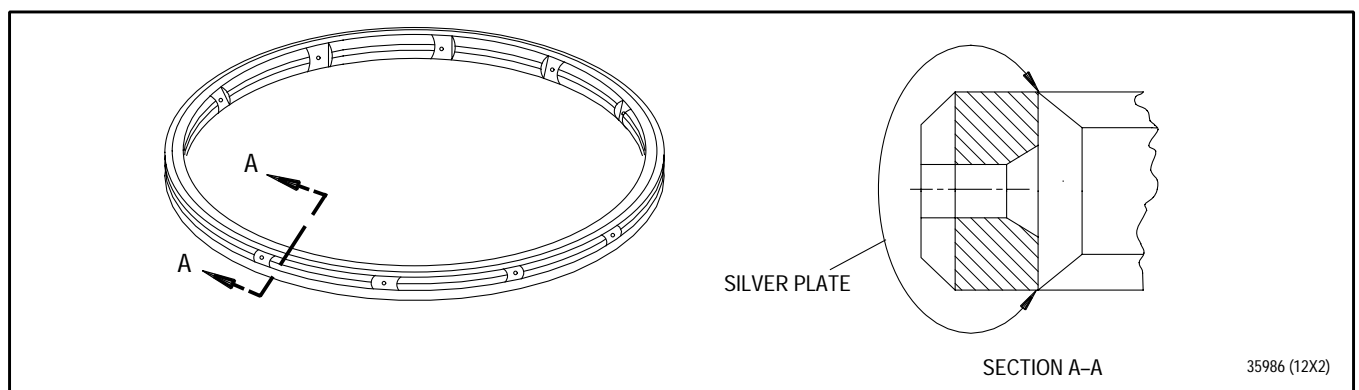


Figure 7. Bearing Retaining Nut (PN 4002513) - Inspection

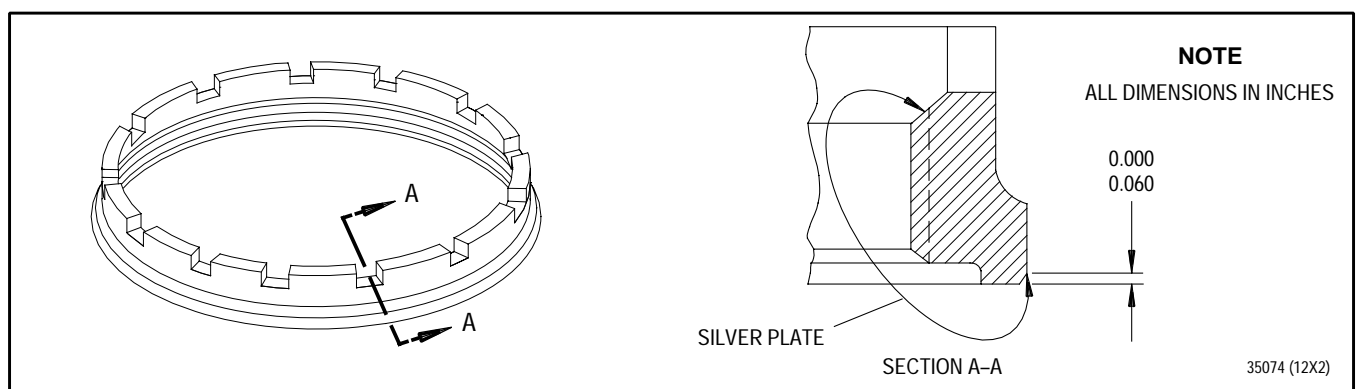


Figure 8. Bearing Retaining Nut (PN 4007568) - Inspection

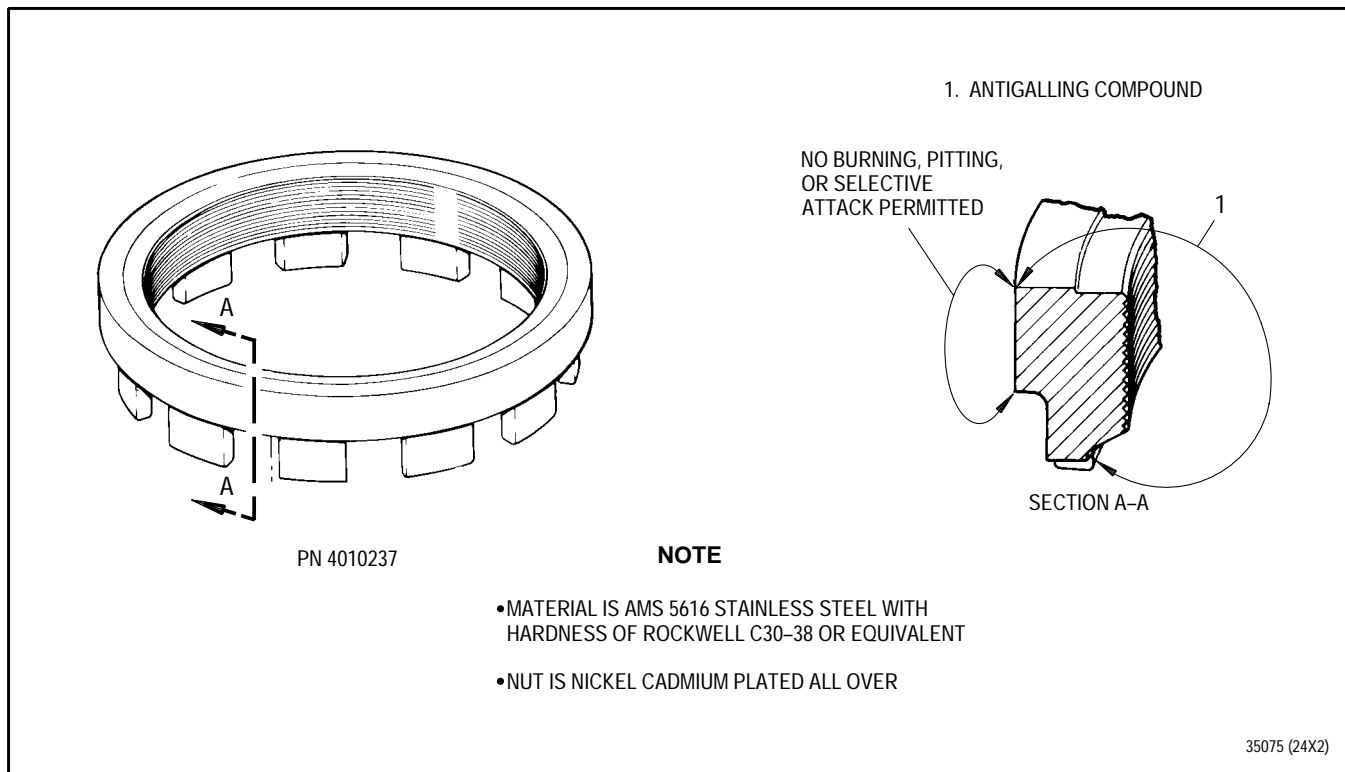


Figure 9. Bearing Retaining Nut (PN 4010237) - Antigalling Compound and Nickel-Cadmium Plate Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

LOCK, REAR COMPRESSOR DRIVESHAFT NUT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	0

T.O. 2J-F100-53-7

WP 304 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

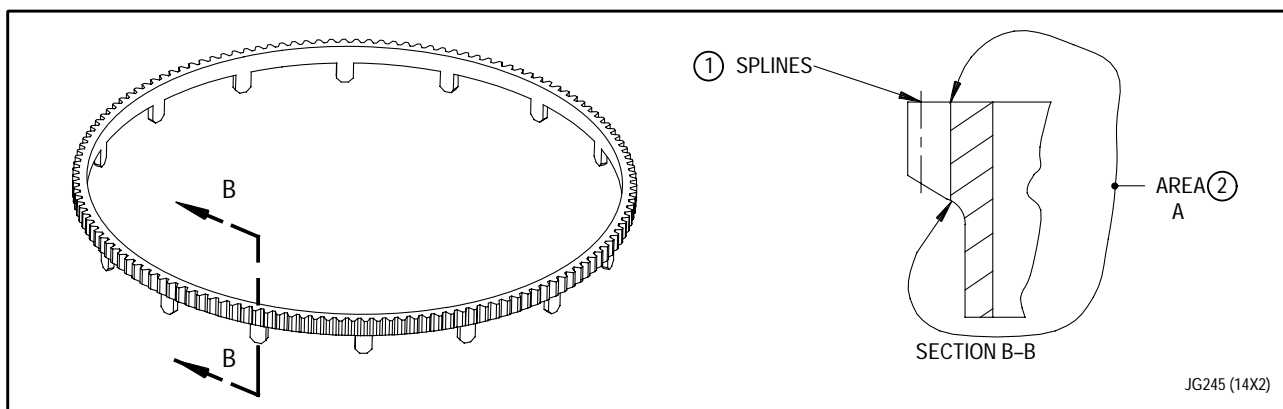
1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor driveshaft nut lock.

2. REAR COMPRESSOR DRIVESHAFT NUT LOCK - INSPECTION.

(See Figure 1.)

- a. Inspect the lock. (See figure 1.)



Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
1. Splines -			
Pits, nicks dents	Not serviceable	All pickup and high metal must be removed.	Remove high metal and pickup per WP 404 00.
2. Areas without splines (Area A) -			
Pits, nicks dents	Not serviceable	Up to 0.015 inch depth and 0.125 inch maximum diameter, damage to be separated by 0.250 inch minimum, up to eight locations allowed, no sharp edges	Blend sharp edges per WP 404 00.
Wear, chafing	Up to 0.005 inch depth	Not reparable	Replace nut lock.
Cracks	Not serviceable	Not reparable	Replace nut lock.

WORK PACKAGE**TECHNICAL PROCEDURES****DISK AND HUB, COMPRESSOR, SIXTH STAGE, ASSEMBLY -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4 Blank	29	8A - 8C Added	18
2	21	5 - 6A	29	8D Blank Added	18
2A - 2B Added	21	6B	21	9	29
3	29	7 - 8	21	10 Blank	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Disk and Hub, Compressor, Sixth Stage, Assembly - Repair	WP 405 00
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

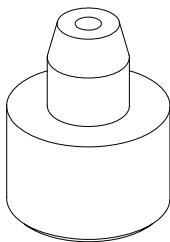
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

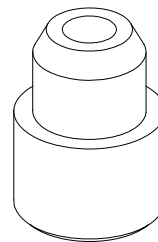
Paragraph	Function - Tool Nomenclature	Tool Number
2	SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - INSPECTION	
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71304
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71305
	MASK, COVER ASSEMBLY - - - - -	PWA 71306

ILLUSTRATED SUPPORT EQUIPMENT



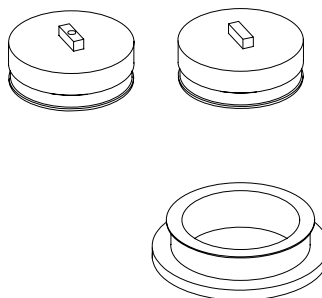
PWA 71304 -C

Figure T1. PWA 71304 MASK PLUG



PWA 71305 -C

Figure T2. PWA 71305 MASK PLUG



PWA 71306 -C

Figure T3. PWA 71306 MASK

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 6th stage compressor disk and hub assembly.

2. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - INSPECTION.

(See Figures 1, 1A, and 1B.)

- a. Ensure 6th stage compressor disk and hub assembly has been cleaned per WP 201 00.

- b. Inspect disk snap diameter for wear or growth at eight equally spaced locations per snap diameter. Calculate average dimension of each snap diameter.

(1) Any snap diameter which has been repaired one time and then engine run shall not have the same snap repaired again.

(2) Replace any disk with growth greater than limits in inspection figure.

- c. Dimensionally inspect disk and hub assembly per figure 1.
- d. Visually inspect disk and hub assembly per figure 1.
- e. If heat shield is not installed, go to step g.
- f. Mask hub and disk assembly as follows:

(1) Insert PWA 71304 plugs into two 0.352 to 0.362 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.

(2) Insert PWA 71305 plugs into eight 0.495 to 0.505 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.

(3) Mask hub rear bore with detail-1 of PWA 71306 cover, and front bore with detail-2.

- g. Fluorescent penetrant inspect disk and hub assembly for cracks on a system with capability defined in figure 1A. Refer to T.O. 2J-F100-9. No cracks allowed. All crack indications observed are cause for rejection and require Material Review Board (MRB) evaluation.

- h. If used, remove mask plugs.



Failure to remove penetrant from internal cavities may lead to fatigue debit on titanium hub.

- i. If plugs were not used, power flush internal cavities to remove all residual penetrant.
- j. Eddy current inspect disk and hub assembly per figure 1B. Refer to T.O. 2J-F100-9.

3. Deleted.

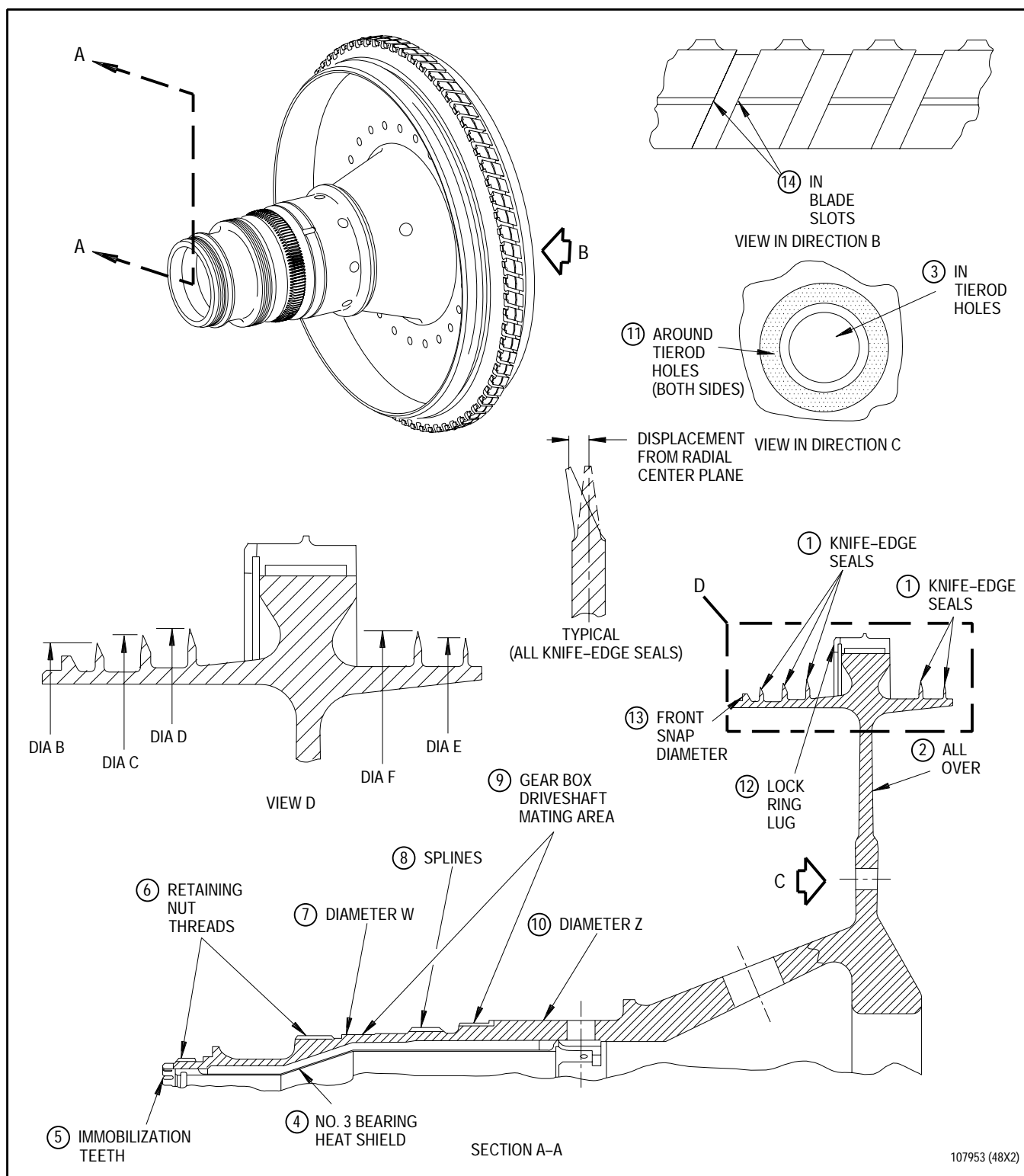


Figure 1. Sixth Stage Compressor Disk and Hub Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Knife-edge seals -			
Small upsets and bends	0.050 inch maximum displacement from radial center plane. 0.500 inch in length per knife-edge.	Reparable if final blend meets blend limits per WP 405 00.	Blend repair per WP 405 00.

NOTE

Imbedded honeycomb material appears as smooth, shiny, often raised surface in discrete and/or continuous length. Material is usually confined to knife-edge tip and adjacent corners, and is not separated from adjacent coating by defined lines of demarcation. See figure 3.

Imbedded honeycomb material	Any amount	None	None
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Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Knife-edge seals (continued) -			
Chipped or missing coating	Visible as lost top coating separated from bond coat layer by defined lines of demarcation. See figure 3. a. Eight places per knife-edge up to 0.500 inch long separated by two times length of longer chipped area b. Any amount per knife-edge up to 0.100 inch long each separated by two times length of longer chipped area.	Any amount	Strip and recoat per WP 405 00.
Nicks and dents	Not serviceable	Reparable if final blend meets blend limits per WP 405 00.	Blend repair per WP 405 00.
Cracks	Not serviceable	Not reparable	Replace assembly.
Wear	Average minimum serviceable diameters: Dia B 17.174 inches Dia C 17.274 inches Dia D 17.374 inches Dia E 17.274 inches Dia F 17.374 inches	Average minimum reparable diameters: Dia B 17.158 inches Dia C 17.258 inches Dia D 17.358 inches Dia E 17.258 inches Dia F 17.358 inches	Strip and recoat per WP 405 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. All over (except in and around tierod holes, in blade slots and knife-edge seals) -			
Scratches	0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 405 00.
Pits, nicks, and dents	0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 405 00.
3. In tierod holes -			
Pits, nicks, dents, and scratches	Minor machining imperfections from original manufacture. Refer to T.O. 2-1-111, PWA 362.	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. No. 3 bearing heat shield -			
Pits, nicks, and scratches	Serviceable provided metal is not torn or worn through.	Not repairable	Replace heat shield.
Dents	0.050 inch depth	Not repairable	Replace heat shield.
5. Immobilization teeth -			
Damage	0.010 inch	0.040 inch damage to front edge of teeth	Blend repair per WP 405 00.
		Two damaged teeth may be removed by machining. Repaired teeth shall not be adjacent.	Machine to remove damaged teeth.
6. Retaining nut threads -			
Damage	Not serviceable	See corrective action.	Blend repair per WP 405 00.
7. Diameter W -			
Hardface wear	Per WP 801 00, Reference 2907.	See corrective action.	Replace hardface per WP 405 00.
Hardface chipping	0.100 inch length, 0.100 inch width, 0.005 inch depth, two places, no raised material or burred edges allowed	See corrective action.	Hand stone burred edges or replace hardface per WP 405 00.
Fretting or galling	Acceptable provided limits for growth and wear are met	Not repairable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
8. Splines - Chips, pits, nicks, and dents	Not serviceable	See corrective action.	Remove pickup and raised metal using fine stone.
9. Gearbox driveshaft mating area - Wear on hardface	Per WP 801 00, References 2908 and 2909	See corrective action.	Replace hardface per WP 405 00.
10. Diameter Z - Hardface wear	Per WP 801 00, Reference 2923	See corrective action.	Replace hardface per WP 405 00.
Hardface chipping	0.100 inch length, 0.100 inch width, 0.005 inch depth, two places, no raised material or burred edges allowed	See corrective action.	Hand stone burred edges or replace hardface per WP 405 00.
Fretting or galling	Acceptable provided limits for growth and wear are met.	See corrective action.	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
11. Around tierod holes -			
Pits, nicks, dents, and scratches	Minor machining imperfections from original manufacture per T.O. 2-1-111, PWA 362	Not repairable	Replace assembly.
12. Lock ring lugs -			
Cracked, bent, or damaged	Not serviceable	Not repairable	Replace assembly.
Pits, nicks, dents, and scratches	0.001 inch depth	0.003 inch depth after blending resulting in wall thickness of 0.053 inch	Blend repair per WP 405 00.
13. Front snap diameter -			
Growth	16.646 inch diameter	Not repairable	Replace assembly.
Wear	16.636 inch diameter minimum	See corrective action.	Strip and recoat per WP 405 00.
Fretting or galling	Acceptable provided limits for growth and wear are met.	Not repairable	Replace assembly.
Chipped or missing coating	Serviceable provided chip does not penetrate parent metal and chipping is less than 10% total coating.	Not repairable	Replace assembly.
14. In blade slots -			
Pits, nicks, scratches, and dents	Not serviceable	Not repairable	Replace assembly.
Fretting	0.0005 inch depth	Not repairable	Replace assembly.

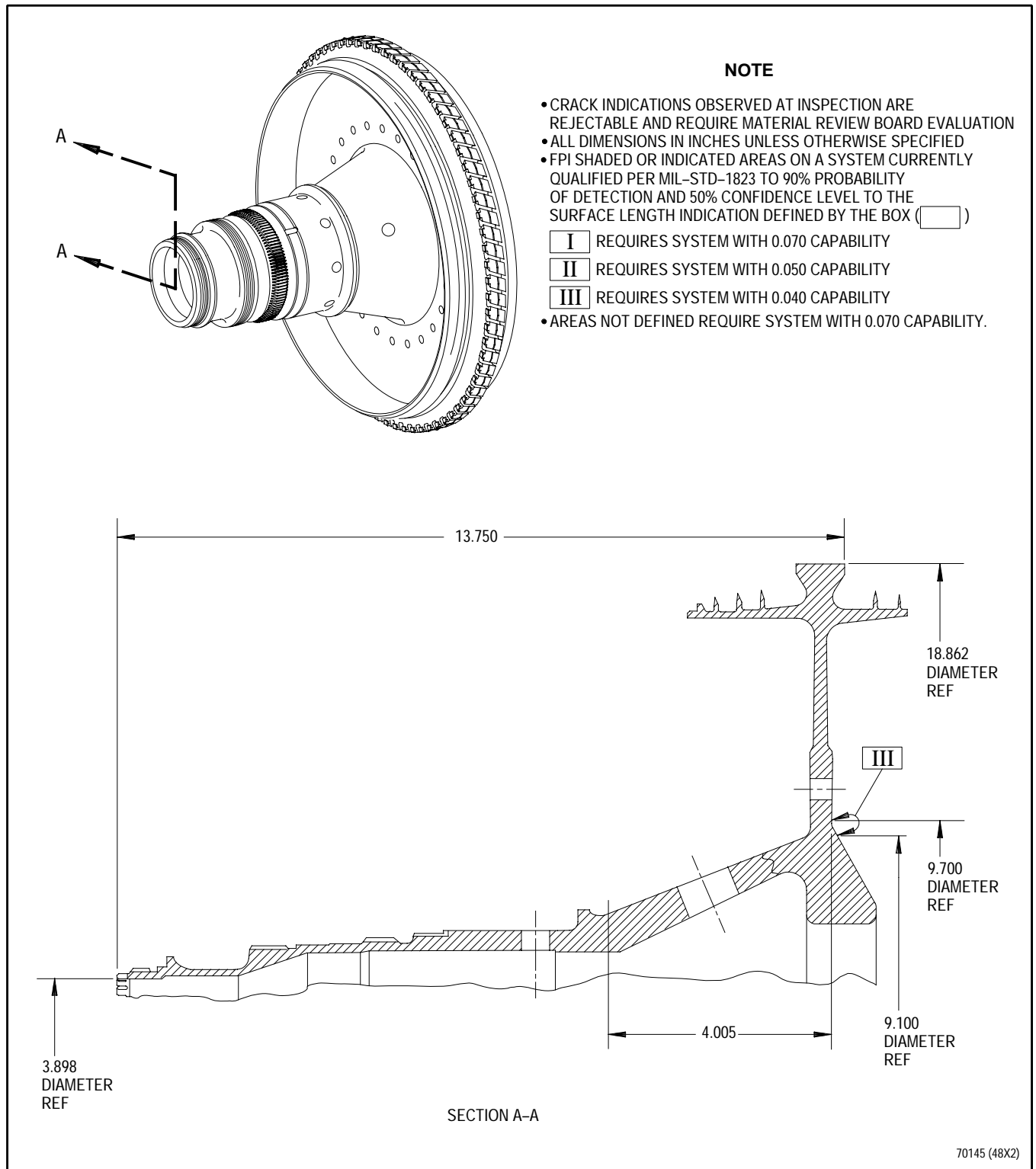


Figure 1A. Sixth Stage Compressor Disk and Hub Assembly - Required Fluorescent Penetrant System Capability

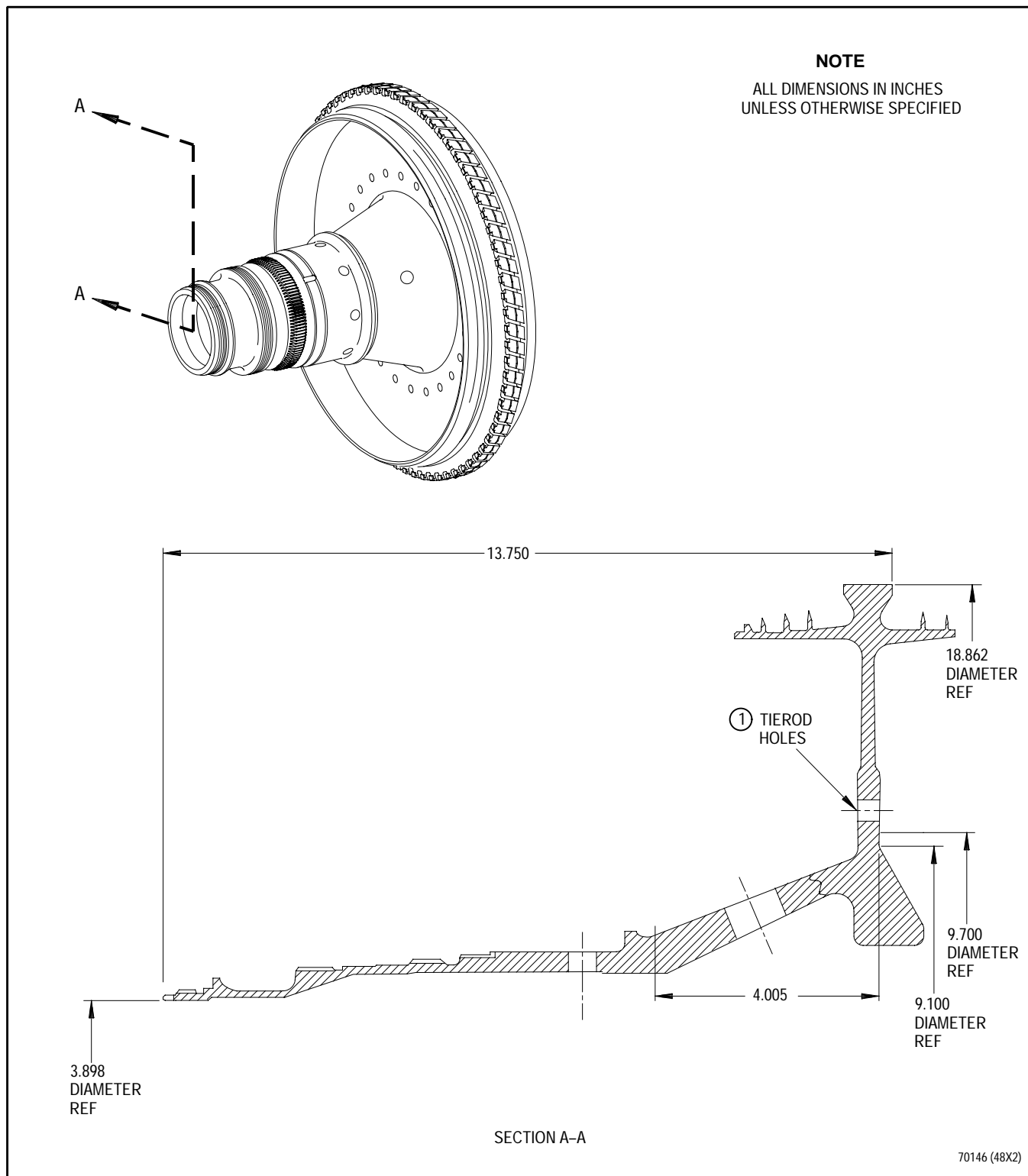


Figure 1B. Sixth Stage Compressor Disk and Hub Assembly - Eddy Current Inspection

Legend for figure 1B

Inspection Area	*Maximum Flaw Depth (Inch)	Flaw Surface Orientation	SRL System Rejection Limit		Corrective Action
			(Counts)	(A50-inch)	
1. Tierod holes -	0.015	Axial	TBD	TBD	Replace disk and hub assembly.

*Eddy current inspect on system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level for required flaw depth.

Figure 2. Deleted.

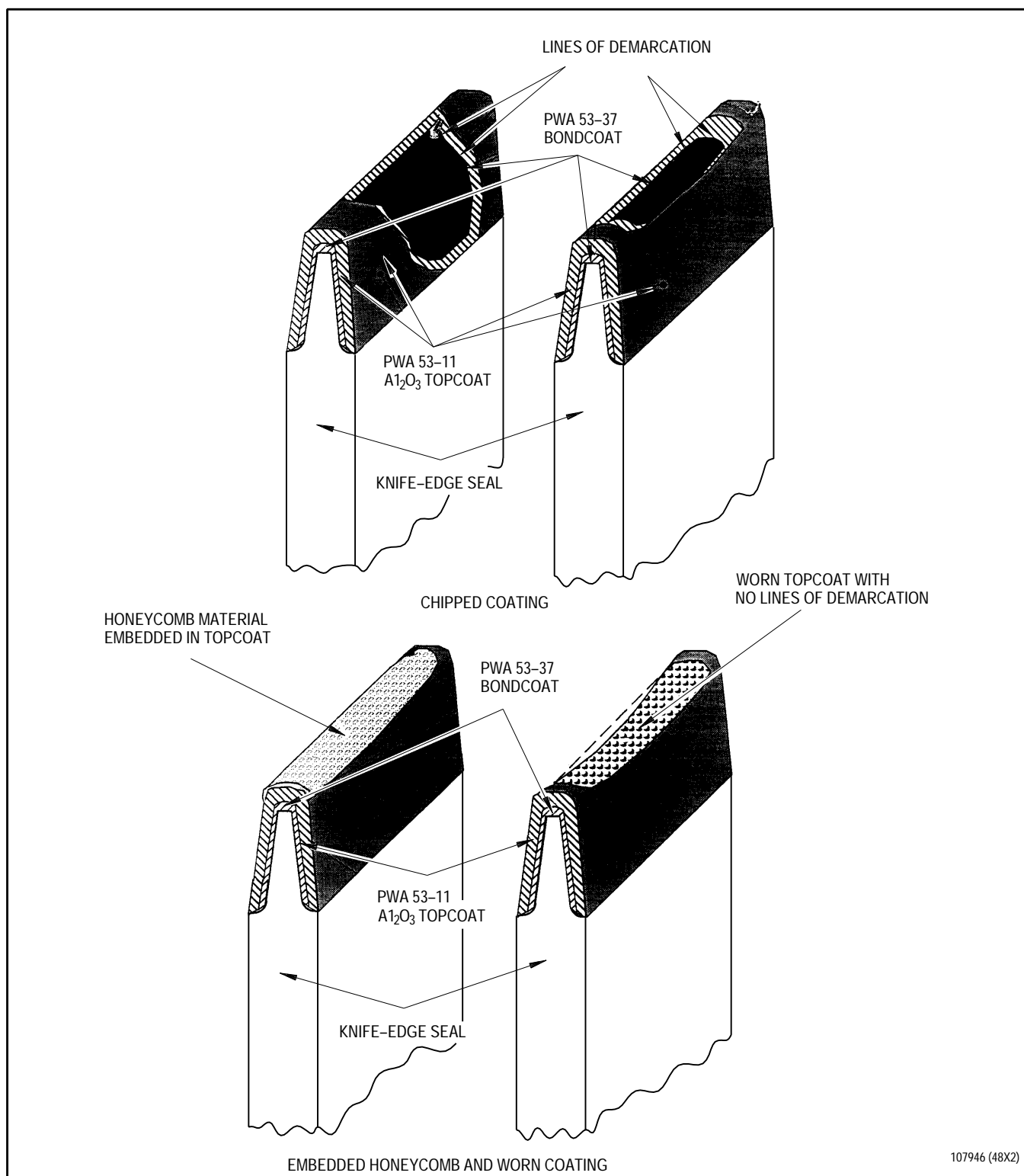


Figure 3. Sixth Stage Compressor Disk and Hub Assembly - Chipped Coating and Embedded Honeycomb and Worn Coating

WORK PACKAGE

TECHNICAL PROCEDURES

SEATS, NO. 2, 3, AND 4 BEARING SEAL -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2		5			
3 - 9		0			
10		5			
11		0			
12 Blank		0			

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2, 3, and 4 bearing seal seats.

2. NO. 2, 3, AND 4 BEARING SEAL SEATS - INSPECTION.

(See Figure 1.)

- a. Inspect bearing seal seats for cracks, using fluorescent penetrant method. Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

Hand lapping is permissible when preparing seat surface for optical flat and monochromatic light check. This procedure is not required for seals that successfully accomplish a vacuum leak check.

- b. Visually inspect bearing seal seats using white light and 3X magnifying glass for surface damage and wear. (See figure 1.)
- c. A 0.030 inch scribe shall be used to feel all surface defects. If defect can be felt with a scribe, part is not acceptable without repair.

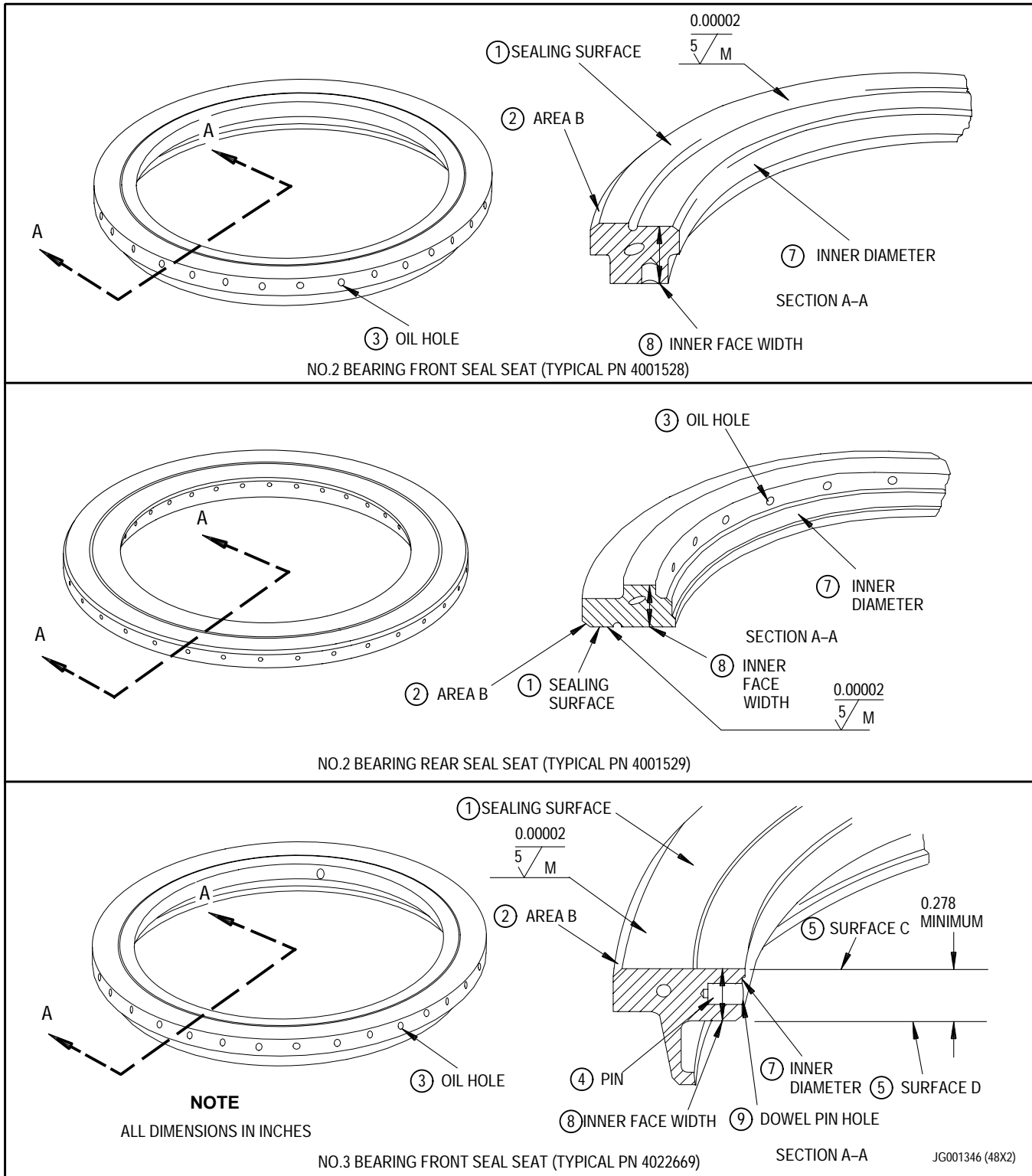


Figure 1. No. 2, 3, and 4 Bearing Seal Seats - Inspection (Sheet 1 of 2)

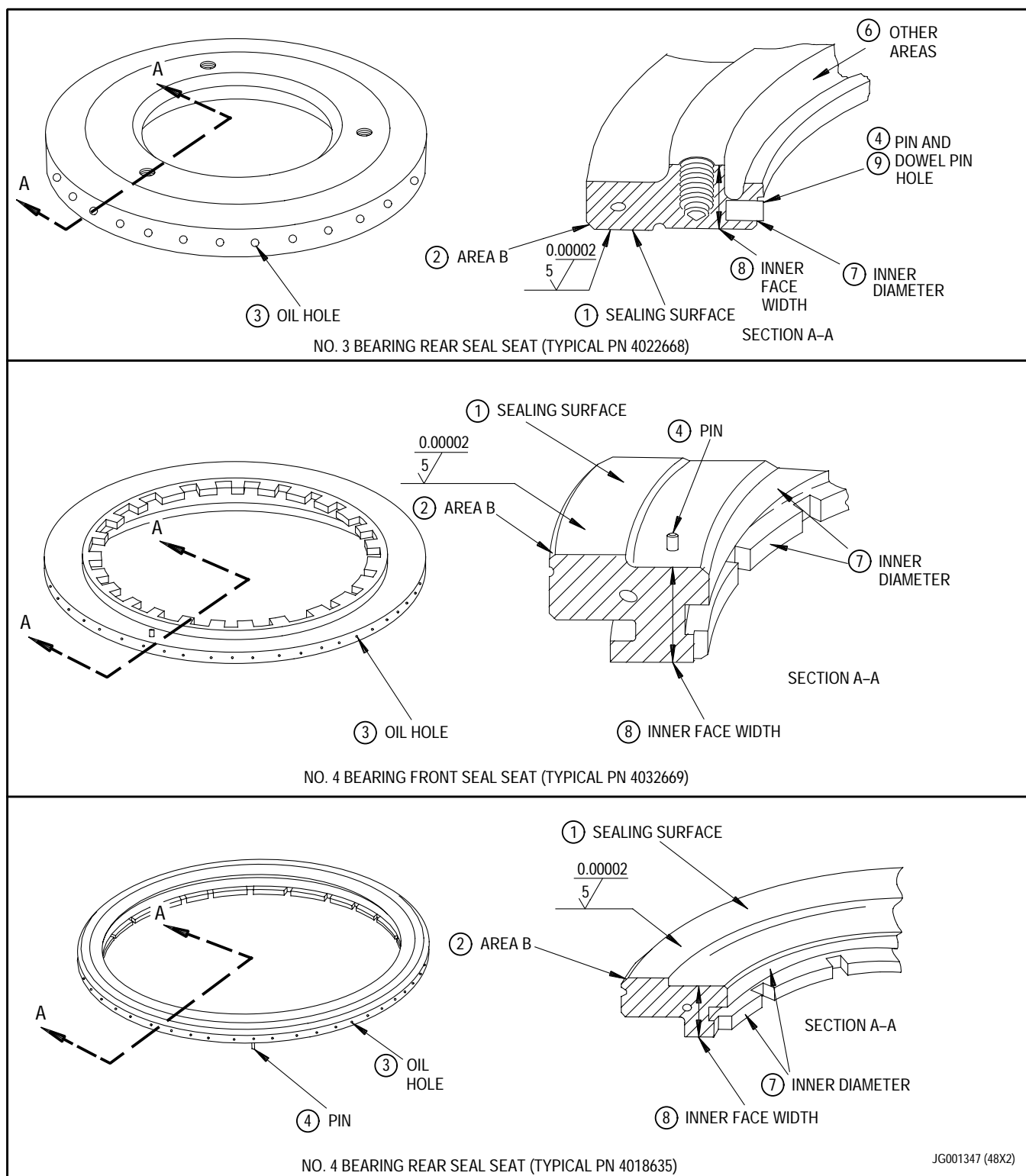


Figure 1. No. 2, 3, and 4 Bearing Seal Seats - Inspection (Sheet 2 of 2)

Legend for figure 1 (Sheets 1 and 2)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Sealing surface -			
Pitted	a. 0.010 inch across longest dimension b. Pits shall be at least 1.000 inch apart. c. Maximum of 3 pits allowed.	See corrective action.	Flame deposition coat seat pitted in excess of serviceable limits per WP 406 00.
Scored	Not serviceable	0.003 inch depth provided scoring does not penetrate parent material	Flame deposition coat surface per WP 406 00.
Cracks	Shall not extend into base material. Reject seat with cracks in base material.	See corrective action.	Replace seal seat.
Nicks and dents (without protruding material)	Serviceable	Not applicable	Not applicable
Nicks and dents (with protruding material)	Not serviceable	0.002 inch minimum thickness flameplate shall remain after lapping	Lap surface per WP 406 00.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Sealing surface - (continued)			
Scratches across sealing surface	a. 0.001 inch depth b. 0.001 inch width	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap to remove high spots. Complete scratch removal unnecessary per WP 406 00.
Chips	a. 0.010 inch length b. 0.010 inch radial width c. Chips shall not be closer together than 0.125 inch. d. Combined length of all chips shall not exceed 0.400 inch.	See corrective action.	Flame deposition coat seat chipped in excess of serviceable limits per WP 406 00.
Wear grooves	Shall not be felt with 0.030 inch scribe	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap surface per WP 406 00.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Sealing surface - (continued)			
NOTE			
Do not confuse unevenness with oxidation discoloration or carbon deposits (smear).			
Inspect surface finish and flatness.	Sealing surfaces shall exhibit uniform contrast all around. Blotchy carbon deposits permissible provided appearance is uniform and cannot be felt with a 0.030 inch scribe.	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap surface per WP 406 00.
2. Area B - Chipped	Acceptable provided chipping is outside seal contact area and does not exceed 0.0625 inch width.	See corrective action.	Flame deposition coat seat in excess of serviceable limits per WP 406 00.
3. Oil holes - Blocked	Not serviceable	See corrective action.	Remove obstruction.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. Pin -			
Loose	Not serviceable	0.081 inch diameter maximum	Replace pin or repair hole per WP 406 00.
Bent	Not serviceable	Not reparable	Replace pin per WP 406 00.
Nicks and scratches	Not serviceable	0.002 inch depth, or not to reduce pin diameter more than 0.002 inch.	Replace pin per WP 406 00.
5. Surface C or D -			
Worn	0.278 inch minimum	See corrective action.	Plate repair per WP 406 00.
6. Other areas -			
Nicks, dents, and burrs	0.030 inch depth	See corrective action.	Blend repair per WP 406 00.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. Inner diameter - Wear	See WP 801 00.	4.096 inch diameter maximum (No. 2 front) 4.015 inch diameter maximum (No. 2 rear) 4.336 inch diameter maximum (No. 3 front) 5.615 inch diameter maximum (No. 3 rear) 6.559 inch diameter maximum (No. 4 front) 6.473 inch diameter maximum (No. 4 rear)	Nickel plate repair per WP 406 00.
8. Inner face width - Wear	0.399 inch (No. 2 front) 0.380 inch (No. 2 rear) 0.278 inch (No. 3 front) 0.359 inch (No. 3 rear) 0.364 inch (No. 4 front) 0.329 inch (No. 4 rear)	0.391 inch (No. 2 front) 0.374 inch (No. 2 rear) 0.2725 inch (No. 3 front) 0.351 inch (No. 3 rear) 0.356 inch (No. 4 front) 0.321 inch (No. 4 rear)	Nickel or chromium plate repair per WP 406 00.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
9. Dowel pin hole - Wear	Not serviceable	0.1384 inch diameter maximum (No. 3 front and rear)	Repair hole per WP 406 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SEATS, NO. 2, 3, AND 4 BEARING SEALS -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 9		8			
10 Blank		8			

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of No. 2, 3, and 4 bearing seal seats after volcanic ash ingestion.

2. INSPECTION.

(See Figure 1.)

- a. Inspect bearing seal seats for cracks, using fluorescent penetrant method. Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

Hand lapping is permissible when preparing seat surface for optical flat and monochromatic light check. This procedure is not required for seals that successfully accomplish a vacuum leak check.

- b. Visually inspect bearing seal seats using white light and 3X magnifying glass for surface damage and wear. (See figure 1.)
- c. A 0.030 inch scriber shall be used to feel all surface defects. If defect can be felt with a scriber, part is not acceptable without repair.

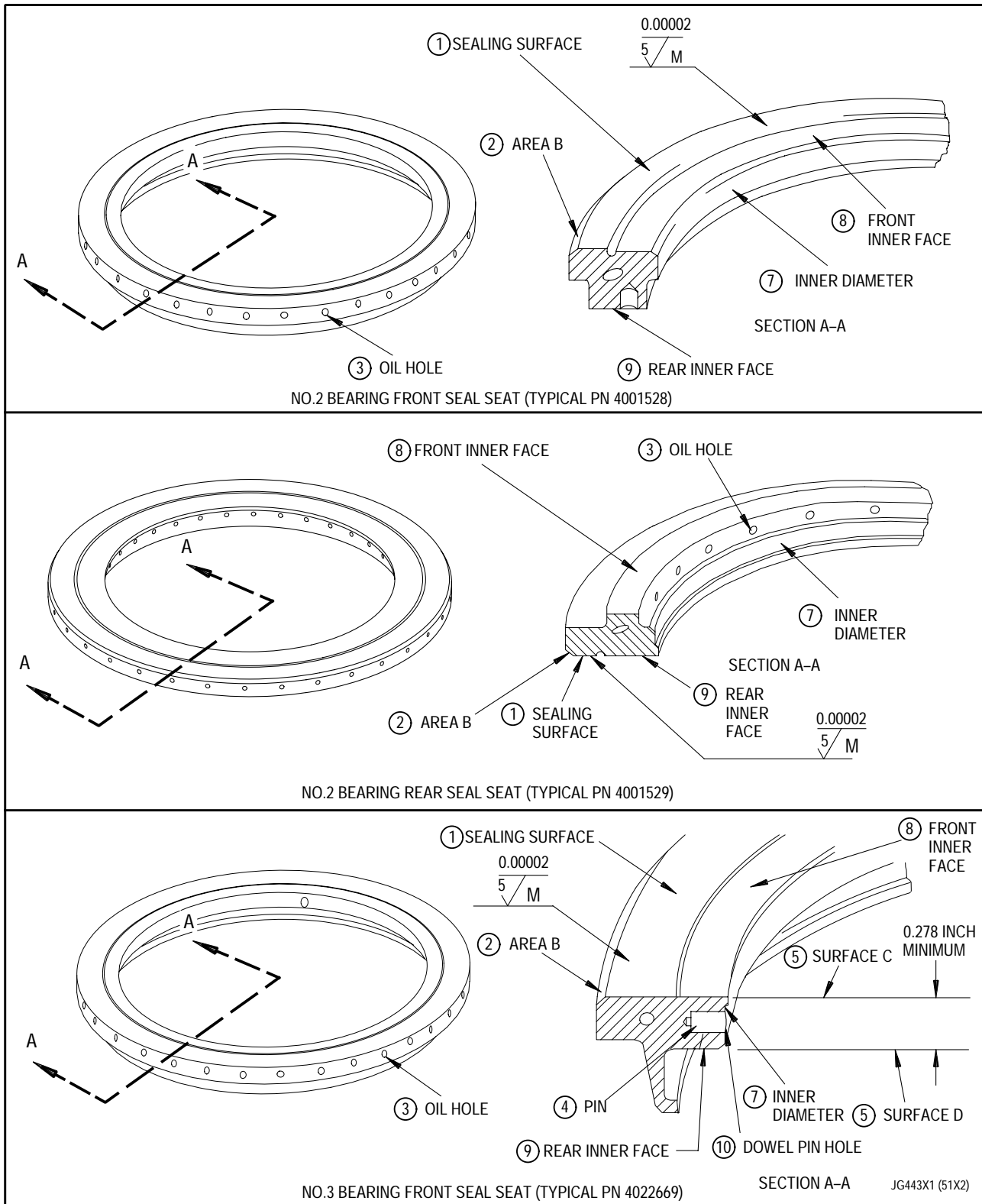


Figure 1. No. 2, 3, and 4 Bearing Seal Seats - Inspection (Sheet 1 of 2)

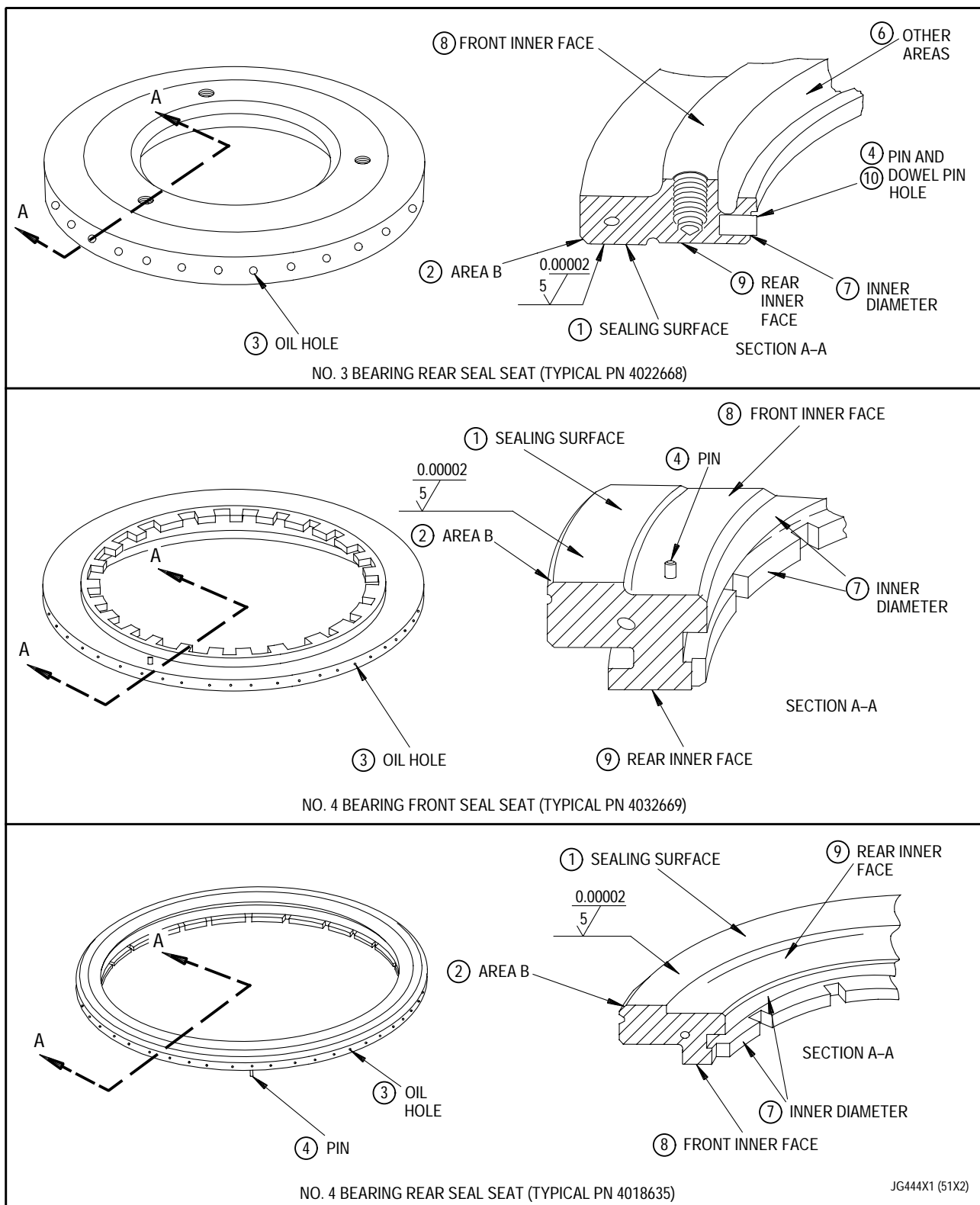


Figure 1. No. 2, 3, and 4 Bearing Seal Seats - Inspection (Sheet 2 of 2)

Legend for figure 1 (Sheets 1 and 2)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Sealing surface			
Pitted	a. 0.010 inch across longest dimension. b. Pits shall be at least 1 inch apart. c. Maximum of 3 pits allowed.	Not repairable	Replace seal seat.
Scored	Not serviceable	Not repairable	Replace seal seat.
Cracks	Shall not extend into base material. Reject seat with cracks in base material.	Not repairable	Replace seal seat.
Nicks and dents without protruding material	a. 0.010 inch length b. 0.010 inch radial width c. Nicks and dents shall not be closer together than 0.125 inch. d. Combined length of all nicks and dents shall not exceed 0.400 inch.	0.002 inch minimum thickness flameplate shall remain after lapping.	Lap surface. Refer to T.O. 2-1-111.
Nicks and dents with protruding material	Not serviceable	0.002 inch minimum thickness flameplate shall remain after lapping.	Lap surface. Refer to T.O. 2-1-111.
Scratches across sealing surface	a. 0.001 inch depth b. 0.001 inch width c. See corrective action.	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap to remove high spots. Complete scratch removal unnecessary. Refer to T.O. 2-1-111.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Sealing surface (continued)			
Chips	a. 0.010 inch length b. 0.010 inch radial width c. Chips shall not be closer together than 0.125 inch. d. Combined length of all chips shall not exceed 0.400 inch.	Not reparable	Replace seal seat.
Wear grooves	Shall not be felt with 0.030 inch scribe	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap surface. Refer to T.O. 2-1-111.

NOTE

Do not confuse unevenness with oxidation discoloration or carbon deposits (smear).

Inspect surface finish and flatness.	Sealing surfaces shall exhibit uniform contrast all around. Blotchy carbon deposits permissible provided appearance is uniform and cannot be felt with a 0.030 inch scriber.	0.002 inch minimum thickness of flameplate shall remain after lapping.	Lap surface. Refer to T.O. 2-1-111.
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Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Area B			
Chipped	Acceptable provided chipping is outside seal contact area and does not exceed 0.0625 inch width.	Not reparable	Replace seal seat.
3. Oil holes			
Blocked	Not serviceable	Not reparable	Remove obstruction.
4. Pin			
Loose	Not serviceable	Not reparable	Replace seal seat.
Bent	Not serviceable	Not reparable	Replace seal seat.
Nicks and scratches	Not serviceable	Not reparable	Replace seal seat.
5. Surface C or D			
Worn	0.278 inch minimum	Not reparable	Replace seal seat.
6. Other areas			
Nicks, dents, and burrs	Not serviceable	Material removal shall not exceed 0.030 inch	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
7. Inner diameter			
Wear	Not serviceable	Not reparable	Replace seal seat.
8. Front inner face			
Wear	Not serviceable	Not reparable	Replace seal seat.

Legend for figure 1 (Sheets 1 and 2) (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
9. Rear inner face			
Wear	Not serviceable	Not repairable	Replace seal seat.
NOTE			
Inspection Area 10 applies only to No. 4 bearing rear seal seat (PN 4018635).			
10. Dowel pin hole			
Wear	Not serviceable	Not repairable	Replace seal seat.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 3 BEARING SEAL -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	4 - 5	31	9	31
2	16	6 - 8	16	10	16
3	18				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedure - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Table of Limits - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 July 1995	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 3 bearing seal support assembly (typical PN 4068182).

2. NO. 3 BEARING SEAL SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure No. 3 bearing seal support assembly has been cleaned per WP 201 00.
- b. Visually inspect support assembly per figure 1.
- c. Dimensionally inspect support assembly per figure 1. All dimensions apply when Diameter M(4) is round within 0.002 inch in free state or constrained, and when Surface L(13) is flat within 0.001 inch total in free state or constrained. Apply constraint to Surface L and Diameter M only. In a free state Diameter M may be 0.030 inch out-of-round.

- d. All scratches and dents shall be fluorescent penetrant inspected. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- e. Visually inspect oil damper orifices for obstructions. Flow shop air at 10 to 15 psig through oil damper inlet and exit orifices. If flow is restricted clean support assembly as required to clear obstruction. (Applies to PN 4076389 only, prior to TCTO 2J-F100229(II)-536.)

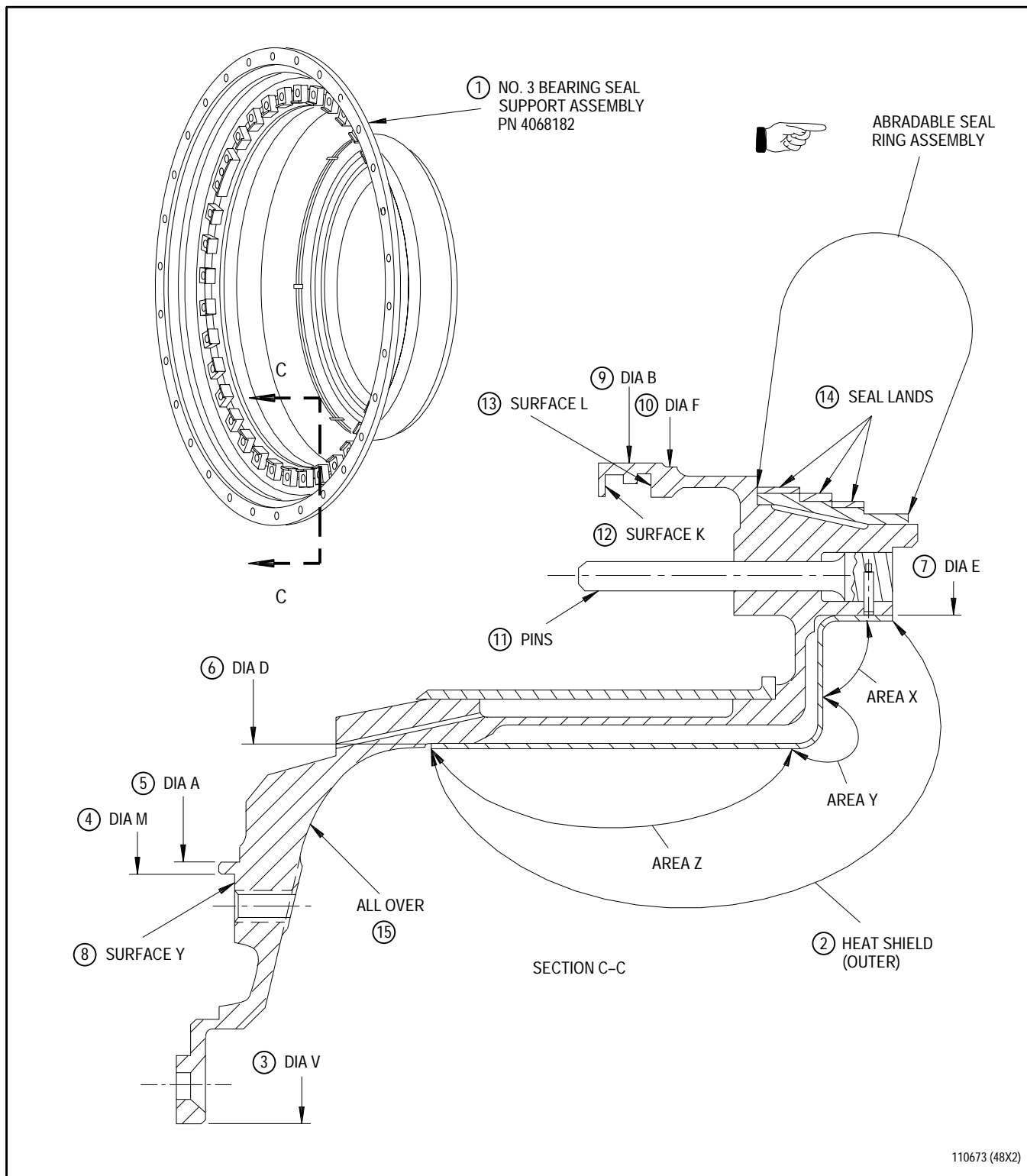


Figure 1. No. 3 Bearing Seal Support Assembly - Inspection (Sheet 1 of 2)

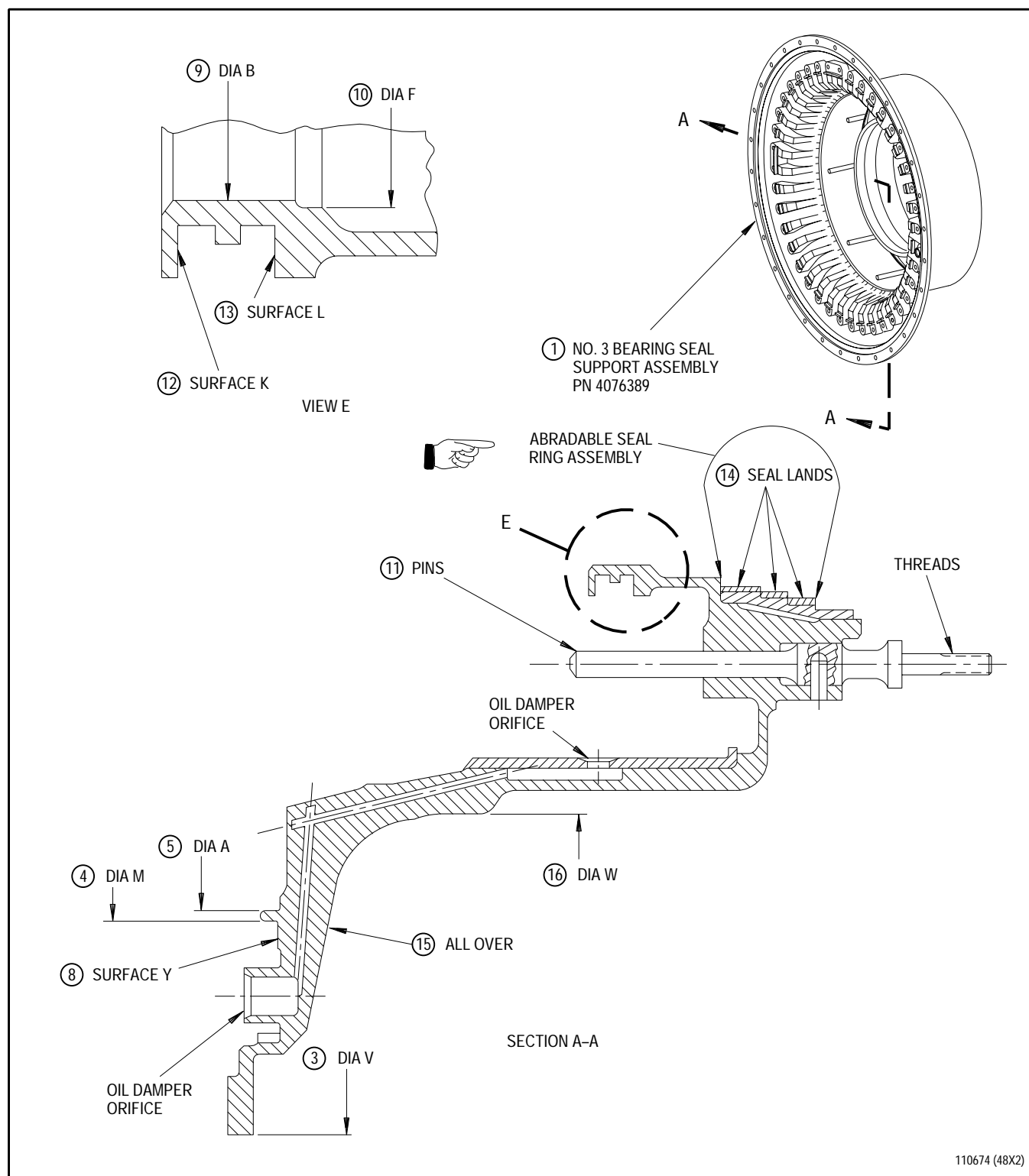


Figure 1. No. 3 Bearing Seal Support Assembly - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Support assembly -			
Stress corrosion, fatigue cracking	Not serviceable	Not reparable	Replace seal support assembly.
2. Heat shield (short) (PN 4061533) (outer) (all over) -			
Stress corrosion, fatigue cracking	Not serviceable	Not reparable	Replace heat shield per WP 407 00.
Scratches	0.010 inch deep if polished out	Not reparable	Replace heat shield per WP 407 00.
2. Heat shield (outer) (area X and Z) -			
Round bottom dents	0.050 inch deep. No sharp radius allowed.	Not reparable	Replace heat shield per WP 407 00.
2. Heat shield (outer) (area Y) -			
Round bottom dents	0.010 inch deep. No sharp radius allowed.	Not reparable	Replace heat shield per WP 407 00.
3. Diameter V -			
Wear or galling	16.560 inch diameter	16.560 inch diameter minimum	Hold for future repair.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Diameter M - Wear or galling	12.780 inch diameter	Not reparable	Replace support assembly.
5. Diameter A - Wear or galling	12.618 inch diameter	Not reparable	Replace support assembly.
6. Diameter D - (only when replacing heat shields)			
Dents, nicks	Not serviceable	Not reparable	Replace support assembly.
Scoring	Not serviceable	Not reparable	Replace support assembly.
Damage	10.729 inch diameter	Not reparable	Replace support assembly.
7. Diameter E - (only when replacing heat shields)			
Damage	8.850 to 8.855 inch diameter	Not reparable	Replace support assembly.
8. Surface Y - Galling	Not serviceable	0.010 inch deep. No cracks allowed.	Blend repair per WP 407 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Diameter B -			
Grooving	0.005 inch maximum	Not reparable	Replace support assembly.
Chipped or missing hardcoat	0.200 square inch total area	Not reparable	Replace support assembly.
10. Diameter F -			
Grooving	0.005 inch maximum	Not reparable	Replace support assembly.
Chipped or missing hardcoat	0.200 square inch total area	Not reparable	Replace support assembly.
11. Pins -			
Loose, bent, cracked or missing	Not serviceable	See corrective action.	Replace pins per WP 407 00
Wear, scratches and nicks	Not serviceable		Polish with fine crocus cloth P-C-458 to remove raised metal. Polishing to be done in lengthwise direction with respect to pin. Pin diameter shall not be reduced more than 0.002 inch.
Damaged threads (PN 4076389 only)	Not serviceable	Not reparable	Replace support assembly
12. Surface K -			
Step	Not serviceable	See corrective action.	Machine for oversize rings per WP 407 00.
13. Surface L -			
Step	Not serviceable	See corrective action.	Machine for oversize rings per WP 407 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
14. Seal lands -			
Abrasion rub grooves	a. 360 degrees b. 0.0312 inch deep	Any amount	Replace abradable seal ring assembly per WP 407 00.
Nicks, gouges, dents, and missing abradable material	a. 0.0938 inch wide extending along front and rear land edges up to 360 degrees b. 0.1875 inch diameter (two per land) c. Less than 0.0625 inch diameter over entire shroud d. Depth of damaged areas may extend to full depth of abradable material and any single damage may intersect front or rear, but not both, edges of any single seal land e. Unbonded abradable material is acceptable in damaged areas provided bond of surrounding material is sound. (See a., b. and c.)	Any amount	Replace abradable seal ring assembly per WP 407 00.
15. All over -			
Nicks, gouges	Not serviceable	See corrective action.	Remove raised metal with fine stone.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
16. Diameter W (PN 4076389 only) -			
Dents, nicks	Not serviceable	0.015 inch deep, 15 places maximum	Blend repair per WP 407 00.
Scoring	Not serviceable	0.015 inch deep, 15 places maximum	Blend repair per WP 407 00.
Damage	Per WP 801 00, reference 3125	See corrective action	Plasma spray repair per WP 407 00.

WORK PACKAGE

TECHNICAL PROCEDURES

TUBE ASSEMBLY, NO. 2 AND 3 BEARING INTERNAL PRESSURE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

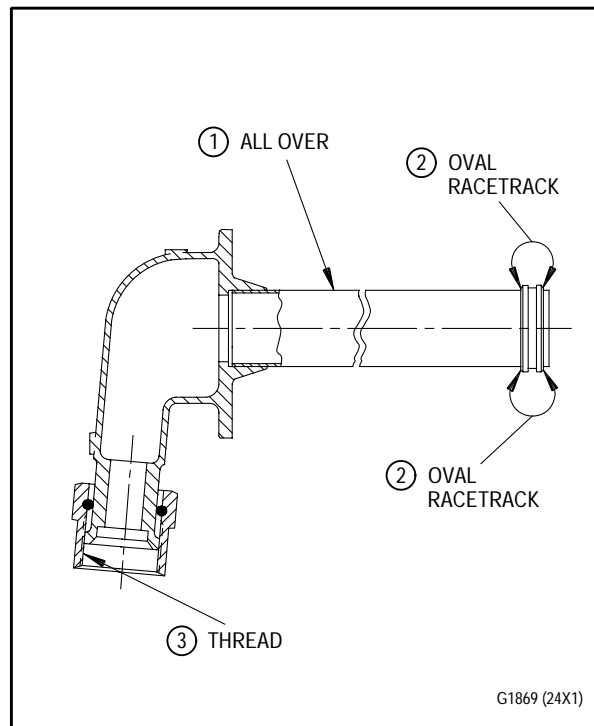
None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 2 and 3 bearing internal pressure tube assembly.

2. NO. 2 AND 3 BEARING INTERNAL PRESSURE TUBE ASSEMBLY - INSPECTION.

(See Figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Dents	0.012 inch depth, provided no sharp edges, or corners with less than 0.060 inch radius	Reparable	Blend repair per WP 408 00.

Figure 1. No. 2 and 3 Bearing Internal Pressure Tube Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - (continued)			
Flattening (due to bending or twisting)	0.025 inch maximum	Not repairable	Replace tube assembly.
Nicks and gouges	0.004 inch maximum depth	Reparable	Blend repair per WP 408 00.

NOTE

Pointed micrometer is required for chafing inspection. Measure tube OD with point of micrometer in cavity of chafed area. Measure tube OD with point of micrometer on tube outer wall immediately adjacent to chafed area. The difference between two dimensions equals depth of chafe.

Chafing	a. 0.004 inch maximum depth provided no sharp edges, or corners with less than 0.060 inch radius.	Reparable	Blend repair per WP 408 00.
	b. 180° maximum circumference of chafe		
Scratches	a. 0.002 inch maximum depth provided no sharp edges, or corners with less than 0.060 inch radius.	Reparable	Blend repair per WP 408 00.
	b. 180° maximum circumference of scratches		
Pits	0.002 inch maximum depth	Reparable	Blend repair per WP 408 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Oval race track - Chafing	a. 0.002 inch maximum depth b. 180° maximum circumference of chafe c. No sharp edges	Reparable	Blend repair per WP 408 00.
3. Thread damage -	Not serviceable	Not reparable.	Replace tube assembly.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 2 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	26	5	26	6 Blank	0
2 - 4	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts - - - - -	WP 801 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 2 bearing seal support assembly.

2. NO. 2 BEARING SEAL SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 2 bearing seal support assembly. (See figure 1.)

- b. Fluorescent penetrant inspect support assembly. Refer to T.O. 2J-F100-9. No cracks allowed.

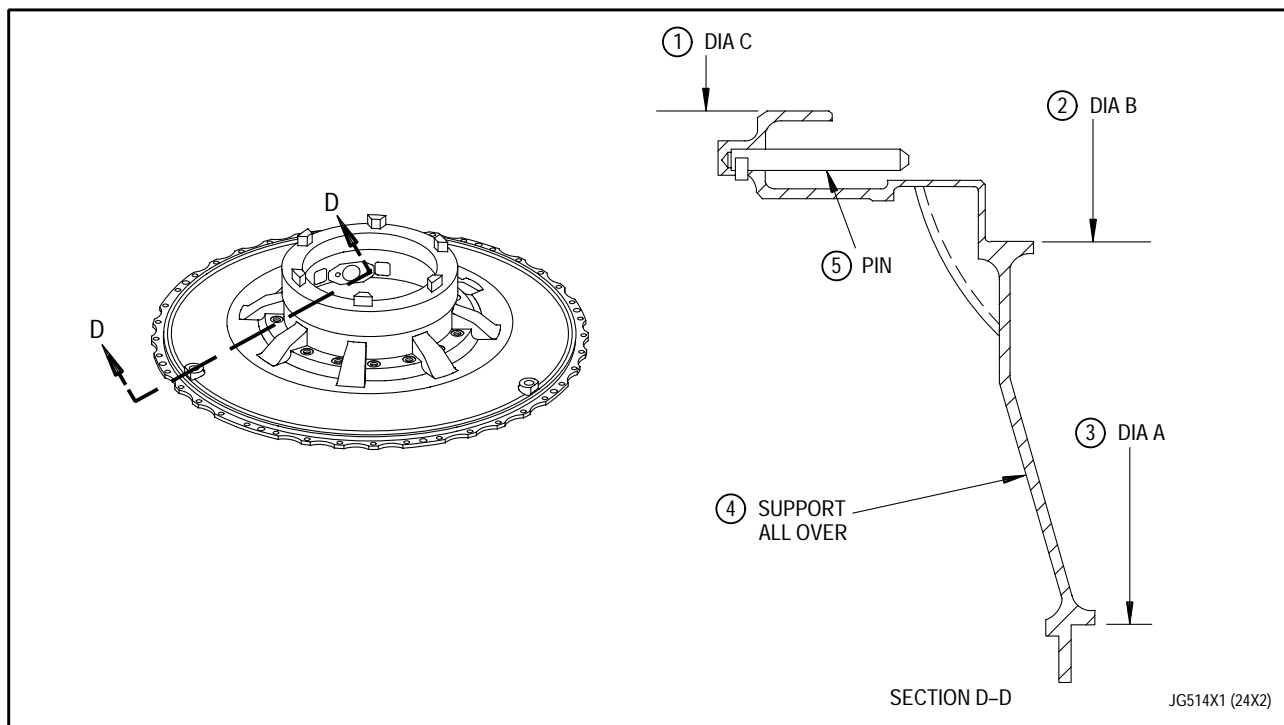


Figure 1. No. 2 Bearing Seal Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Diameter C -			
Wear	0.0005 inch maximum on a side	Not reparable	Replace support assembly.
Dimension	0.002 inch out of round maximum excess of tolerance	Not reparable	Replace support assembly.
2. Diameter B -			
Wear	Per WP 801 00, Reference 2927	Not reparable	Replace support assembly.
3. Diameter A -			
Wear	Per WP 801 00, Reference 2926	Not reparable	Replace support assembly.
4. All over -			
Cracks	Not serviceable	Not reparable	Replace support assembly.
5. Pins -			
Bent, loose, cracked, or missing	Not serviceable	See corrective action.	Replace pin per WP 409 00.
Wear, scratches or nicks	Not serviceable	Pin diameter shall not be reduced more than 0.002 inch by blending. Minimum diameter 0.218 inch. If more than 0.002 inch reduction, replace pin.	Blend repair or replace pin per WP 409 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 2 BEARING -

INSPECTION AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	26	2 - 3	8	4	26

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of the No. 2 bearing support assembly after volcanic ash ingestion.

2. NO. 2 BEARING SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect support assembly. (See figure 1.)
- b. Fluorescent penetrant inspect support assembly. Refer to T.O. 2J-F100-9. No cracks allowed.

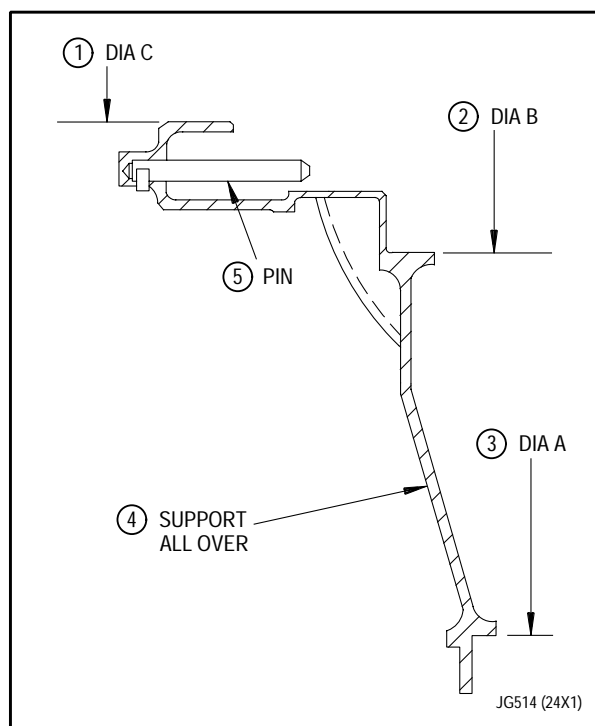


Figure 1. No. 2 Bearing Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Diameter C -			
Wear	0.0005 inch maximum on a side	Not reparable	Replace support assembly.
Dimension	0.002 inch out of round maximum excess of tolerance	Not reparable	Replace support assembly.
2. Diameter B -			
Wear	8.019 inch diameter	Not reparable	Replace support assembly.
3. Diameter A -			
Wear	16.279 inch diameter	Not reparable	Replace support assembly.
4. All over -			
Cracks	Not serviceable	Not reparable	Replace support assembly.
5. Pins -			
Bent, loose, cracked, or missing	Not serviceable	See corrective action.	Replace pin per WP 409 00.
Wear, scratches, or nicks	Not serviceable	Pin diameter shall not be reduced more than 0.002 inch by blending. Minimum diameter 0.218 inch. If more than 0.002 inch reduction, replace pin.	Blend repair or replace pin per WP 409 00.

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, GEARBOX DRIVE BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts - - - - -	WP 801 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the inspection of the gearbox drive bearing housing.

2. GEARBOX DRIVE BEARING HOUSING (P/N 4028827) - INSPECTION.

(See Figure 1.)

- a. Visually inspect gearbox drive bearing housing. (See figure 1.)

- b. Fluorescent penetrant inspect housing. Refer to T.O. 2J-F100-9. No cracks allowed.

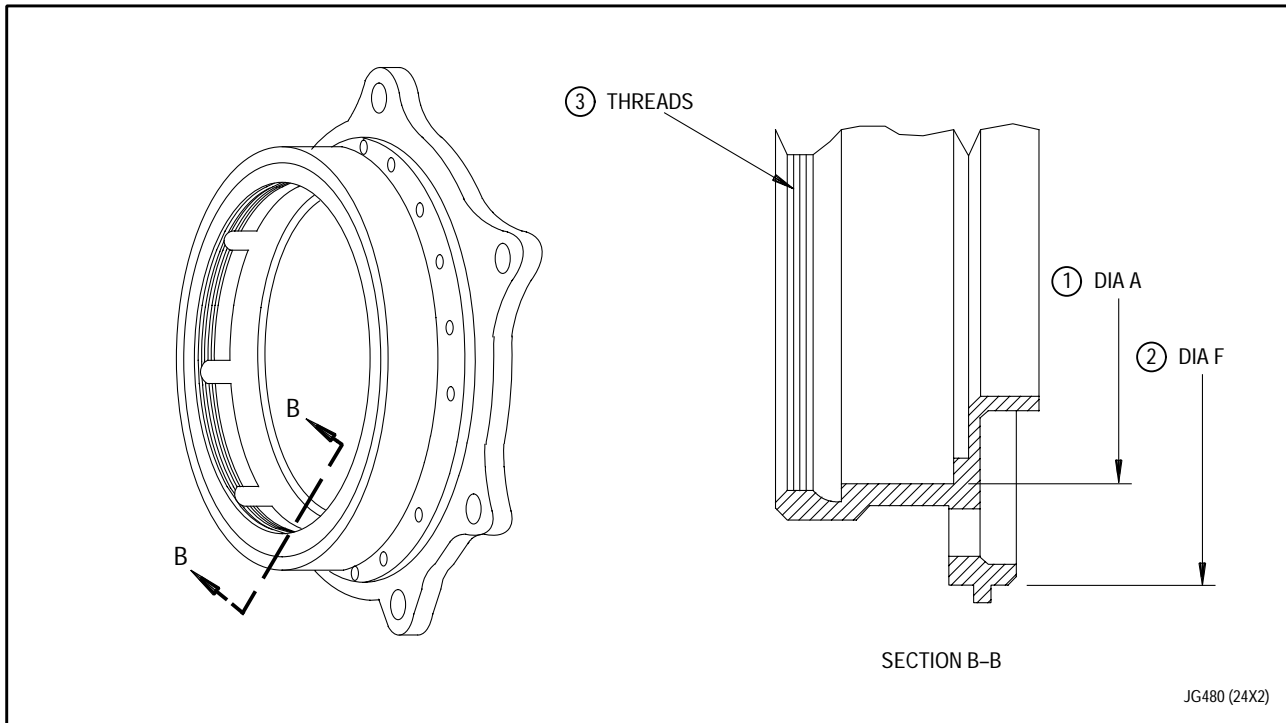


Figure 1. Gearbox Drive Bearing Housing - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Diameter A - Wear	Per WP 801 00, Reference 2930.	4.156 inch diameter maximum	Plasma spray per WP 410 00.
2. Diameter F - Wear	Per WP 801 00, Reference 2933.	5.260 inch diameter maximum	Plasma spray per WP 410 00.
3. Threads - Damage	Not serviceable	All pickup and high metal shall be removed	Blend to remove raised metal and pickup per WP 410 00.

WORK PACKAGE

TECHNICAL PROCEDURES

GEAR AND GEARSHAFT, BEVEL, GEARBOX DRIVE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7	0				
8 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts - - - - -	WP 801 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the inspection of the gearbox drive bevel gear and gearshaft.

2. GEARBOX DRIVE BEVEL GEAR (73 TEETH) - INSPECTION.

(See Figure 1.)

- a. Visually and dimensionally inspect gearbox drive bevel gear. (See figure 1.)

- b. Magnetic particle inspect gear. Refer to T.O. 2J-F100-9. No cracks allowed.

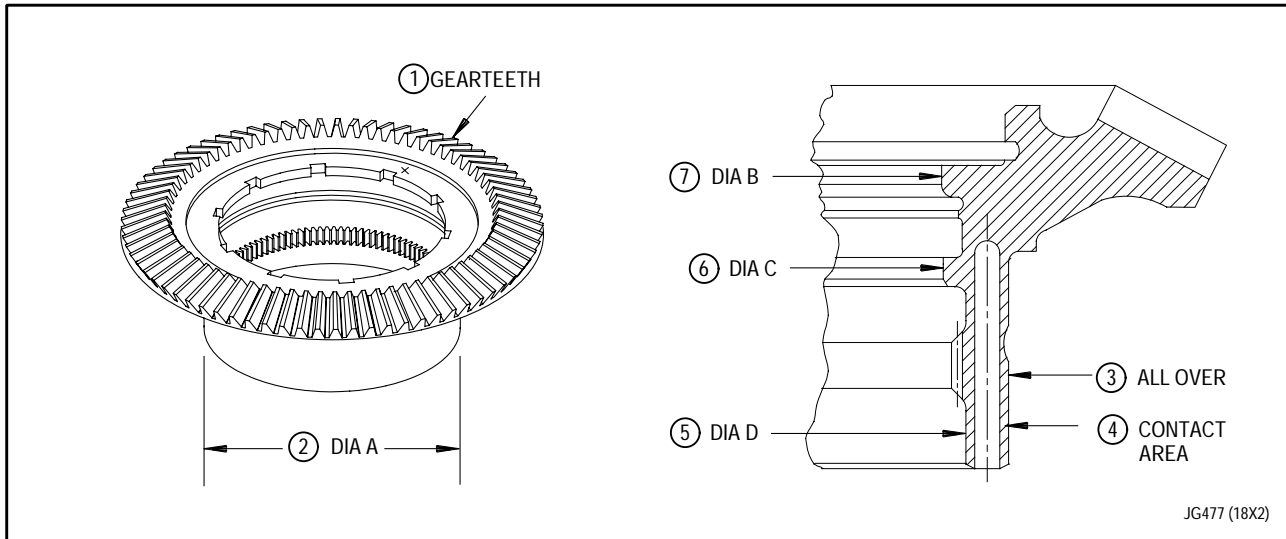


Figure 1. Gearbox Drive Bevel Gear (73 Teeth) - Inspection

Legend for figure 1

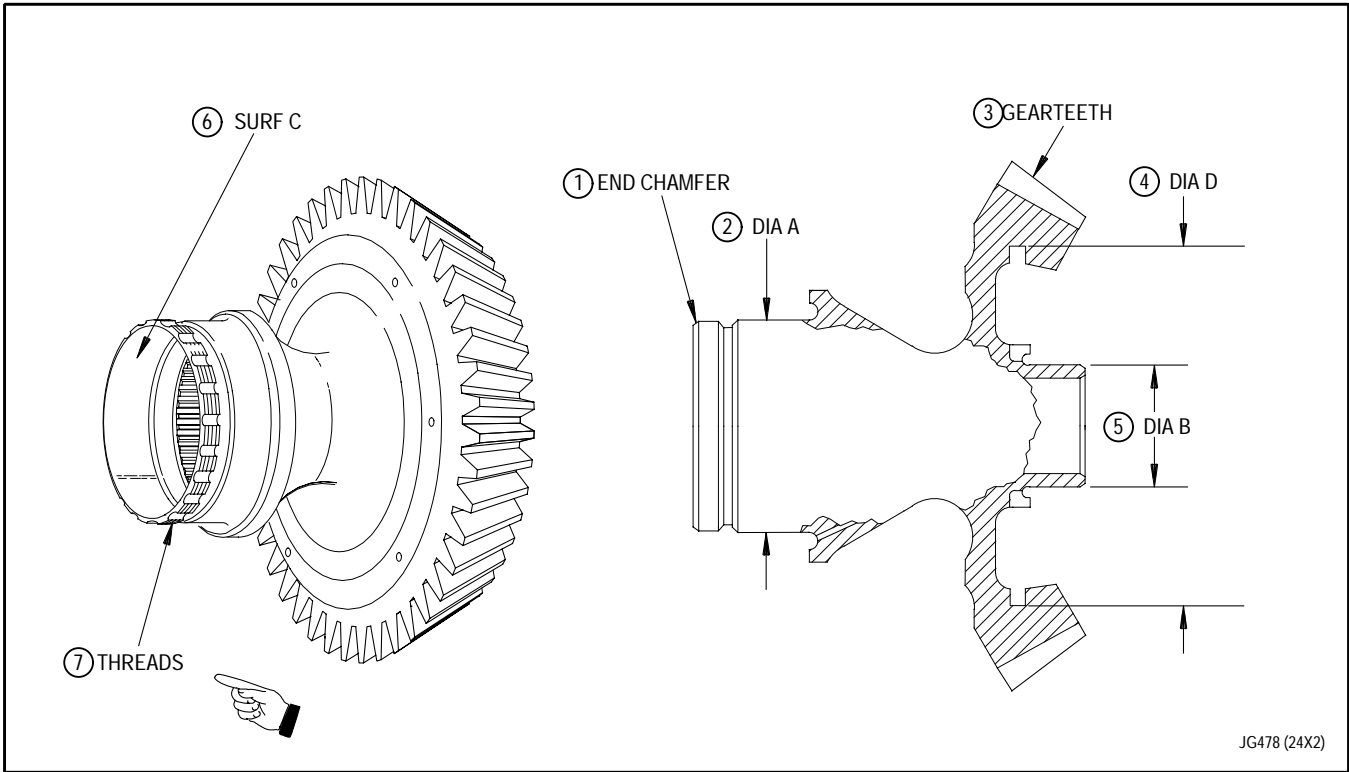
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Gearteeth - Surface damage or high spots	Not serviceable	0.002 inch depth	Blend repair per WP 411 00.
2. Diameter A - Wear	Per WP 801 00, Reference 2915	Not reparable	Replace drive bevel gear.
3. All over - Nicks, dents and scratches	Not serviceable	Not reparable	Replace drive bevel gear.
4. Contact area - Nicks, dents and scratches	Not serviceable	0.010 inch depth	Blend to remove raised metal.
5. Diameter D - Worn	Per WP 801 00, Reference 2909 Scraping and noticeable termination line from interference with mating part is acceptable provided wear is within limits.	Not reparable	Replace drive bevel gear.
6. Diameter C - Worn	Per WP 801 00, Reference 2908	Not reparable	Replace drive bevel gear.
7. Diameter B - (interrupted diameter) - Worn	Per WP 801 00, Reference 2907	Not reparable	Replace drive bevel gear.

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3. GEARBOX DRIVE BEVEL GEARSHAFT (38
TEETH) (Typical PN 4068119) - INSPECTION.
(See Figure 2.)

a. Visually and dimensionally
inspect gearbox drive bevel
gearshaft. (See figure 2.)

b. Magnetic particle inspect
gearshaft. Refer to
T.O. 2J-F100-9. No cracks
allowed.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. End chamfer - Gouges, scoring	0.010 inch depth	0.030 inch depth	Blend per WP 411 00.
2. Diameter A - Wear	Per WP 801 00, Reference 2932	See corrective action.	Chromium plate per WP 411 00.
Scratches	0.010 inch depth with no raised metal, 25% of surface may be scratched	0.030 inch depth	Blend to remove raised metal. For scratches deeper than 0.010 inch, chromium plate per WP 411 00.

Figure 2. Gearbox Drive Bevel Gearshaft (38 Teeth) - Inspection

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Diameter A - (continued)			
Nicks, gouges	0.010 inch depth with no raised metal	0.030 inch depth	Blend per WP 411 00.
3. Gearteeth -			
Surface damage or high spots	Not serviceable	0.002 inch depth	Blend per WP 411 00.
4. Diameter D -			
Wear	3.505 inch diameter	Not repairable	Replace bevel gearshaft.
5. Diameter B -			
Wear	Per WP 801 00, Reference 2929	See corrective action.	Chromium plate per WP 411 00.
Scratches	0.010 inch depth with no raised metal, 25% of surface may be scratched.	0.030 inch depth	Blend to remove raised metal. For scratches deeper than 0.010 inch, chromium plate per WP 411 00.
Nicks, gouges	0.010 inch depth with no raised metal	0.030 inch depth	Blend per WP 411 00.
6. Surface C -			
Nicks, scratches	0.005 inch depth with no raised metal	0.010 inch depth	Blend per WP 411 00.
7. External threads -			
High metal nicks, dents	Not serviceable	All thread pickup and high metal. Excessive damage first thread only.	Blend repair per WP 411 00.

WORK PACKAGE

TECHNICAL PROCEDURES

COUPLING, TURBINE SHAFT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	18	4 - 6	29
2	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Coupling, Turbine Shaft - Repair - - - - -	WP 412 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of turbine shaft coupling.

2. TURBINE SHAFT COUPLING - INSPECTION.

(See Figure 1.)

- a. Ensure turbine shaft coupling has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect coupling for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually and dimensionally inspect coupling per figure 1.
- d. After inspection and repair, apply antigalling compound per WP 412 00.

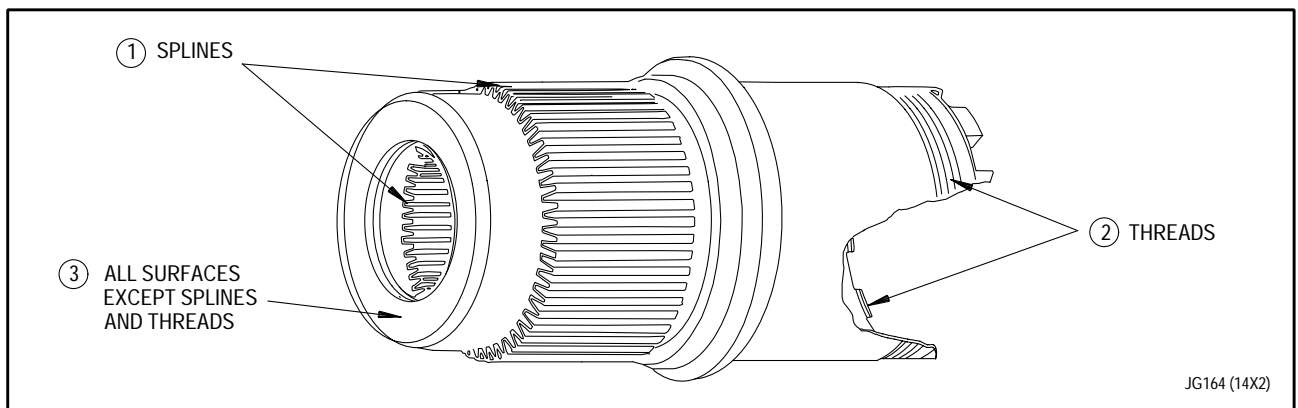
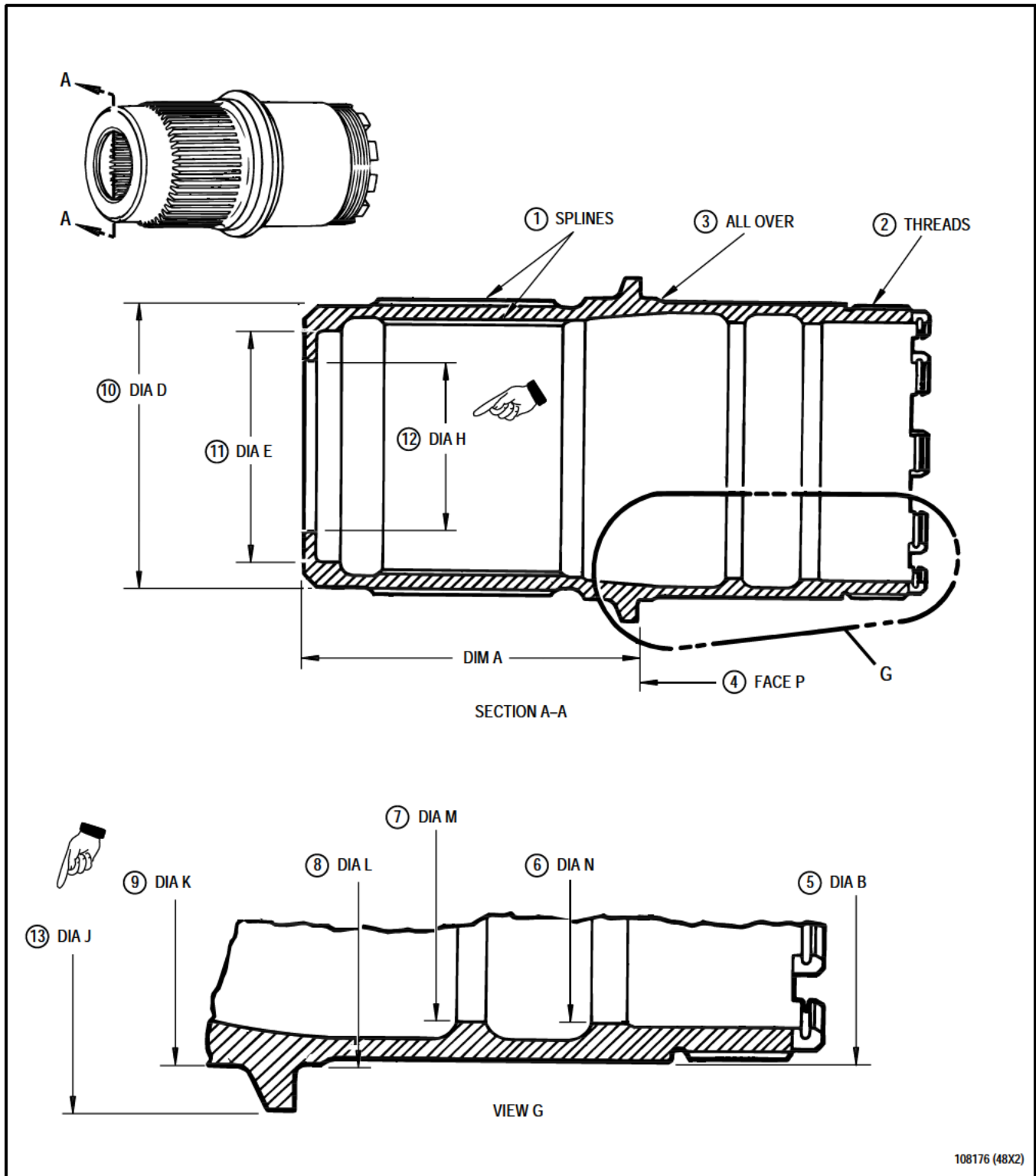


Figure 1. Turbine Shaft Coupling - Inspection and Repair (Sheet 1 of 2)



108176 (48X2)

Figure 1. Turbine Shaft Coupling - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Splines -			
Pits, nicks, dents	Not serviceable	0.007 inch depth after removal of raised metal.	Blend repair per WP 412 00. Replace coupling exceeding blend repair limits.
Wear	0.005 inch	Not repairable	Replace coupling.
2. Threads -			
Galling, nicks, dents	Not serviceable	See corrective action.	Blend repair per WP 412 00.
3. All surfaces (except splines and threads) -			
Nicks, gouges	Not serviceable	0.008 inch maximum depth	Blend repair per WP 412 00.
4. Face P -			
Wear	3.729 inches minimum Dimension A	3.719 inches minimum Dimension A	TBD
5. Diameter B -			
Wear	Refer to WP 801 00 References 2902, 2903, and 2905.	3.9800 inches diameter minimum	TBD
6. Diameter N -			
Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 33.	3.5214 inches diameter maximum	TBD
7. Diameter M -			
Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 32.	3.520 inches diameter maximum	TBD
8. Diameter L -			
Wear	Refer to WP 801 00, Reference 2901.	4.0587 inches diameter minimum	TBD

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Diameter K - Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 13.	4.0695 inches diameter minimum	TBD
10. Diameter D - Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 21.	3.7903 inches diameter maximum	TBD
11. Diameter E - Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 19.	3.1683 inches diameter maximum	Replace coupling. Repair to be supplied.
12. Diameter H - Wear	Refer to T.O. 2J-F100-53-5, WP 801 00, Reference 79.	None	Replace coupling. Repair to be supplied.
13. Diameter J - Wear	4.675 inches diameter minimum	None	Replace coupling. Repair to be supplied.

WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP ASSEMBLY, NO. 2 BEARING, FRONT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Pin hole - Oversize	0.0932 inch minimum diameter, no eccentricity allowed	See corrective action.	Drill new pin hole and install new pin per WP 413 00. Existing oversize hole will be left unfilled. Only one oversize hole per part.
4. All over - Cracks	Not serviceable	Not repairable	Replace scoop assembly.
5. Dimension X - Wear	0.691 inch minimum	See corrective action.	Nickel plate per WP 413 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP, NO. 2 BEARING, REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	0				
4 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

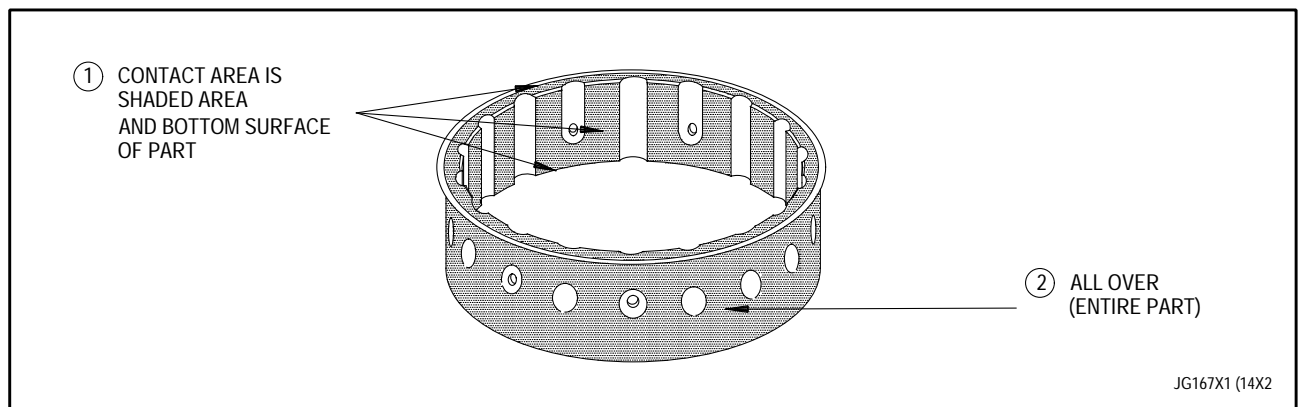
1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2 bearing rear scoop.

2. NO. 2 BEARING REAR SCOOP - INSPECTION.

(See Figure 1.)

- a. Magnetic particle inspect No. 2 bearing rear scoop. Refer to T.O. 2J-F100-9. No cracks are allowed.
- b. Visually inspect scoop. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Contact areas - Scratches, dents, nicks,	Not serviceable	0.010 inch depth	Blend repair per WP 414 00.
2. All over - Cracks	Not serviceable	Not repairable	Replace scoop.

Figure 1. No. 2 Bearing Rear Scoop - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING ASSEMBLY, NO. 2 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4	29	5	25
2 - 3	0			6	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2 bearing housing assembly.

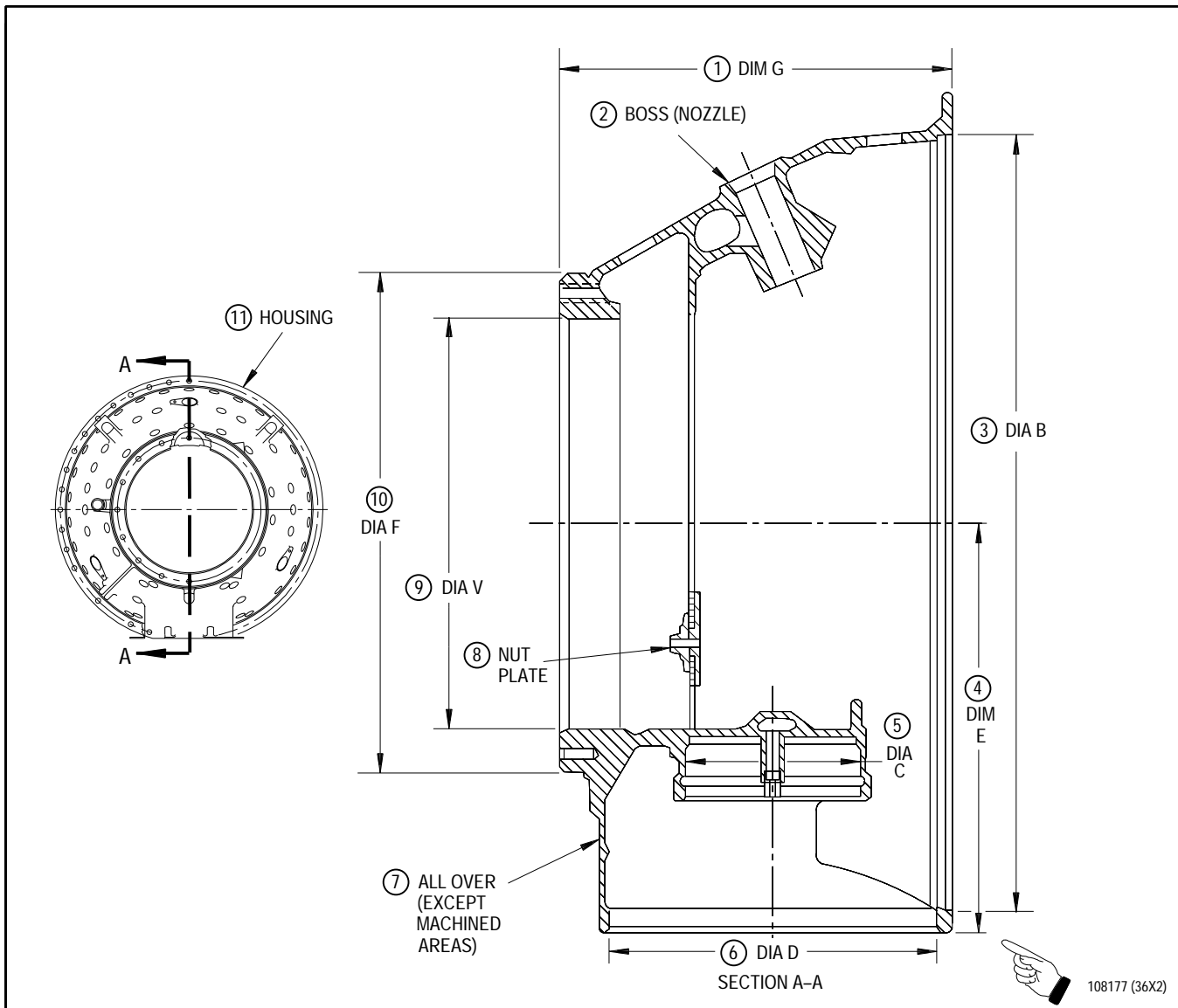
2. NO. 2 BEARING HOUSING ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure No. 2 bearing housing assembly has been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect housing assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect housing assembly per figure 1.



Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Dimension G - Wear	6.2995 inches	6.2845 inches minimum	Repair per WP 415 00.
2. Boss (nozzle) - Wear	Per WP 801 00, Reference 3085	0.7315 inch maximum diameter	Repair per WP 415 00.
3. Diameter B - Wear	Per WP 801 00, Reference 2935	12.562 inches maximum diameter	Repair per WP 415 00.
4. Dimension E - Wear	6.499 inches	6.489 inches minimum	Repair per WP 415 00.
5. Diameter C - Wear	Per WP 801 00, Reference 2928. Greater than maximum diameter allowed up to 0.008 inch deep over arc of 0.200 inch for full axial length of diameter.	2.8547 inches maximum diameter	Repair per WP 415 00.
6. Diameter D - Wear	Per WP 801 00, Reference 2933	5.301 inches maximum diameter	Repair per WP 415 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. All over (except machined surfaces) -			
Nicks, dents	Not serviceable	0.010 inch depth	Blend to remove raised metal per WP 415 00.
Scratches	0.003 inch depth	0.010 inch depth	Blend to remove raised metal per WP 415 00.
8. Nut plate -			
Loose, inadequate torque of self- locking feature	a. 13.000 pound-inches maximum locking torque b. 2.000 pound-inches minimum break-away torque	See corrective action.	Replace nut plate per WP 415 00.
9. Diameter V -			
Wear	Per WP 801 00, Reference 2924	Not reparable	Replace housing assembly.
10. Diameter F -			
Wear	Per WP 801 00, Reference 2927	7.999 inches minimum diameter	Repair per WP 415 00.
11. Housing -			
Cracks	Not serviceable	Not reparable	Replace housing assembly.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL SUPPORT ASSEMBLY, NO. 2 AND 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	0				
4 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

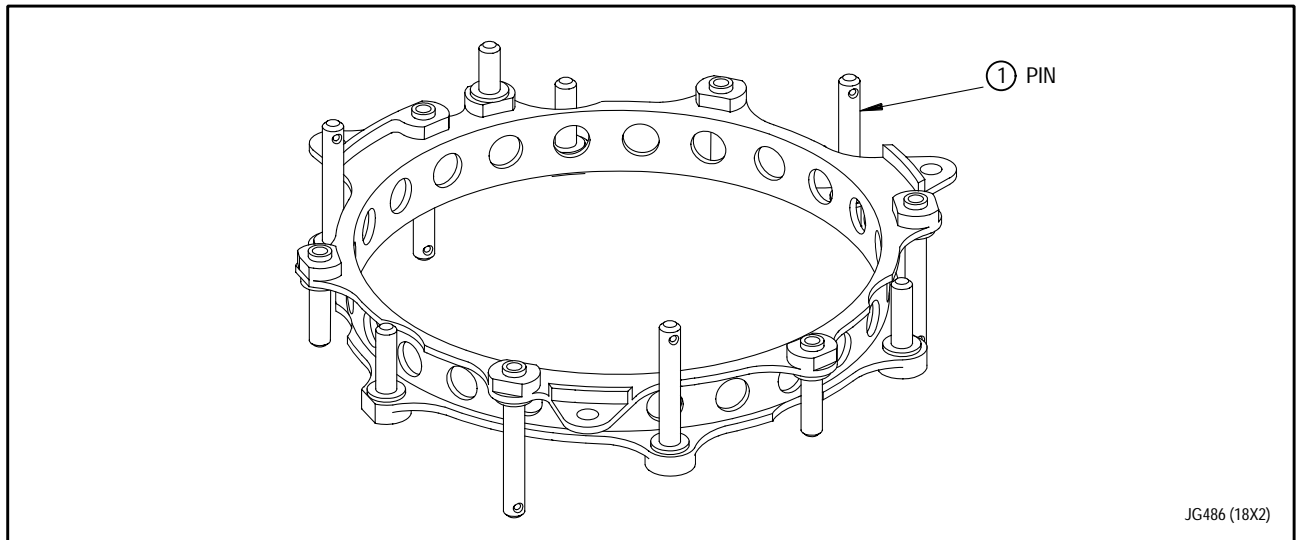
1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2 and 3 bearing seal support assembly.

2. NO. 2 AND 3 BEARING SEAL SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect pins. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pins			
Bent, loose or missing	Not serviceable	See corrective action.	Replace assembly.
Wear, scratches, or nicks	Not serviceable	See corrective action.	Replace assembly.

Figure 1. No. 2 and 3 Bearing Seal Support Assembly - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLIES, FACE, NO. 2 BEARING, FRONT AND REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	19	11 - 12	19	13 Added	19
2 - 10	0			14 Blank Added	19

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and	
Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

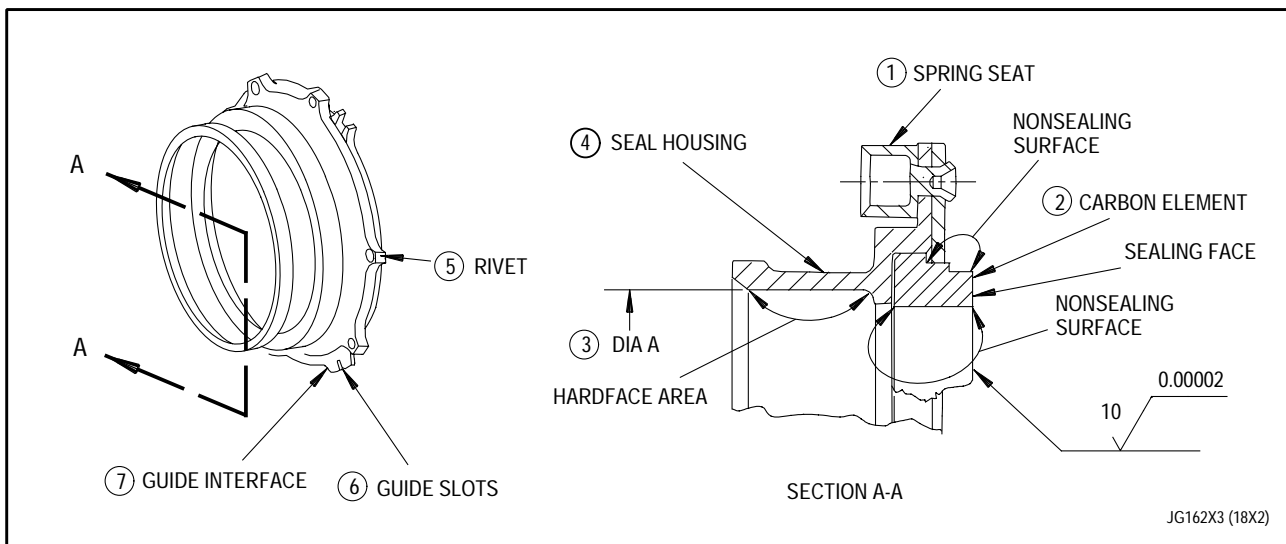
1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 2 bearing front and rear face seal assemblies.

2. NO. 2 BEARING REAR FACE SEAL ASSEMBLY (PN 4033283 or 4033284) - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 2 bearing rear face seal assembly for surface defects using white light and 3X magnifying glass.
- b. Dimensionally inspect face seal assembly. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Spring seat - Loose, damaged, or missing	Not serviceable	See corrective action.	Replace spring seat per WP 417 00.
2. Carbon element - Wear (face seal height)	Per WP 801 00, Reference 3104	Not repairable	Replace carbon element per WP 417 00.

Figure 1. No. 2 Bearing Rear Face Seal Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Carbon element - (continued)			
Cracks	Not serviceable	Not reparable	Replace carbon element per WP 417 00.
Deterioration (crumbling of carbon)	Not serviceable	Not reparable	Replace carbon element per WP 417 00.
Chips, nicks, scratches (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat.	Defects larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3359.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 417 00.
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed.	Not applicable	Not applicable
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded.	Scratches larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3359.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 417 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Carbon element - (continued)			
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch	Squareness outside serviceable limit may be regained by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3359.	Lap carbon element. Replace carbon element damaged in excess of serviceable limit per WP 417 00.
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limits may be regained by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3359.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 417 00.
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check.	Surface finish which does not register light bands during flatness check may be restored by lapping. Maintain face seal height per WP 801 00, Reference 3359.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 417 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Diameter A -			
Dimensional	0.002 inch out-of-round maximum in excess of tolerance	Reparable provided 0.003 to 0.007 inch thick hardface will restore diameter to serviceable limits.	Hardface Diameter A per WP 417 00.
Wear	0.0005 inch maximum on a side	Reparable provided 0.003 to 0.007 inch thick plating will restore diameter to serviceable limits.	Hardface Diameter A per WP 417 00.
Nicks or dents (without burrs)	Serviceable	Not applicable	Not applicable.
Nicks, or dents (with burrs)	Not serviceable	Any amount	Polish diameter per WP 417 00.
Chipped	0.010 inch width and length with a combined length less than 0.400 inch, chips not closer together than 0.125 inch	Any amount	Hardface Diameter A per WP 417 00.
Cracks	Shall not extend into parent material	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Diameter A - (continued)			
Scratches (without burrs)	0.001 inch width and depth	Any amount	Hardface Diameter A per WP 417 00.
Scratches (with burrs)	Not serviceable	Any amount	Polish Diameter A per WP 417 00.
Pitting	Serviceable provided sealing is not affected.	Any amount	Hardface Diameter A per WP 417 00.
Discoloration	Serviceable	Not applicable	Not applicable.
4. Seal housing -			
Cracks	Not serviceable	Not serviceable	Replace assembly.
Nicks, dents, or scratches (without burrs)	Serviceable	Not applicable	Not applicable
Nicks, dents, or scratches (with burrs)	Not serviceable	Any amount	Remove high metal with fine file or stone.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. Rivets - Loose, damaged, or missing	Not serviceable	See corrective action.	Replace rivet per WP 417 00.
6. Guide slots - Wear	Not serviceable	0.348 inch width maximum	Chromium plate per WP 417 00.
7. Guide interface - Wear	Not serviceable	0.063 inch minimum thickness	Chromium plate per WP 417 00.

3. NO. 2 BEARING FRONT FACE SEAL ASSEMBLY (Typical PN 4072837 or 4072839) - INSPECTION.

(See Figure 2.)

- a. Visually inspect No. 2 bearing front face seal assembly for surface defects using white light and 3X magnifying glass.
- b. Dimensionally and visually inspect face seal assembly.
(See figure 2.)

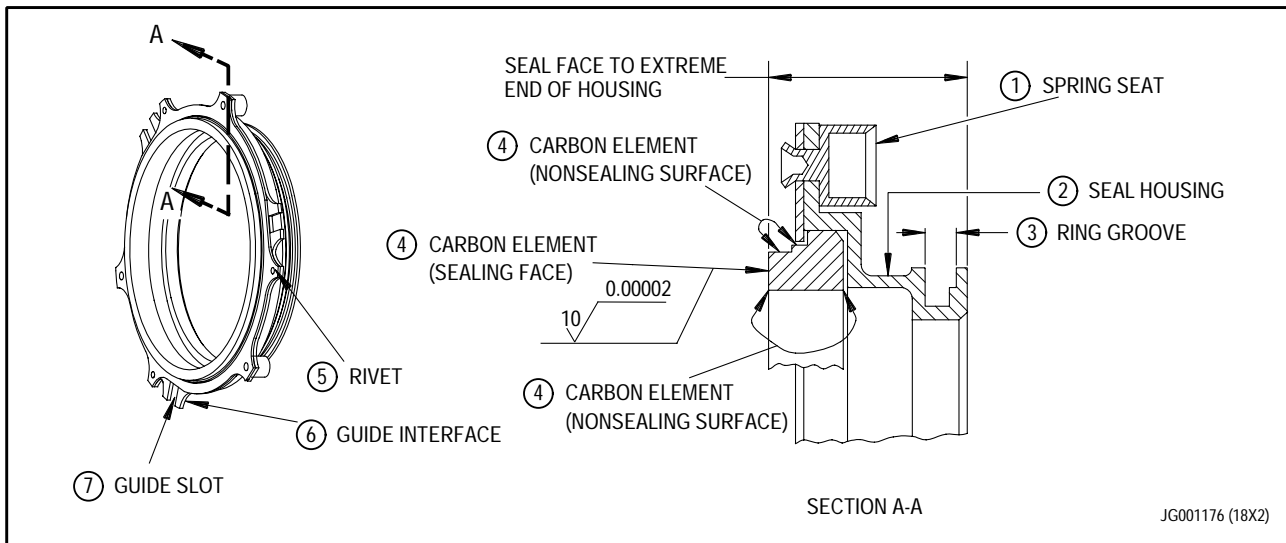


Figure 2. No. 2 Bearing Front Face Seal Assembly - Inspection (PN 4072837 or 4072839 Typical)

Legend for figure 2

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Spring seat -			
Loose, damaged, or missing	Not serviceable	See corrective action.	Replace spring seat per WP 417 00.
2. Sealing housing -			
Cracks	Not serviceable	See corrective action.	Replace assembly.
Nicks or scratches (without burrs)	Serviceable	Not applicable	Not applicable
Nicks or scratches (with burrs)	Not serviceable	Any amount	Remove high metal with fine file or stone.
3. Ring groove -			
Wear	Not serviceable	See corrective action.	Machine for oversize ring per WP 417 00.
Step	Not serviceable	See corrective action.	Machine for oversize ring per WP 417 00.
4. Carbon element -			
Wear (face seal height)	Per WP 801 00, Reference 3104	See corrective action.	Replace carbon element per WP 417 00.
Cracks	Not serviceable	See corrective action.	Replace carbon element per WP 417 00.
Deterioration (crumbling of carbon)	Not serviceable	See corrective action.	Replace carbon element per WP 417 00.
Chips, nicks, scratches (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat.	Defects larger than serviceable limit may be removed by lapping to serviceable limit, provided face seal height is maintained. Refer to WP 801 00, Reference 3104.	Lap carbon element or replace carbon element damaged in excess of serviceable limits per WP 417 00.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. Carbon element - (continued)			
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed.	Not applicable	Not applicable
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded.	Scratches larger than serviceable limit may be removed by lapping to serviceable limit, provided face seal height is maintained. Refer to WP 801 00, Reference 3104.	Lap carbon element or replace carbon element damaged in excess of serviceable limit per WP 417 00.
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch.	Squareness outside serviceable limit may be repaired by lapping to serviceable limit, provided face seal height is maintained. Refer to WP 801 00, Reference 3104.	Lap carbon element or replace carbon element damaged in excess of serviceable limit per WP 417 00.
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limit may be repaired by lapping to serviceable limit, provided face seal height is maintained. Refer to WP 801 00, Reference 3104.	Lap carbon element or replace carbon element damaged in excess of serviceable limit per WP 417 00.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. Carbon element - (continued)			
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check.	Surface finish which does not register light bands during flatness check may be restored by lapping, provided face seal height is maintained. Refer to WP 801 00, Reference 3104.	Lap carbon element or replace carbon element damaged in excess of serviceable limit per WP 417 00.
5. Rivet -			
Loose, damaged, or missing	Not serviceable	See corrective action.	Replace rivet per WP 417 00.
6. Guide interface -			
Wear	Not serviceable	See corrective action.	Replace assembly.
7. Guide slots -			
Wear	Not serviceable	See corrective action.	Chromium plate per WP 417 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 2 BEARING, FRONT -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					8

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

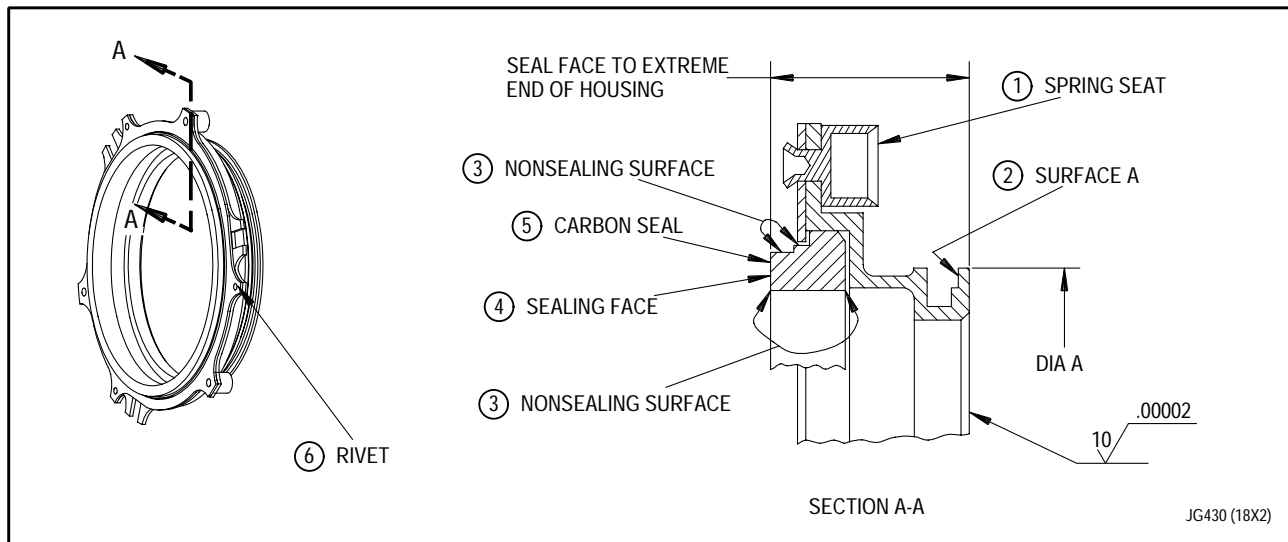
- a. This subordinate work package contains instructions for inspection of No. 2 bearing front face seal assembly after volcanic ash ingestion.

2. NO. 2 BEARING FACE SEAL ASSEMBLY (FRONT) - INSPECTION.

(See Figure 1.)

- a. Inspect No. 2 bearing face seal assembly. (See figure 1.)

- b. Visually inspect face seal assembly, using white light and 3X magnifying glass, for surface defects.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Spring seat - Loose, damaged, or missing	Not serviceable	Not repairable	Replace face seal assembly.
2. Surface A - Ring groove wear	Surface wear up to 0.0015 inch depth	Not repairable	Replace face seal assembly.
3. Nonsealing surface (carbon seal) - Chips, nicks, scratches	Acceptable provided other items of this table are observed.	See corrective action.	Replace face seal assembly.

Figure 1. No. 2 Bearing Face Seal Assembly (Front) - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Sealing face (carbon seal) -			
Wear (seal face to extreme end of housing)	1.520 inch height	Not reparable	Replace face seal assembly.
Chips, nicks, scratches (in sealing face)	60% of original width of seal face in questionable area, remains undamaged. Concentric circular area of not less than 60% of sealing face contact with seal plate.	Not reparable	Replace face seal assembly.
Scratches extending across sealing face	0.005 inch depth 0.010 inch width	Not reparable	Replace face seal assembly.
Squareness	Seal face shall be square with Diameter A within 0.001 inch.	Not reparable	Replace face seal assembly.
Surface finish, inspect using optical flats	(See figure 1.)	Not reparable	Replace face seal assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
5. Carbon seal -			
Cracks	Not serviceable	Not repairable	Replace face seal assembly.
Deterioration (crumbling of carbon)	Not serviceable	Not repairable	Replace face seal assembly.
6. Rivet -			
Loose, damaged, or missing	Not serviceable	Not repairable	Replace face seal assembly.

WORK PACKAGE**TECHNICAL PROCEDURES****SEAL ASSEMBLY, FACE, NO. 3 BEARING, FRONT -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7					
8 Blank					

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and	
Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

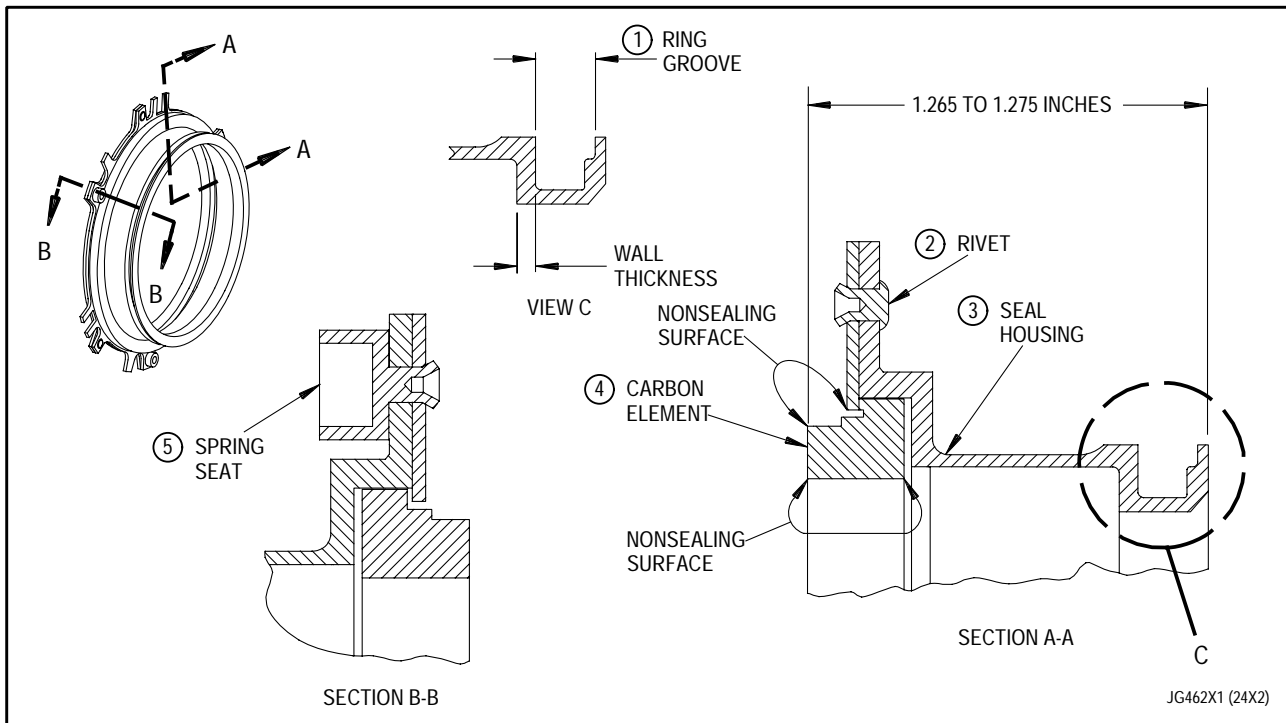
1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 3 bearing front face seal assembly.

2. NO. 3 BEARING FRONT FACE SEAL ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 3 bearing front face seal assembly for surface defects using white light and 3X magnifying glass.
- b. Dimensionally inspect face seal assembly. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Ring groove -			
Wear	Not serviceable	See corrective action.	Machine for oversize ring per WP 418 00.
Fretting	Not serviceable	See corrective action.	Machine for oversize ring per WP 418 00.

Figure 1. No. 3 Bearing Front Face Seal Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Rivets -			
Loose, damaged, or missing	Not serviceable	See corrective action.	Replace rivet per WP 418 00.
3. Seal housing -			
Cracks	Not serviceable	Not serviceable	Replace assembly.
Nicks, dents, or scratches (without burrs)	Serviceable	Not applicable	Not applicable.
Nicks, dents, or scratches (with burrs)	Not serviceable	Any amount	Remove high metal with fine file or stone.
4. Carbon element -			
Wear (face seal height)	Per WP 801 00, Reference 3308.	Not repairable	Replace carbon element per WP 418 00.
Cracks	Not serviceable	Not repairable	Replace carbon element per WP 418 00.
Deterioration (crumbling of carbon)	Not serviceable	Not repairable	Replace carbon element per WP 418 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Carbon element - (continued)			
Chips, nicks, (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat.	Defects larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3308.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 418 00.
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed.	Not applicable	Not applicable
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded.	Scratches larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3308.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 418 00.
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch.	Squareness outside serviceable limit may be regained by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3308.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 418 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Carbon element - (continued)			
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limits may be regained by lapping to serviceable limit. Maintain face seal height per WP 801 00, Reference 3308.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 418 00.
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check.	Surface finish which does not register light bands during flatness check may be restored by lapping. Maintain face seal height per WP 801 00, Reference 3308.	Lap carbon element. Replace carbon element damaged in excess of serviceable limits per WP 418 00.
5. Spring seat -			
Loose, damaged, or missing	Not serviceable	See corrective action.	Replace spring seat per WP 418 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 3 BEARING, REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

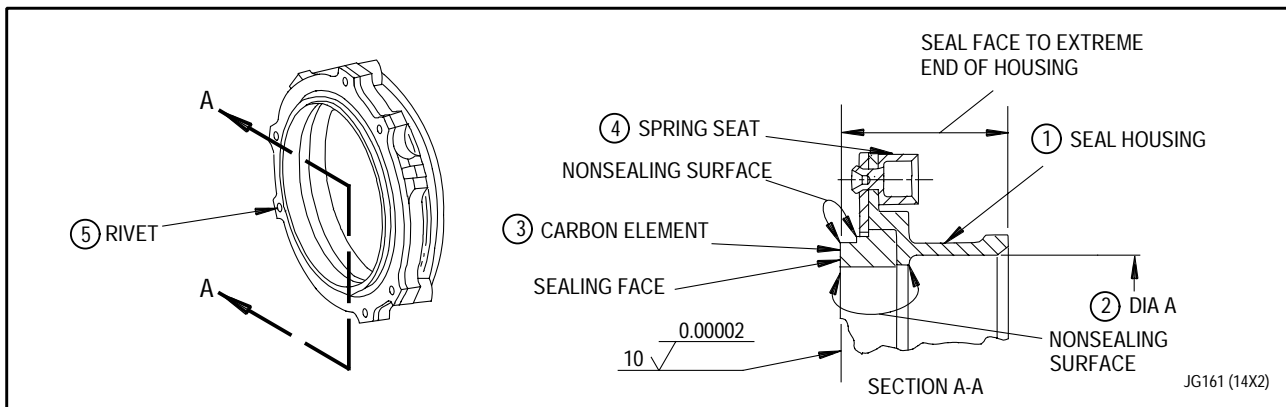
- a. This work package contains instructions for inspection of the No. 3 bearing rear face seal assembly.

2. NO. 3 BEARING REAR FACE SEAL ASSEMBLY (PN 4036993 or 4036994) - INSPECTION.

(See Figure 1.)

b. Dimensionally inspect face seal assembly. (See figure 1.)

a. Visually inspect No. 3 bearing rear face seal assembly for surface defects using white light and 3X magnifying glass.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Seal housing -			
Cracks	Not serviceable	See corrective action.	Replace assembly.
Nicks, dents or scratches (without burrs)	Serviceable	Not applicable	Not applicable
Nicks, dents or scratches (with burrs)	Not serviceable	Any amount	Remove high metal with fine file or stone.
2. Diameter A -			
Dimensional	0.002 inch out-of-round maximum excess of tolerance	Reparable provided 0.003 to 0.007 inch thick hardface will restore diameter to serviceable limits.	Hardface Diameter A per WP 419 00.
Wear	0.0005 inch maximum on a side	Reparable provided 0.003 to 0.007 inch thick plating will restore diameter to serviceable limits.	Hardface Diameter A per WP 419 00.

Figure 1. No. 3 Bearing Rear Face Seal Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Diameter A - (continued)			
Nicks, or dents (without burrs)	Serviceable	Not applicable	Not applicable.
Nicks or dents (with burrs)	Not serviceable	Any amount	Polish diameter per WP 419 00.
Chipped	0.010 inch width and a combined length less than 0.400 inch. Chips not closer together than 0.125 inch.	Any amount	Hardface Diameter A per WP 419 00.
Cracks	Serviceable provided cracks do not extend into parent material.	See corrective action.	Replace assembly.
Scratches (without burrs)	0.001 inch width and depth.	Any amount	Hardface Diameter A per WP 419 00.
Scratches (with burrs)	Not serviceable	Any amount	Polish diameter per WP 419 00.
Pitting	Serviceable provided sealing is not affected.	Any amount	Hardface Diameter A per WP 419 00.
Discoloration	Serviceable	Not applicable	Not applicable.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Carbon element -			
Wear (face seal height)	Per WP 801 00, Reference 3309	See corrective action.	Replace carbon element per WP 419 00.
Cracks	Not serviceable	See corrective action.	Replace carbon element per WP 419 00.
Deterioration (crumbling of carbon)	Not serviceable	See corrective action.	Replace carbon element per WP 419 00.
Chips, nicks, scratches (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat.	Defects larger than serviceable limit may be removed by lapping to serviceable limit.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3309. Replace carbon element damaged in excess of serviceable limit per WP 419 00.
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed.	Not applicable	Not applicable.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Carbon element - (continued)			
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded.	Scratches larger than serviceable limit may be removed by lapping to serviceable limit. See corrective action.	Lap carbon element to serviceable limit per WP 801 00, Reference 3309. Replace carbon element damaged in excess of serviceable limits per WP 419 00.
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch.	Squareness outside serviceable limit may be regained by lapping to serviceable limit. See corrective action.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3309. Replace carbon element damaged in excess of serviceable limits per WP 419 00.
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limits may be regained by lapping to serviceable limit. See corrective action.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3309. Replace carbon element damaged in excess of serviceable limits per WP 419 00.
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check.	Surface finish which does not register light bands during flatness check may be restored by lapping. See corrective action.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3309. Replace carbon element damaged in excess of serviceable limits per WP 419 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Spring seat - Loose, damaged or missing	Not serviceable	See corrective action.	Replace spring seat per WP 419 00.
5. Rivets - Loose, damaged or missing	Not serviceable	See corrective action.	Replace rivet per WP 419 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 4 BEARING FRONT AND REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and	
Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

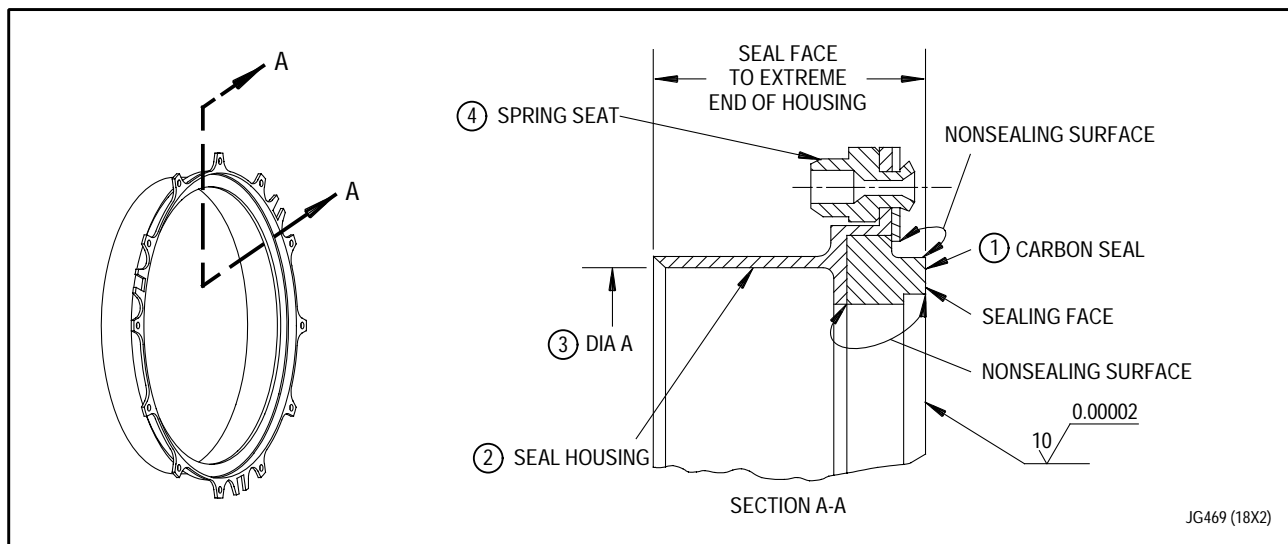
1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 4 bearing front and rear face seal assembly.

2. NO. 4 BEARING FRONT AND REAR FACE SEAL ASSEMBLY (PN 4035882 or 4035883) - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 4 bearing face seal assembly for surface defects using white light and 3X magnifying glass.
- b. Dimensionally inspect face seal assembly. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Carbon seal -			
Wear (face seal height)	Per WP 801 00, Reference 3105.	See corrective action.	Replace carbon element per WP 420 00.
Cracks	Not serviceable	See corrective action.	Replace carbon element per WP 420 00.
Deterioration (crumbling of carbon)	Not serviceable	See corrective action.	Replace carbon element per WP 420 00.

Figure 1. No. 4 Bearing Front and Rear Face Seal Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Carbon seal - (continued)			
Chips, nicks, scratches (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat.	Defects larger than serviceable limit may be removed by lapping to serviceable limit.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3105. Replace carbon element damaged in excess of serviceable limits per WP 420 00.
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed.	Not applicable	Not applicable
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded.	Scratches larger than serviceable limit may be removed by lapping to serviceable limit.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3105. Replace carbon element damaged in excess of serviceable limits per WP 420 00.
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch.	Squareness outside serviceable limit may be regained by lapping to serviceable limit.	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3105. Replace carbon element damaged in excess of serviceable limits per WP 420 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Carbon seal - (continued)			
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limits may be regained by lapping to serviceable limit	Lap carbon element to serviceable limit. Maintain face seal height per WP 801 00, Reference 3105.. Replace carbon element damaged in excess of serviceable limits per WP 420 00.
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check.	Surface finish which does not register light bands during flatness check may be restored by lapping	Lap carbon element. Maintain face seal height per WP 801 00, Reference 3105.. Replace carbon element damaged in excess of serviceable limits per WP 420 00.
2. Seal housing -			
Cracks	Not serviceable	Not serviceable	Replace assembly.
Nicks, dents or scratches (without burrs)	Serviceable	Not applicable	Not applicable
Nicks, dents or scratches (with burrs)	Not serviceable	Any amount	Remove high metal with fine file or stone.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Diameter A -			
Dimensional	0.002 inch out-of-round maximum excess of tolerance	Reparable provided 0.003 to 0.007 inch thick hardface will restore diameter to serviceable limits.	Hardface Diameter A per WP 420 00.
Wear	0.0005 inch maximum on a side	Reparable provided 0.003 to 0.007 inch thick plating will restore diameter to serviceable limits.	Hardface Diameter A per WP 420 00.
Nicks, or dents (without burrs)	Serviceable	Not applicable	Not applicable
Nicks or dents (with burrs)	Not serviceable	Any amount	Polish diameter per WP 420 00.
Chipped	0.010 inch width and length with a combined length less than 0.400 inch. Chips not closer together than 0.125 inch.	Any amount	Hardface Diameter A per WP 420 00.
Cracks	Not serviceable	Not reparable	Replace assembly.
Scratches (without burrs)	0.001 inch width and depth.	Any amount	Hardface Diameter A per WP 420 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Diameter A - (continued)			
Scratches (with burrs)	Not serviceable	Any amount	Polish diameter per WP 420 00.
Pitting	Serviceable provided sealing is not affected.	Any amount	Hardface Diameter A per WP 420 00.
Discoloration	Serviceable	Not applicable	Not applicable.
4. Spring seat -			
Loose, damaged or missing	Not serviceable	See corrective action.	Replace spring seat per WP 420 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 4 BEARING -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

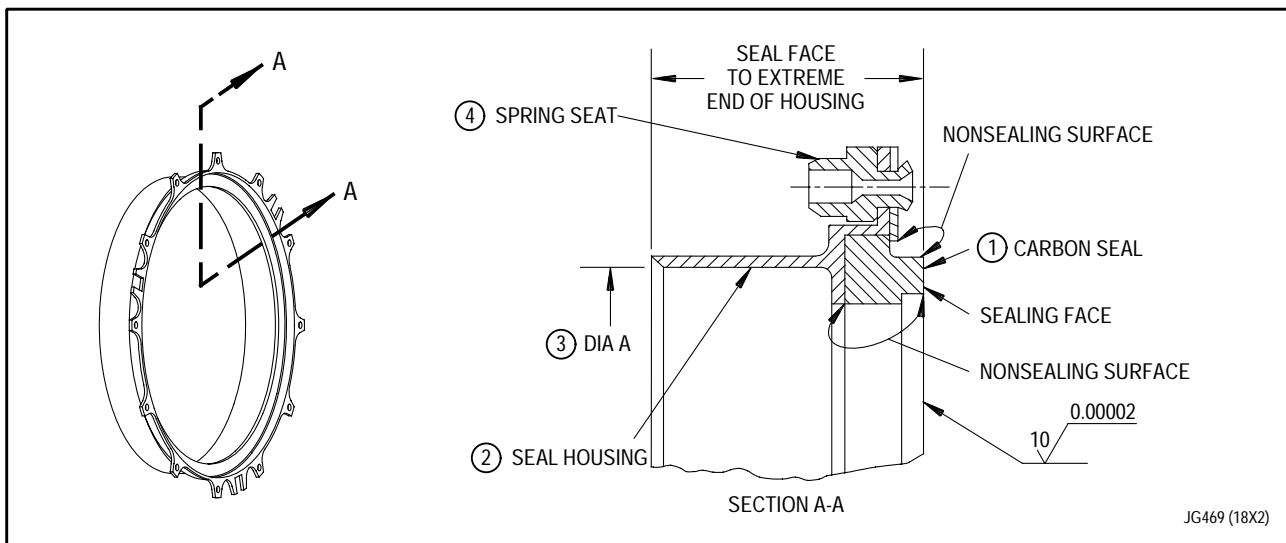
1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of the No. 4 bearing face seal assembly after volcanic ash ingestion.

2. NO. 4 BEARING FACE SEAL ASSEMBLY (PN 4035882 or 4035883) - INSPECTION.

(See Figure 1.)

- a. Visually inspect face seal assembly using white light and 3X magnifying glass for surface defects.
- b. Dimensionally inspect face seal assembly. (See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Carbon seal -			
Wear (face seal height)	1.520 inch height	Not repairable	Replace assembly.
Cracks	Not serviceable	Not repairable	Replace assembly.
Deterioration (crumbling of carbon)	Not serviceable	Not repairable	Replace assembly.

Figure 1. No. 4 Bearing Face Seal Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Carbon seal - (continued)			
Chips, nicks, scratches (sealing face)	Serviceable provided a concentric circular area of not less than 60% of original width of seal face remains undamaged and makes sealing contact with seal seat	Defects larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height 1.520 to 1.530 inches.	Lap carbon element. Replace assembly if carbon element damaged in excess of serviceable limits per WP 420 00.
Chips, nicks, scratches (nonsealing surface)	Serviceable provided all other items of this table are observed	-	-
Scratches (extending across sealing face)	Serviceable provided a depth of 0.005 inch and a width of 0.010 inch is not exceeded	Scratches larger than serviceable limit may be removed by lapping to serviceable limit. Maintain face seal height 1.520 to 1.530 inches.	Lap carbon element. Replace assembly if carbon element damaged in excess of serviceable limits per WP 420 00.
Squareness (sealing surface)	Seal face shall be square with Diameter A within 0.001 inch.	Squareness outside serviceable limit may be regained by lapping to serviceable limit. Maintain face seal height 1.520 to 1.530 inches.	Lap carbon element. Replace assembly if carbon element damaged in excess of serviceable limits per WP 420 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Carbon element - (continued)			
Flatness (sealing surface)	Flatness of seal face shall be within two helium light bands. Inspect using optical flat. Refer to T.O. 2-1-111.	Flatness outside serviceable limits may be regained by lapping to serviceable limit. Maintain face seal height 1.520 to 1.530 inches.	Lap carbon element. Replace assembly if carbon element damaged in excess of serviceable limits per WP 420 00.
Surface finish (sealing surface)	Serviceable provided light bands are visible during flatness check	Surface finish which does not register light bands during flatness check may be restored by lapping. Maintain face seal height 1.520 to 1.530 inches.	Lap carbon element. Replace assembly if carbon element damaged in excess of serviceable limits per WP 420 00.
2. Seal housing -			
Cracks	Not serviceable	Not reparable	Replace assembly.
Nicks, dents, or scratches (without burrs)	Any amount	-	-
Nicks, dents, or scratches (with burrs)	Not serviceable	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Diameter A -			
Dimensional	0.002 inch out-of-round maximum excess of tolerance	Not repairable	Replace assembly.
Wear	0.0005 inch maximum on a side	Not repairable	Replace assembly.
Nicks or dents (without burrs)	Any amount	-	-
Nicks or dents (with burrs)	Not serviceable	Not repairable	Replace assembly.
Chipped	0.010 inch width and length with a combined total less than 0.400 inch. Chips not closer together than 0.125 inch	Not repairable	Replace assembly.
Cracks	Not serviceable	Not repairable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Diameter A - (continued)			
Scratches (without burrs)	0.001 inch width and depth	Not reparable	Replace assembly.
Scratches (with burrs)	Not serviceable	Not reparable	Replace assembly.
Pitting	Serviceable provided sealing is not affected	Not reparable	Replace assembly.
Discoloration	Any amount	-	-
4. Spring seat -			
Loose, damaged, or missing	Not serviceable	Not reparable	Replace assembly.

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, COMPRESSOR, THIRD STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	27	5	29
2	0	4	4	6	27

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of third stage compressor stator.

2. THIRD STAGE COMPRESSOR STATOR - INSPECTION.

(See Figure 1.)

- a. Ensure third stage compressor stator has been cleaned per WP 201 00.

- b. Visually inspect stator per figure 1.

- c. Fluorescent penetrant inspect stator for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

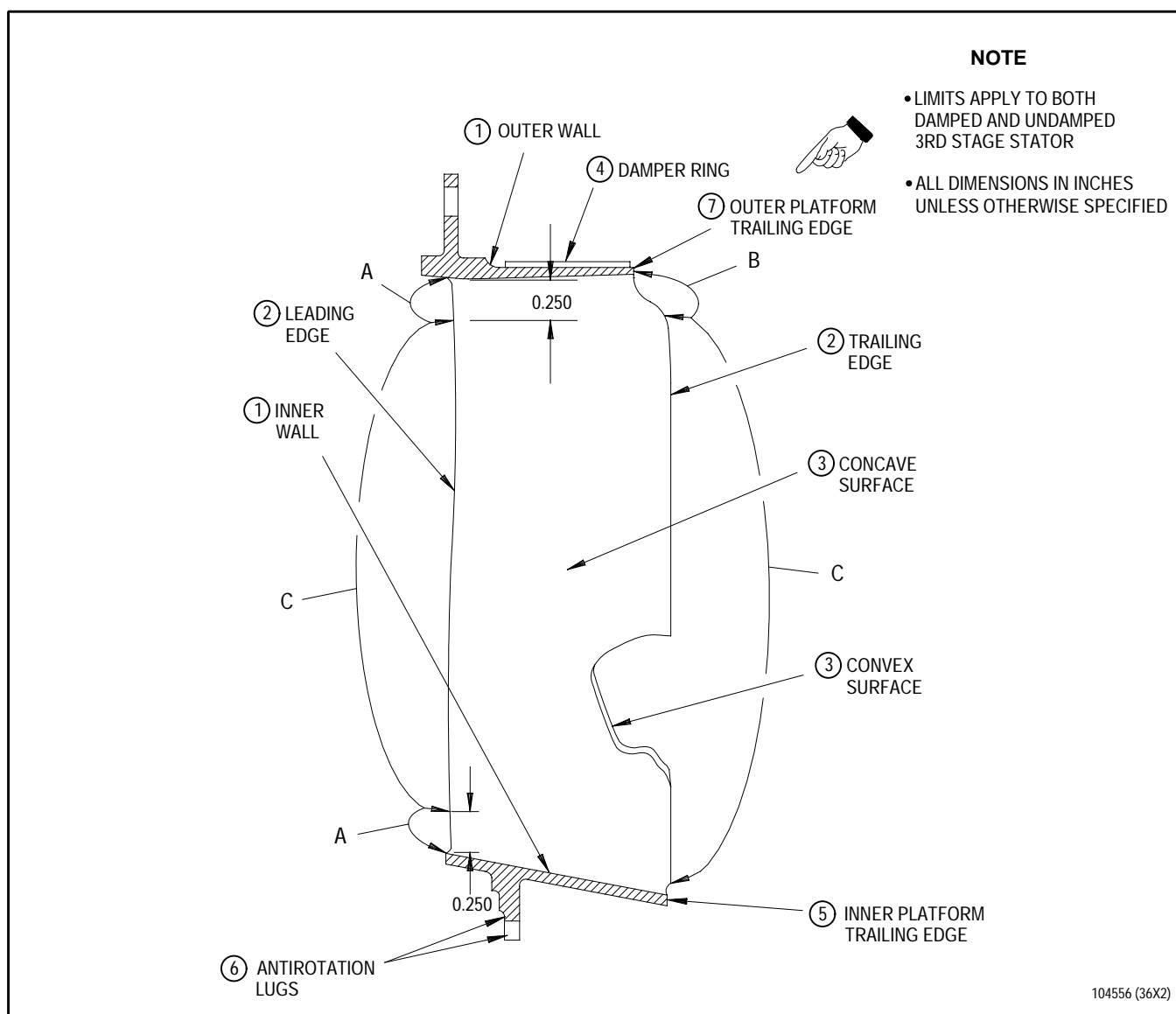


Figure 1. Third Stage Compressor Stator - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Outer and inner walls -			
Cracks (in flange at boltholes)	Not serviceable	Not repairable	Replace stator assembly.
Cracks other than in flange	Not serviceable	Not repairable	Replace stator assembly.
Impact damage, nicks or dents	Not serviceable	Blend depth not to exceed 0.010 inch for outer wall and 0.025 inch for inner wall. No blends permitted in airfoil radii.	Blend repair per WP 421 00.
2. Vane leading and trailing edges -			
Nicks, dents, and bends	Not serviceable	a. Repairable if damage can be blend repaired within maximum depth of following limits: Area A:0.030 inch Area B:0.030 inch Area C:0.125 inch b. Blends on leading and trailing edges must not be directly opposite and shall be separated diagonally by a minimum distance equal to the mean chordal length of the vane.	Blend repair per WP 421 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Vane leading and trailing edges - (continued)			
Nicks, dents, and bends (continued)	Not serviceable	c. Damage in more than three places on any one vane's leading and trailing edges is not acceptable. d. 17 vanes may be blend repaired.	Blend repair per WP 421 00.
Cracks	Not serviceable	Reparable to blend limits defined above.	Blend repair per WP 421 00.
3. Vane convex and concave surfaces - (Not within 0.125 inch of leading and trailing edge)			
Round-bottom dents without cracks	0.005 inch material protrusion on opposite face, 0.020 inch deep.	Not reparable	Replace stator assembly.
Cracks	Not serviceable	Not reparable	Replace stator assembly.
Nicks	Not serviceable	Depth of material removed must not exceed 0.020 inch. Not more than 25% of the vanes in any assembly may be blend repaired.	Blend repair per WP 421 00.
4. Damper ring - Nicks, dents	Not serviceable	Blend depth not to exceed 0.010 inch.	Blend repair per WP 421 00.
5. Inner platform trailing edge - Wear	0.030 inch	See corrective action.	Weld repair per WP 421 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Antirotation lugs -			
Wear of flange face and lugs	0.005 inch	0.020 inch	Weld and plasma spray repair per WP 421 00.
7. Outer platform trailing edge -			
Wear	0.005 inch axially; 0.050 inch minimum platform wall thickness	0.030 inch axially; 0.025 inch minimum platform wall thickness	Weld repair per WP 421 00.

WORK PACKAGE**TECHNICAL PROCEDURES****LOCK, NO. 3 BEARING -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

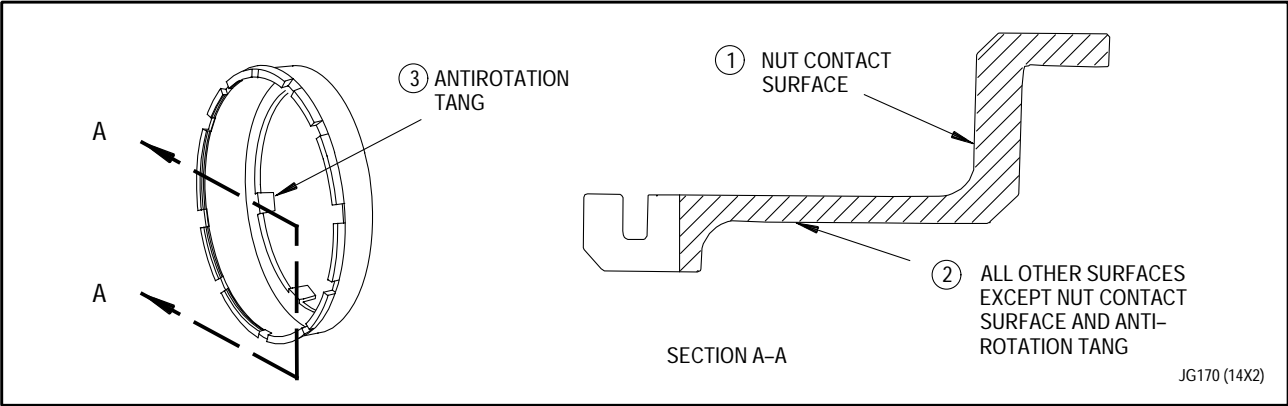
1. INTRODUCTION.

- a. This work package contains instructions for inspection of the No. 3 bearing lock.

2. NO. 3 BEARING LOCK - INSPECTION.

(See Figure 1.)

- a. Inspect No. 3 bearing lock.
(See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Nut contact surface - Burr's, scratches, galling, scoring, pitting, corrosion, tool damage	Not serviceable	See corrective action.	Replace lock.

Figure 1. No. 3 Bearing Lock - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. All other surfaces (except nut contact surface and antirotation tangs) -			
Burrs, scratches, galling, pitting, corrosion, tool damage	Not serviceable	See corrective action.	Replace lock.
3. Antirotation tangs -			
Nicks, dents scratches	Not serviceable	See corrective action.	Replace lock.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					0

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the inspection of the No. 3 bearing support assembly.

2. NO. 3 BEARING SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 3 bearing support assembly. (See figure 1.)
- b. Dimensionally inspect support assembly. (See figure 1.)

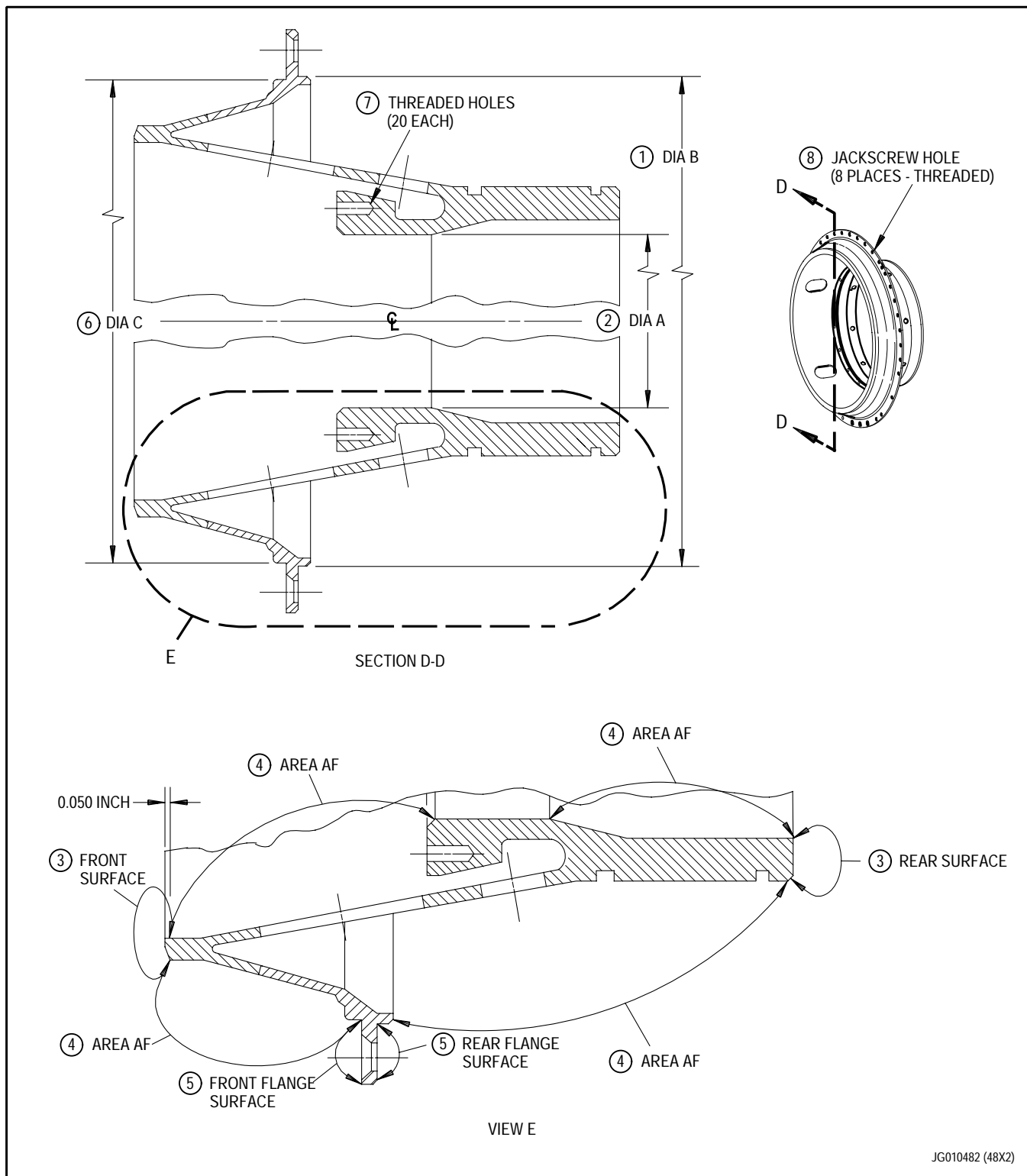


Figure 1. No. 3 Bearing Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Diameter B -			
Wear	Per WP 801 00, Reference 3046.	Reparable	Plasma spray per WP 423 00.
Galling	Per WP 801 00, Reference 3046. Diametrical measurement shall include point of deepest galling.	Reparable	Plasma spray per WP 423 00.
2. Diameter A -			
Wear	Per WP 801 00, Reference 2913.	Reparable	Plasma spray per WP 423 00.
3. Front and rear surfaces -			
Raised metal	Not serviceable	Any amount.	Blend repair to remove raised metal per WP 423 00.
Nicks, dents, scratches	0.010 inch depth, 0.100 minimum width, spaced 1.000 inch apart	Reparable	Blend repair to remove raised metal per WP 423 00.
Cracks	Not serviceable	Not reparable.	Replace support.
4. Area AF -			
Raised metal	Not serviceable	Reparable	Blend repair per WP 423 00.
Nicks, dents, scratches	Not serviceable	Reparable	Blend repair per WP 423 00.
Cracks	Not serviceable	Not reparable.	Replace support.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
5. Front and rear flange surfaces -			
Raised metal	Not serviceable	Reparable	Blend repair per WP 423 00.
Galling, wear	0.003 inch depth for 25% of repair area	Reparable	Blend repair or plasma spray per WP 423 00.
Nicks, dents, scratches	Not serviceable	Reparable	Blend repair per WP 423 00.
Cracks	Not serviceable	Not reparable.	Replace support.
6. Diameter C -			
Wear	Per WP 801 00, Reference 2935.	Reparable	Plasma spray per WP 423 00.
7. Threaded holes (20 each) -			
Damage	Not serviceable	Not reparable.	Replace support.
8. Jackscrew holes (8 places threaded) -			
Stripped threads	Four unstripped holes equally spaced	Reparable	Repair per WP 423 00.

WORK PACKAGE

TECHNICAL PROCEDURES

BAFFLE, NO. 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

T.O. 2J-F100-53-7

WP 324 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 3 bearing baffle.

2. NO. 3 BEARING BAFFLE - INSPECTION.

(See Figure 1.)

- a. Inspect No. 3 bearing baffle.
(See figure 1.)

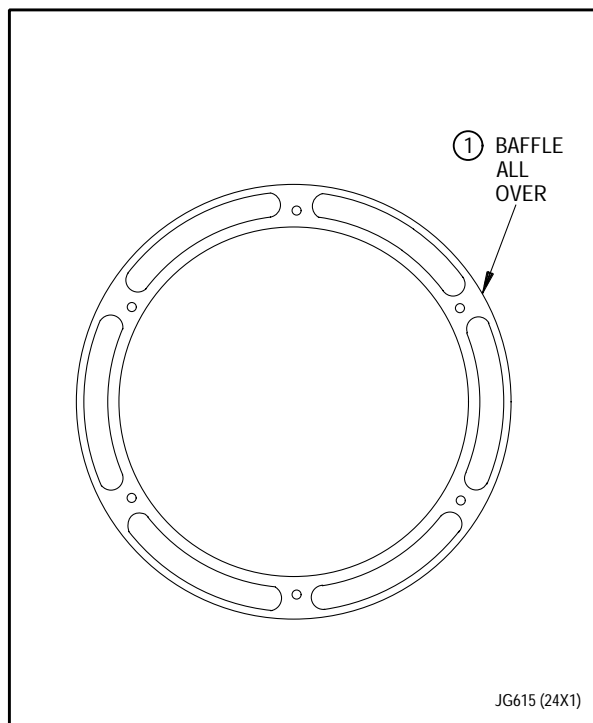


Figure 1. No. 3 Bearing Baffle - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Baffle all over -			
Stress, corrosion, fatigue, cracking	Not serviceable	See corrective action.	Replace baffle.
Scratches	0.010 inch depth if polished out	See corrective action.	Replace baffle.
Round bottom dents	0.025 inch depth; no sharp radius	See corrective action.	Replace baffle.

WORK PACKAGE

TECHNICAL PROCEDURES

RING ASSEMBLY, AIR SEALING, NO. 4 BEARING, REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	4	18	5	1
2 - 3	0			6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing rear air sealing ring assembly.

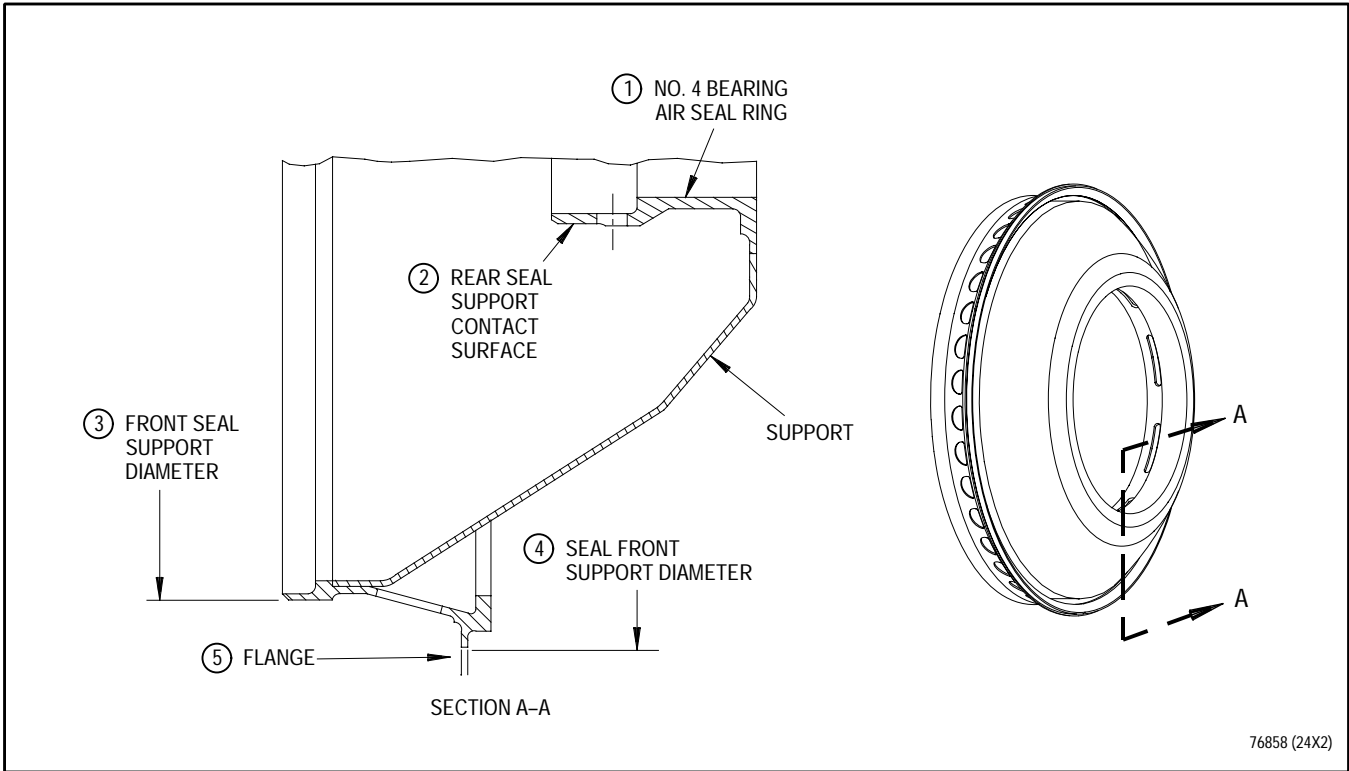
2. NO. 4 BEARING REAR AIR SEALING RING ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing rear air sealing ring assembly has been cleaned per WP 201 00.

b. Fluorescent penetrant inspect air sealing ring assembly for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect air sealing ring assembly for surface damage and wear per figure 1.

d. Dimensionally inspect air sealing ring assembly per figure 1.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. No. 4 bearing air seal ring - Wear, grooving	Per WP 801 00, Reference 3057	Not reparable	Replace air sealing ring assembly.

Figure 1. No. 4 Bearing Rear Air Sealing Ring Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Rear seal support contact surface-			
Distortion, wear	Per WP 801 00, Reference 3108.	Reparable	Nickel plate per WP 425 00.
3. Front seal support diameter-			
Wear	Per WP 801 00, Reference 3320.	Reparable	Plasma spray per WP 425 00.
4. Seal front support diameter-			
Wear	12.625 inch average diameter	Not reparable	Replace air sealing ring assembly.
5. Flange-			
Wear	0.039 inch	Not reparable	Replace air sealing ring assembly.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 4 BEARING SEAL, REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	5	16
2	0	4	0	6	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

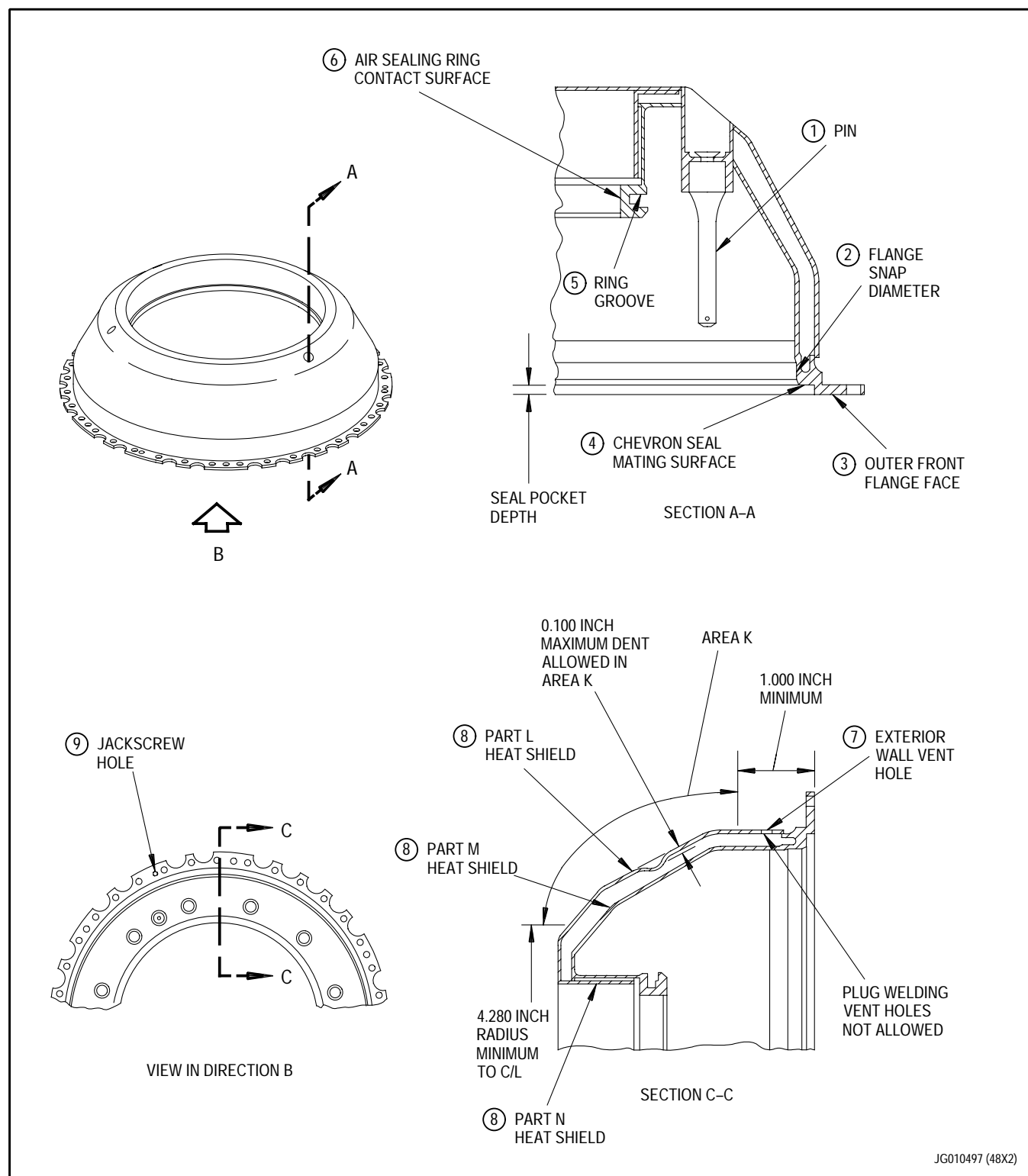
1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing rear seal support assembly.

2. NO. 4 BEARING REAR SEAL SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing rear seal support assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect support assembly for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect support assembly per figure 1.
- d. Dimensionally inspect support assembly per figure 1.



JG010497 (48X2)

Figure 1. No. 4 Bearing Rear Seal Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Pin -			
Bent, damaged, missing	Not serviceable	Not reparable	Replace pin per WP 426 00.
Wear	Not serviceable	Not reparable	Replace pin per WP 426 00.
2. Flange snap diameter -			
Wear	Per WP 801 00, Reference 3245	Not reparable	Replace support.
3. Outer front flange face -			
Wear or fretting	Not serviceable	Not reparable	Replace support.
4. Chevron seal mating surface -			
Scratches or galling caused by metal seal edges	Not serviceable	Reparable	Polish per WP 426 00.
5. Ring groove -			
Wear	Not serviceable	See corrective action	Machine groove oversize per WP 426 00.
6. Air sealing ring contact surface -			
Distortion, wear	Per WP 801 00, Reference 3108.	Not reparable	Replace support.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. Exterior wall vent holes -			
Fluid trapped between inner and outer wall	Not serviceable	Not repairable	Replace support.
8. Part L, M and N heat shields -			
Dents	Dents up to 0.100 inch depth and 0.500 inch diameter are permitted in 6 places. (See Area K.)	Repairable	Weld repair per WP 426 00.
Nicks, cracks, scratches, and gouges with sharp indentations	Not serviceable	Repairable	Weld repair per WP 426 00.
Nicks, cracks, scratches, and gouges	Not serviceable	Repairable	Weld repair per WP 426 00.
9. Jackscrew hole -			
Stripped	Not serviceable	Repairable	Machine per WP 426 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 4 BEARING SEAL, REAR -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	5	16
2	8	4	8	6	8

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

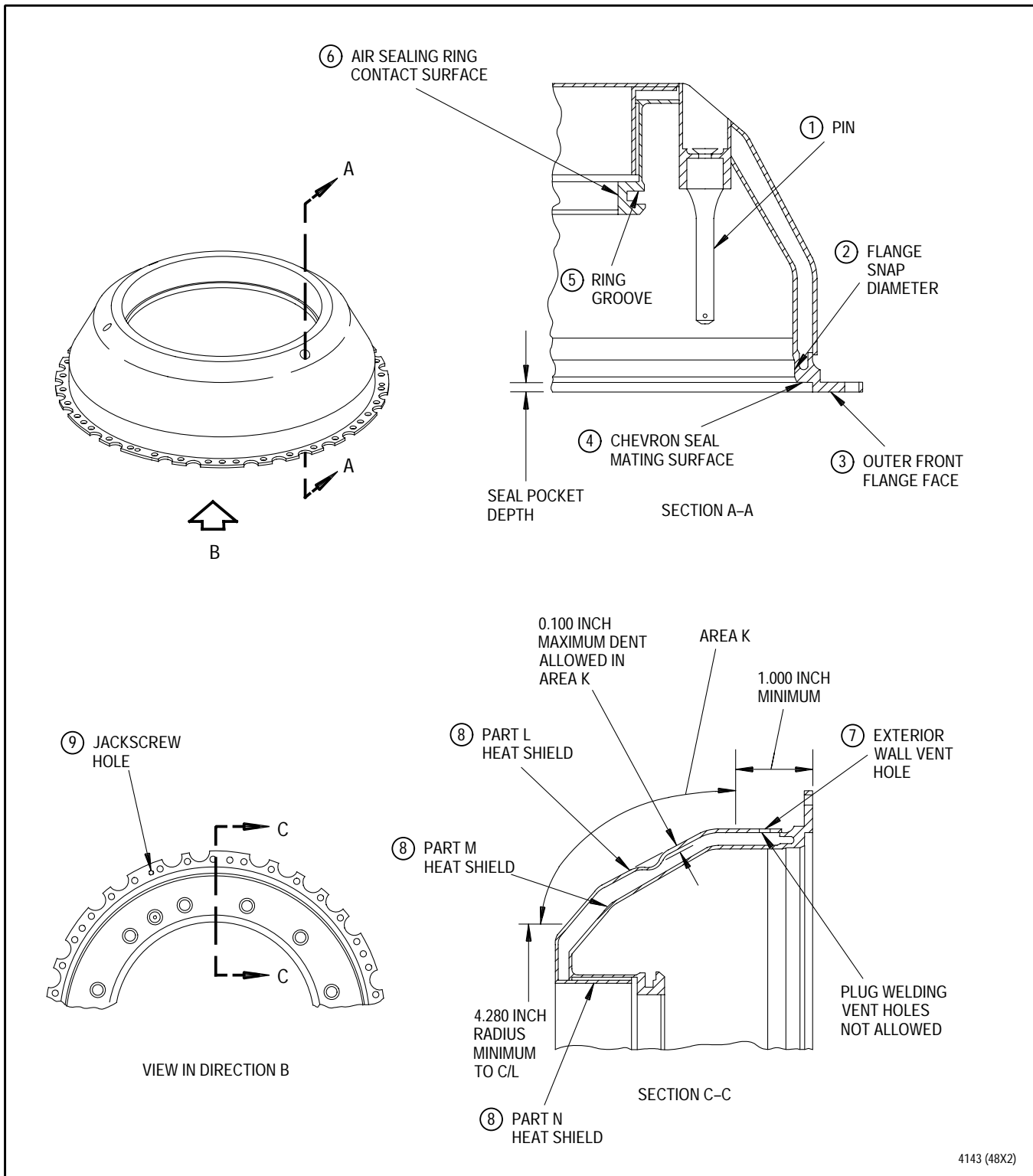
1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of No. 4 bearing seal rear support assembly after volcanic ash ingestion.

2. NO. 4 BEARING SEAL REAR SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing seal rear support assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect support assembly for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect support assembly per figure 1.
- d. Dimensionally inspect support assembly per figure 1.



4143 (48X2)

Figure 1. No. 4 Bearing Seal Rear Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pins -			
Bent, damaged, missing	Not serviceable	Not repairable	Replace pin per WP 426 00.
Wear	Not serviceable	Not repairable	Replace pin per WP 426 00.
2. Flange snap diameter -			
Wear	10.503 inch diameter	Not repairable	Replace support.
3. Outer front flange face -			
Wear or fretting	Not serviceable	Not repairable	Replace support.
4. Chevron seal mating surface -			
Scratches or galling caused by metal seal edges	Not serviceable	Seal pocket depth shall not exceed 0.112 inch after polishing	Polish repair per WP 426 00.
5. Ring groove -			
Wear	Not serviceable	See corrective action	Machine groove oversized per WP 426 00.
6. Air sealing ring contact surface -			
Distortion, wear	7.043 inch diameter	Not repairable	Replace support.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. Exterior wall vent holes -			
Fluid trapped between inner and outer wall	Not serviceable	Not repairable	Replace support.
8. Heat shield -			
Dents	Dents up to 0.100 inch depth and 0.500 inch diameter are permitted in 6 places. (See Area K.)	Not repairable	Replace support.
Nicks, cracks, scratches, and gouges with sharp indentations	Not serviceable	Not repairable	Replace support.
Nicks, cracks, scratches, and gouges	Not serviceable	Not repairable	Replace support.
9. Jackscrew hole -			
Stripped	Not serviceable	Not repairable	Replace support.

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, NO. 4 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	4	18	5 - 6	0
2 - 3	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, CROCUS	P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing housing.

2. NO. 4 BEARING HOUSING - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing housing has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect housing for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect housing per figure 1.
- d. Dimensionally inspect housing per figure 1.

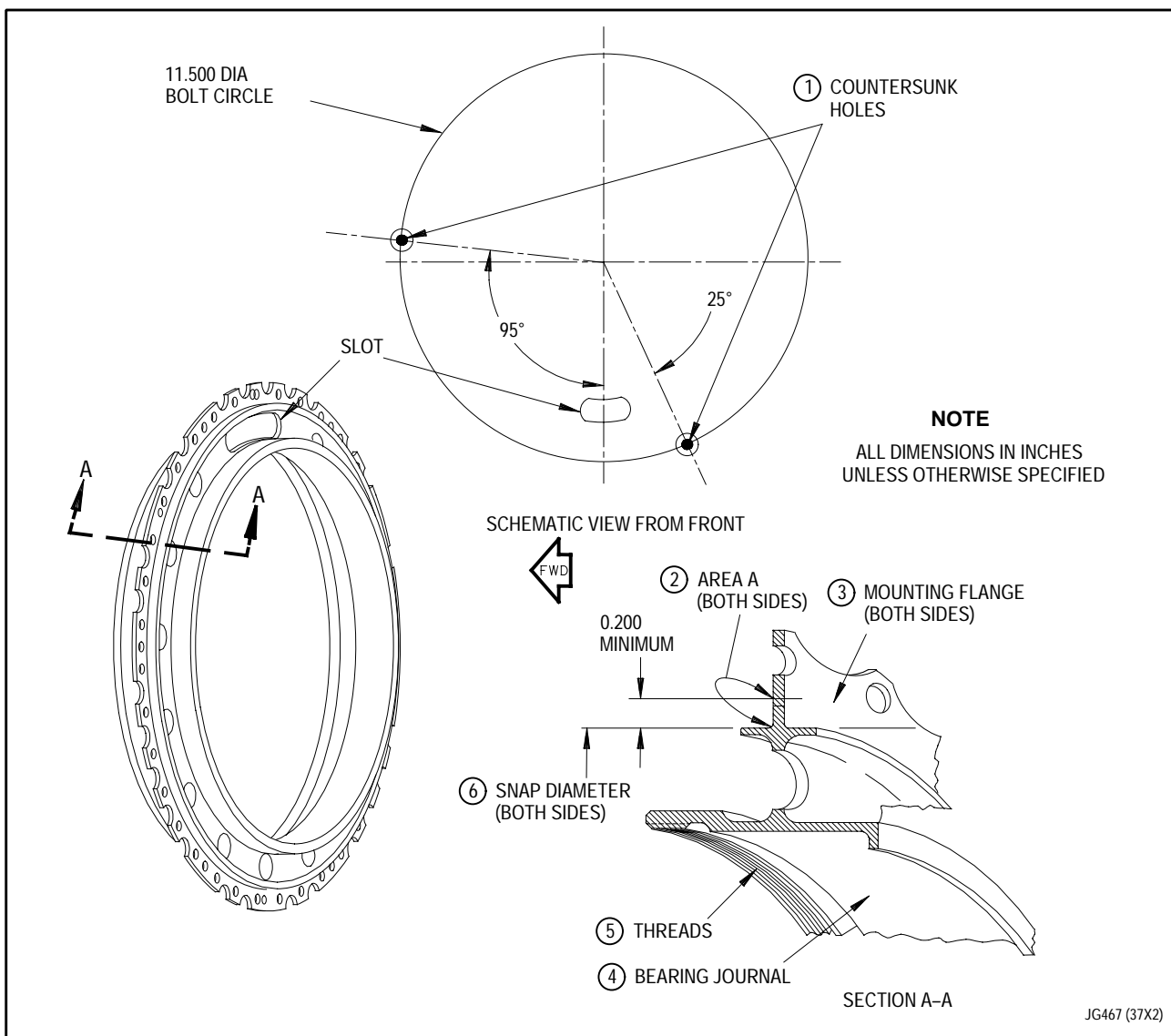


Figure 1. No. 4 Bearing Housing - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Countersunk holes -			
Elongation	0.050 inch. See corrective action.	Not reparable	Stone raised metal flush to original surface.
2. Area A (both sides) -			
Galling or scratches	Serviceable provided that 100% of surface is polished using P-C-458 crocus cloth. Complete flatness of surface not required.	See corrective action.	Plasma spray per WP 427 00.
3. Mounting flange (both sides) (including Area A) -			
Galling	0.003 inch	See corrective action.	Plasma spray per WP 427 00.
Wear	0.003 inch	0.070 inch minimum flange thickness	Plasma spray per WP 427 00.
Parallelism with opposite flange face	0.002 inch	See corrective action.	Plasma spray per WP 427 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Bearing journal - Wear	Per WP 801 00, Reference 3010.	8.8753 inch diameter	Repair per WP 427 00.
5. Threads - Damage	Not established	Not established	Not established
6. Snap Diameter (both sides) - Wear	Per WP 801 00, References 3245 and 3246.	10.482 inch diameter	Repair per WP 427 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, NO. 4 BEARING -

INSPECTION AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	4 - 5	8
2	8			6 Blank	8

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, CROCUS	P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of No. 4 bearing housing after volcanic ash ingestion.

2. NO. 4 BEARING HOUSING - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing housing has been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect housing for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect housing per figure 1.

- d. Dimensionally inspect housing per figure 1.

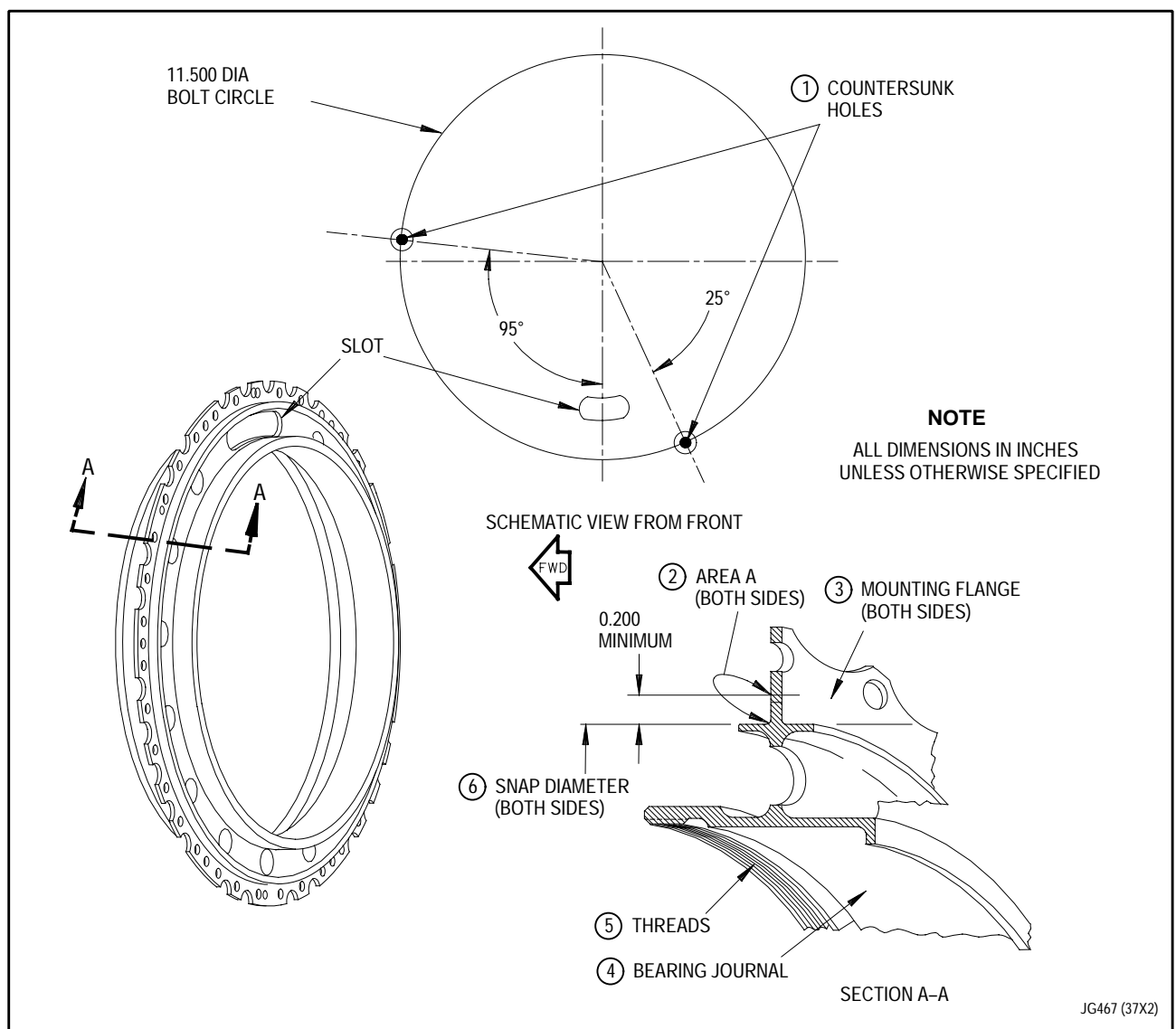


Figure 1. No. 4 Bearing Housing - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Countersunk holes			
Elongation	0.050 inch	Not reparable	Replace housing.
2. Area A (both sides)			
Galling or scratches	Serviceable provided that 100% of surface is polished using P-C-458 crocus cloth. Complete flatness of surface not required.	Not reparable	Replace housing.
3. Mounting flange (both sides including Area A)			
Galling	0.003 inch	Not reparable	Replace housing.
Wear	0.003 inch	Not reparable	Replace housing.
Parallelism with opposite flange face	0.002 inch	Not reparable	Replace housing.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Bearing journal			
Wear	8.8588 inch diameter	Not reparable	Replace housing.
5. Threads			
Damage	Not serviceable	Not reparable	Replace housing.
6. Snap diameter (both sides)			
Wear	10.500 inch diameter	Not reparable	Replace housing.

WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP, NO. 4 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	18	4	18	5	0
3	0			6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing scoop.

2. NO. 4 BEARING SCOOP - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing scoop has been cleaned per WP 201 00.
- b. Magnetic particle inspect scoop. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect scoop per figure 1.
- d. Dimensionally inspect scoop per figure 1.

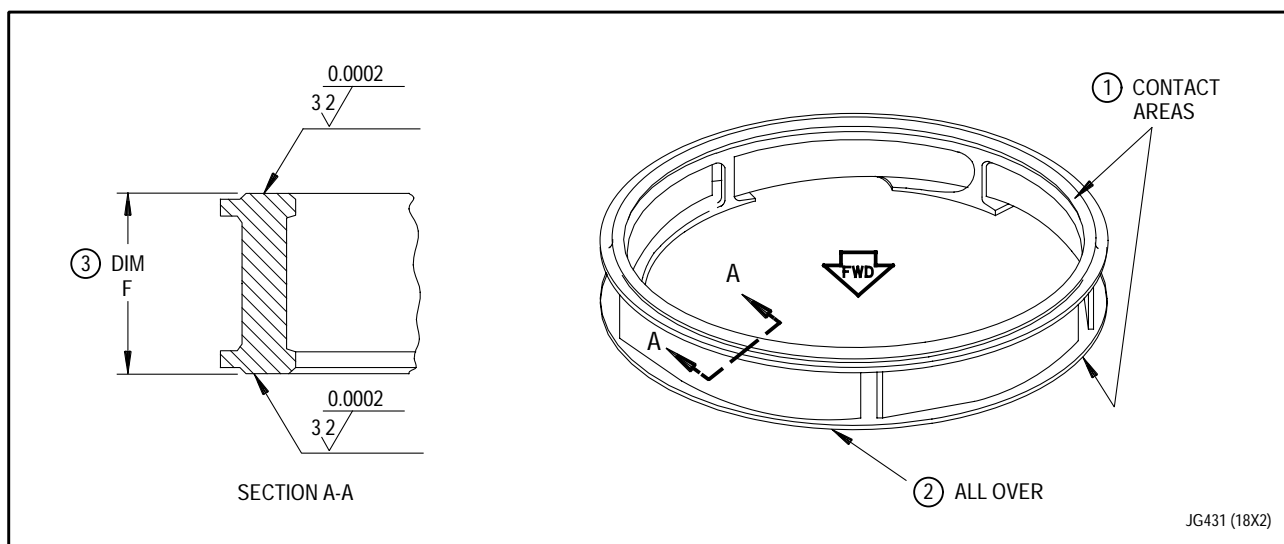


Figure 1. No. 4 Bearing Scoop - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Contact areas -			
Scratches, nicks, dents	Not serviceable	0.010 inch depth	Blend repair per WP 428 00.
Surface finish and flatness	See figure 1.	0.909 inch minimum	Lap per WP 428 00.
2. All over -			
Cracks	Not serviceable	Not repairable	Replace scoop.
3. Dimension F -			
Wear	0.909 inch minimum	0.901 inch minimum	Lap per WP 428 00.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP, NO. 4 BEARING -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	18	4	18	5	8
3	8			6 Blank	8

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of No. 4 bearing scoop after volcanic ash ingestion.

2. NO. 4 BEARING SCOOP - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing scoop has been cleaned per WP 201 00.
- b. Magnetic particle inspect scoop. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect scoop per figure 1.
- d. Dimensionally inspect scoop per figure 1.

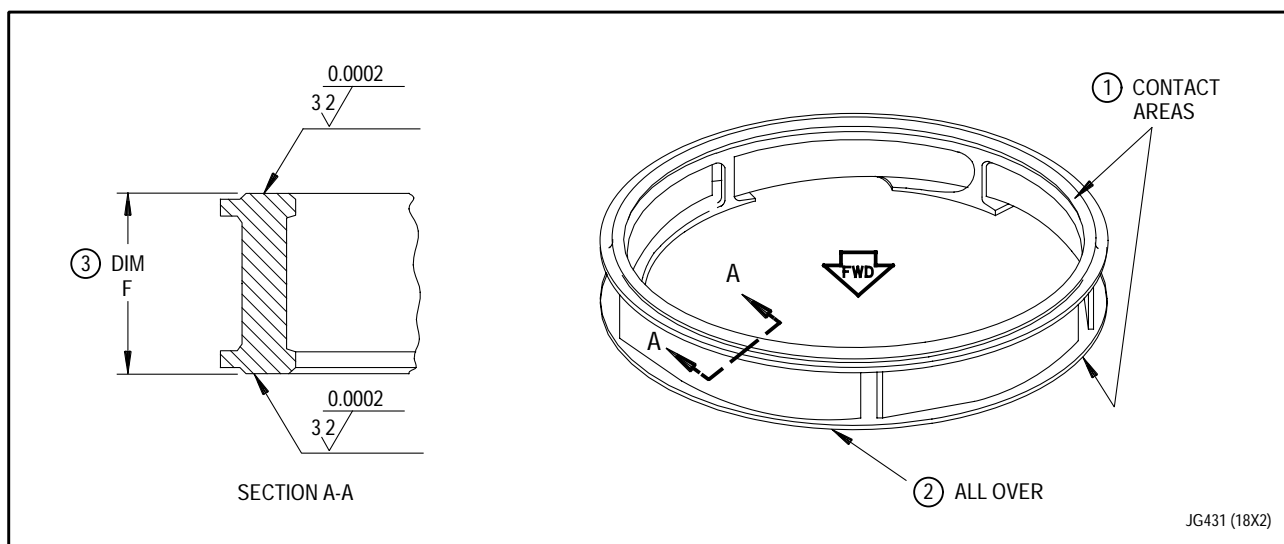


Figure 1. No. 4 Bearing Scoop - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Contact areas -			
Scratches, nicks, dents	Not serviceable	Not repairable	Replace scoop.
Surface finish	(See figure.)	Not repairable	Replace scoop.
2. All over -			
Cracks	Not serviceable	Not repairable	Replace scoop.
3. Dimension F -			
Wear	0.909 inch minimum	Not repairable	Replace scoop.

WORK PACKAGE

TECHNICAL PROCEDURES

RING SEGMENT, COMPRESSOR STATOR SUPPORT,
TENTH THROUGH TWELFTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 10th- through 12th-stage compressor stator support ring segments.

2. TENTH- THROUGH TWELFTH-STAGE COMPRESSOR STATOR SUPPORT RING SEGMENTS

(PN 4076566 AND PN 4076567) - INSPECTION.

(See Figure 1.)

- a. Visually inspect 10th through 12th stage compressor stator support ring segments. (See figure 1.)

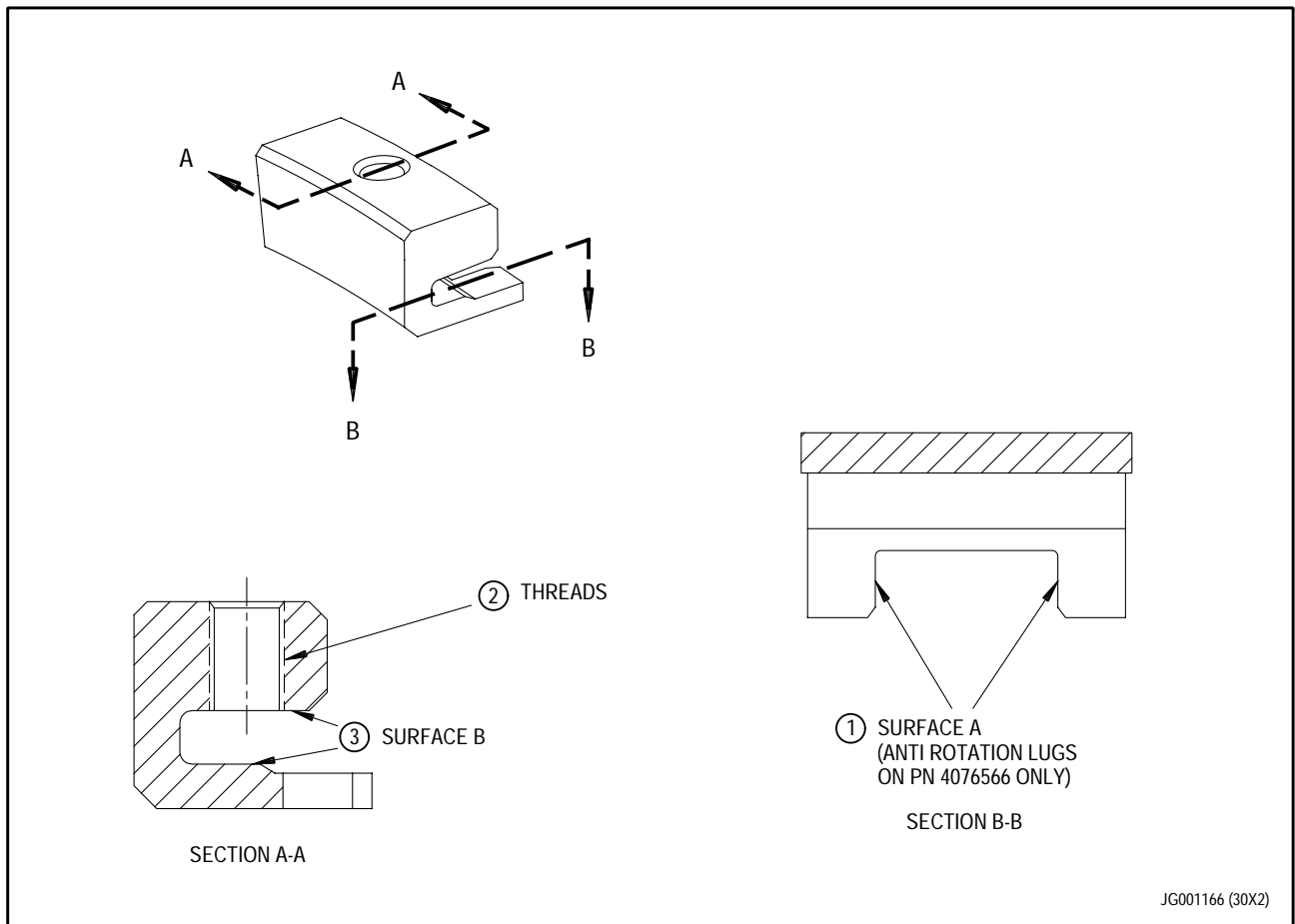


Figure 1. Tenth- Through Twelfth-Stage Compressor Stator Support Ring Segment - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Surface A - (Anti Rotation Lugs on PN 4076566 Only)			
Wear	0.005 inch depth	See corrective action.	Replace segment.
2. Threads -			
Pits, galling deformation	Not serviceable	See corrective action.	Replace segment.
3. Surface B -			
Wear	0.004 inch depth	See corrective action.	Replace segment.

WORK PACKAGE

TECHNICAL PROCEDURES

SHROUD, COMPRESSOR STATOR, THIRD STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	27	3	18	4	27

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Shroud, Compressor Stator, Third Stage - Repair - - - - -	WP 430 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

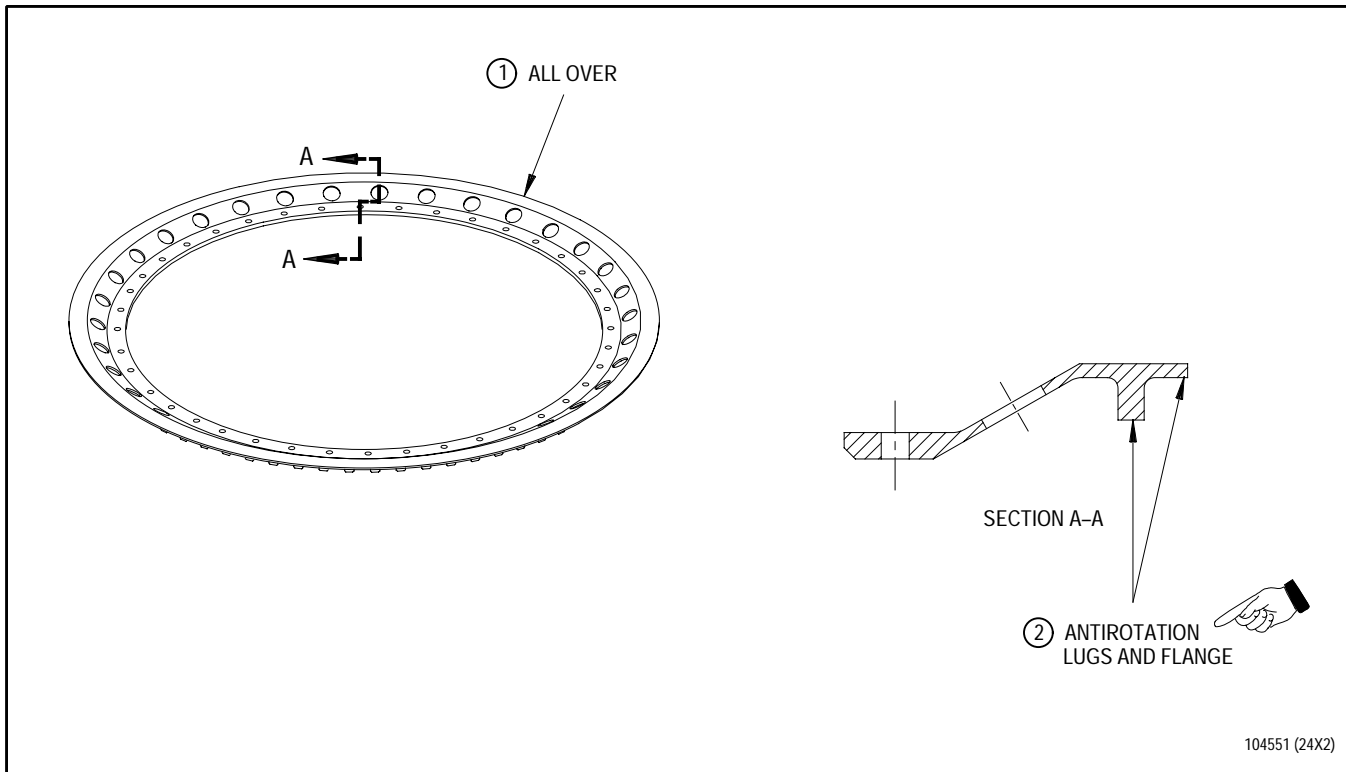
1. INTRODUCTION.

- a. This work package contains instructions for inspection of 3rd stage compressor stator shroud.

2. THIRD STAGE COMPRESSOR STATOR SHROUD - INSPECTION.

(See Figure 1.)

- a. Ensure 3rd stage compressor stator shroud has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect shroud for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect shroud per figure 1.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not repairable	Replace shroud.
Impact damage, nicks or dents	Well-rounded damage 0.025 inch deep. Non-destructive test shall confirm no cracks.	Not repairable	Replace shroud.
2. Antirotation lugs and flange - Wear	0.005 inch	0.020 inch	Weld repair lugs and plasma spray repair flange per WP 430 00.

Figure 1. Third Stage Compressor Stator Shroud - Inspection

TECHNICAL PROCEDURES

SHROUD SET, REAR COMPRESSOR STATOR, INLET -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
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1 - 4 25

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Shroud Set, Rear Compressor Stator, Inlet - Repair - - - -	WP 431 00
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor stator inlet shroud set.

2. REAR COMPRESSOR STATOR INLET SHROUD SET - INSPECTION.

(See Figure 1.)

- a. Ensure rear compressor stator inlet shroud set has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect shroud set for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect shroud set per figure 1.
- d. After inspection and repair, apply antigalling compound per WP 431 00.

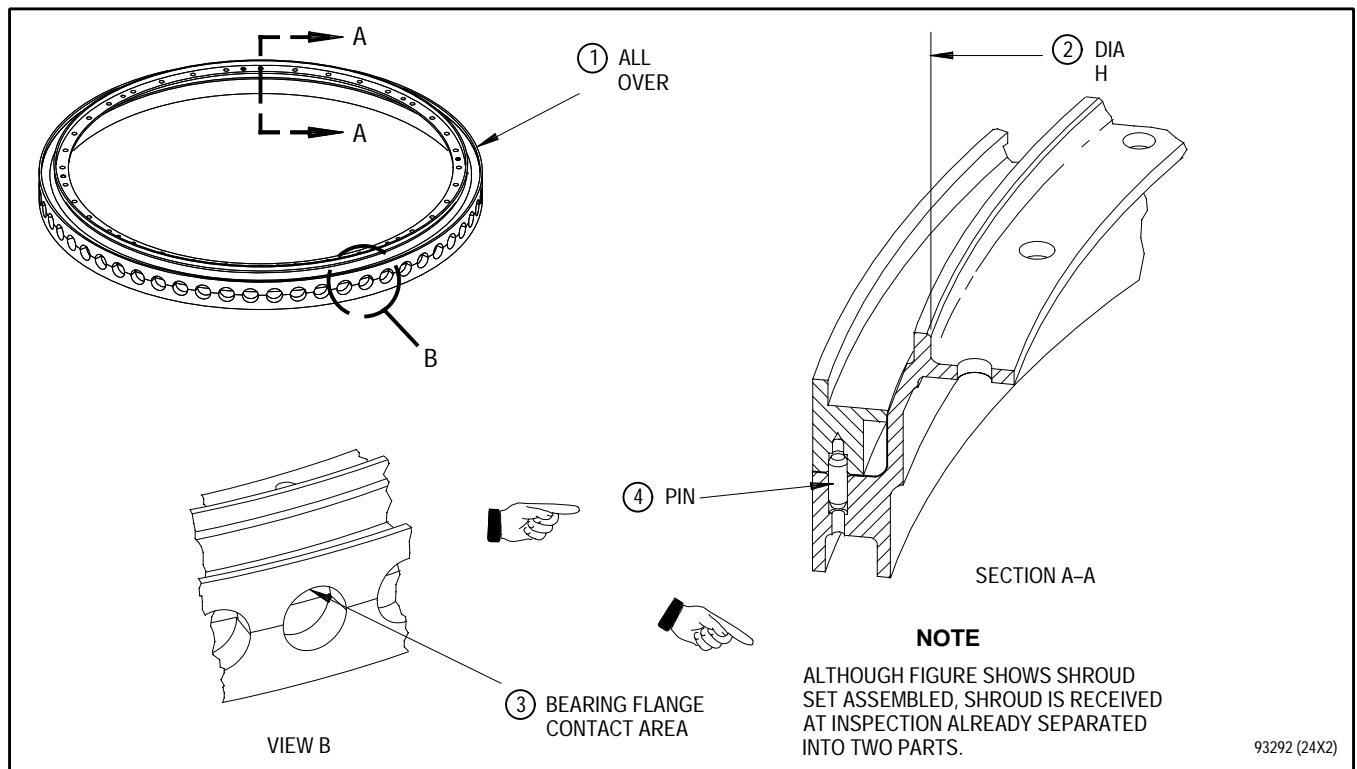


Figure 1. Rear Compressor Stator Inlet Shroud Set - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
1. All over -			
Pitting and nicks	Not serviceable	See corrective action.	Replace shroud set.
Corrosion	Not serviceable	See corrective action.	Clean shroud set per WP 201 00.
2. Diameter H -			
Wear	Per WP 801 00, Reference 2917.	See corrective action.	Replace shroud set.
3. Bearing flange contact area -			
Wear	0.010 inch depth	Not reparable	Replace shroud set.
4. Pin -			
Missing or damaged	Not serviceable	Not reparable	Replace pin per WP 431 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 4 BEARING FRONT SEAL -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	18	4 - 10	16		

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

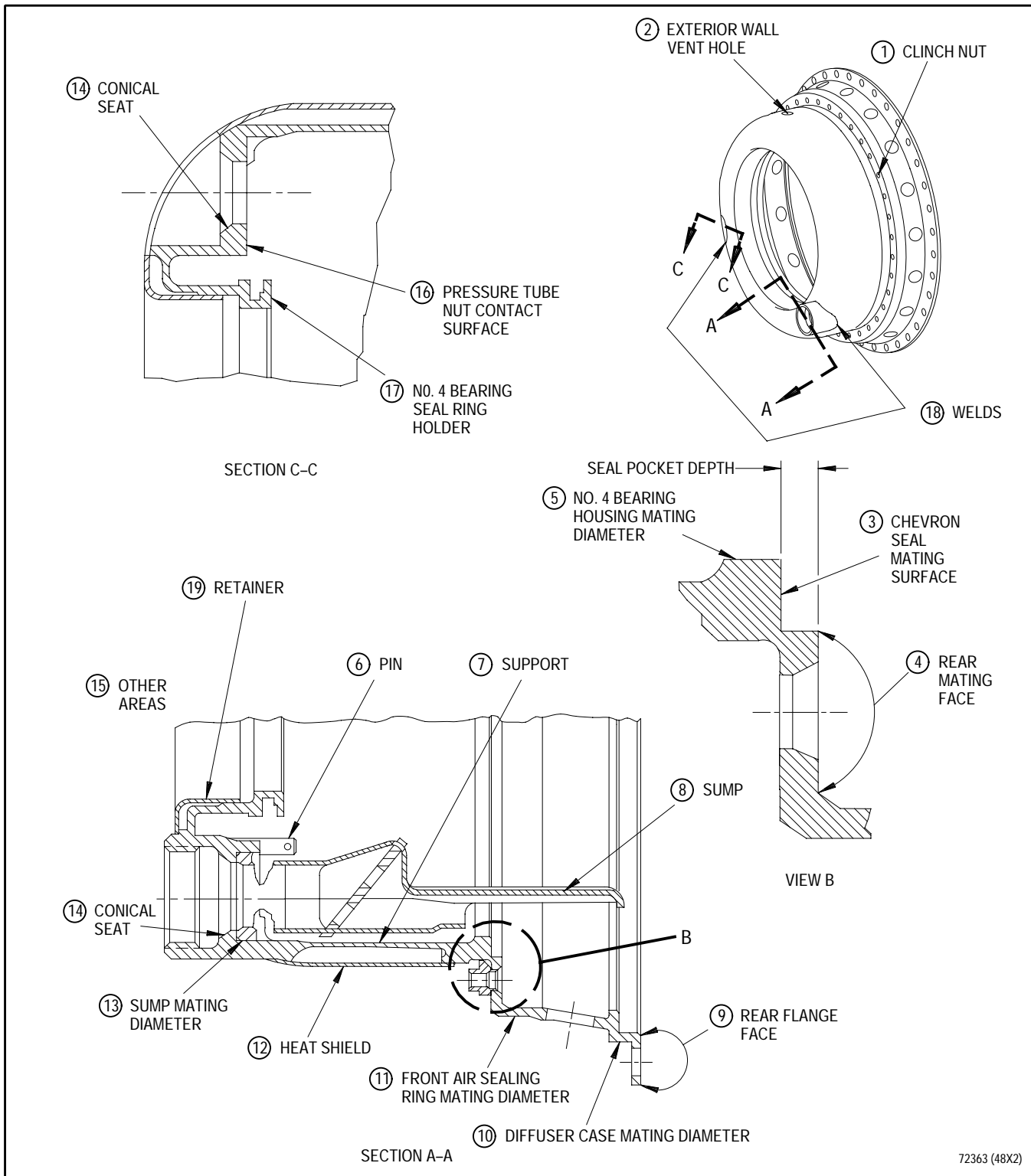
- a. This work package contains instructions for inspection of No. 4 bearing front seal support assembly.

2. NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY (TYPICAL PN 4074882) - INSPECTION.

(See Figures 1 and 2.)

- a. Ensure No. 4 bearing front seal support assembly has been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect support assembly for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect support assembly per figure 1.
- d. Dimensionally inspect support assembly per figure 1.



72363 (48X2)

Figure 1. No. 4 Bearing Front Seal Support Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Clinch nuts - Damaged, missing, stripped threads	Not serviceable	Not repairable	Replace clinch nuts per WP 432 00.
2. Exterior wall vent hole - Fluid trapped between inner and outer wall	Not serviceable	Reparable	Drain as much fluid as possible.
3. Chevron seal mating surface - Scratches or galling caused by metal seal edges	Not serviceable	a. Complete flatness of surface not required but seal pocket depth shall not exceed 0.112 inch. b. Damage in excess of polishing limits.	a. Polish per WP 432 00. b. Plasma spray per WP 432 00.
4. Rear mating face - Galling	0.005 inch depth	See corrective action	Plasma spray per WP 432 00.
5. No. 4 bearing housing mating diameter - Wear	Per WP 801 00, Reference 3246.	Not repairable	Replace support.
6. Pin, 3 places - Bent, damaged	Not serviceable	Not repairable	Replace pins per WP 432 00.
Wear	Not serviceable	Diameter shall not be reduced more than 0.002 inch by polishing.	Polish per WP 432 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. Support -			
Dents	0.100 inch maximum depth as shown in Area AR. (See figure 2.)	Dents deeper than 0.100 inch in Area AR. See figure 2.	Replace support.
Nicks, cracks, scratches, and gouges with sharp indentations	Not serviceable.	a. Up to 0.010 inch deep b. Over 0.010 to 0.047 inch deep but less than 6.0 inches long and not over 0.050 inch wide. Two repairs per surface. One inch distance between repairs. c. In excess of limits	a. Blend per WP 432 00. b. Weld repair per WP 432 00. c. Replace support assembly.
8. Sump -			
Damaged	Not serviceable	Not reparable	Replace sump per WP 432 00.
9. Rear flange face -			
Galling	0.005 inch	See corrective action.	Nickel plate per WP 432 00.
10. Diffuser case mating diameter -			
Wear	Per WP 801 00, Reference 3224.	Not reparable	Replace support.
11. Front air sealing ring mating diameter -			
Wear	Per WP 801 00, Reference 3227.	See corrective action.	Plasma spray per WP 432 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
12. Heat shield -			
Dents	Under 0.100 inch depth as shown in Area AR. (See figure 2.)	0.100 to 0.160 inch deep in area AR. See figure 2. Repairs that will distort part are not permitted.	Weld per WP 432 00.
Nicks, scratches, with sharp indentations and, cracks and gouges	Not serviceable	a. Up to 0.010 inch deep b. Over 0.010 inch deep but less than six inches long and not over 0.050 inch wide. Maximum of two repairs per surface. One inch minimum distance between repairs. c. In excess of limits.	a. Blend per WP 432 00. b. Weld per WP 432 00. c. Replace support assembly.
13. Sump mating diameter -			
Wear	1.0005 inch	0.010 inch deep	Nickel plate per WP 432 00.
14. Conical seats -			
Nicks, dents, scratches	Not serviceable	Not reparable	Replace support.
15. Other areas -			
Nicks, dents, scratches	Not serviceable	Up to 0.025 inch deep	Blend all sharp edges per WP 432 00.
16. Pressure tube nut contact surface -			
Nicks, dents, scratches	Not serviceable	Up to 0.050 inch deep	Blend sharp edges per WP 432 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
17. No. 4 bearing seal ring holder -			
Piston ring groove wear	Not serviceable	See corrective action	Machine groove oversize per WP 432 00.
Piston ring groove step	Not serviceable	See corrective action	Machine groove oversize per WP 432 00.
18. Welds			
Cracks	Not serviceable	Reparable	Repair support per WP 432 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
19. Retainer -			
Dents	Under 0.100 inch deep as shown in Area AR. See figure 2.	0.100 to 0.160 inch deep in Area AR. See figure 2. Repairs that will distort part are not permitted.	Weld per WP 432 00.
Nicks, cracks, scratches, and gouges with sharp indentations	Not serviceable	a. Up to 0.010 inch deep b. 0.010 to 0.025 inch deep but less than 6.000 inches long and not over 0.050 inch wide. • Two repairs per surface • 1.000 inch minimum distance between repairs.	a. Blend per WP 432 00. b. Weld per WP 432 00.
Nicks, cracks, scratches, and gouges with sharp indentations		c. In excess of limits.	c. Replace support assembly.

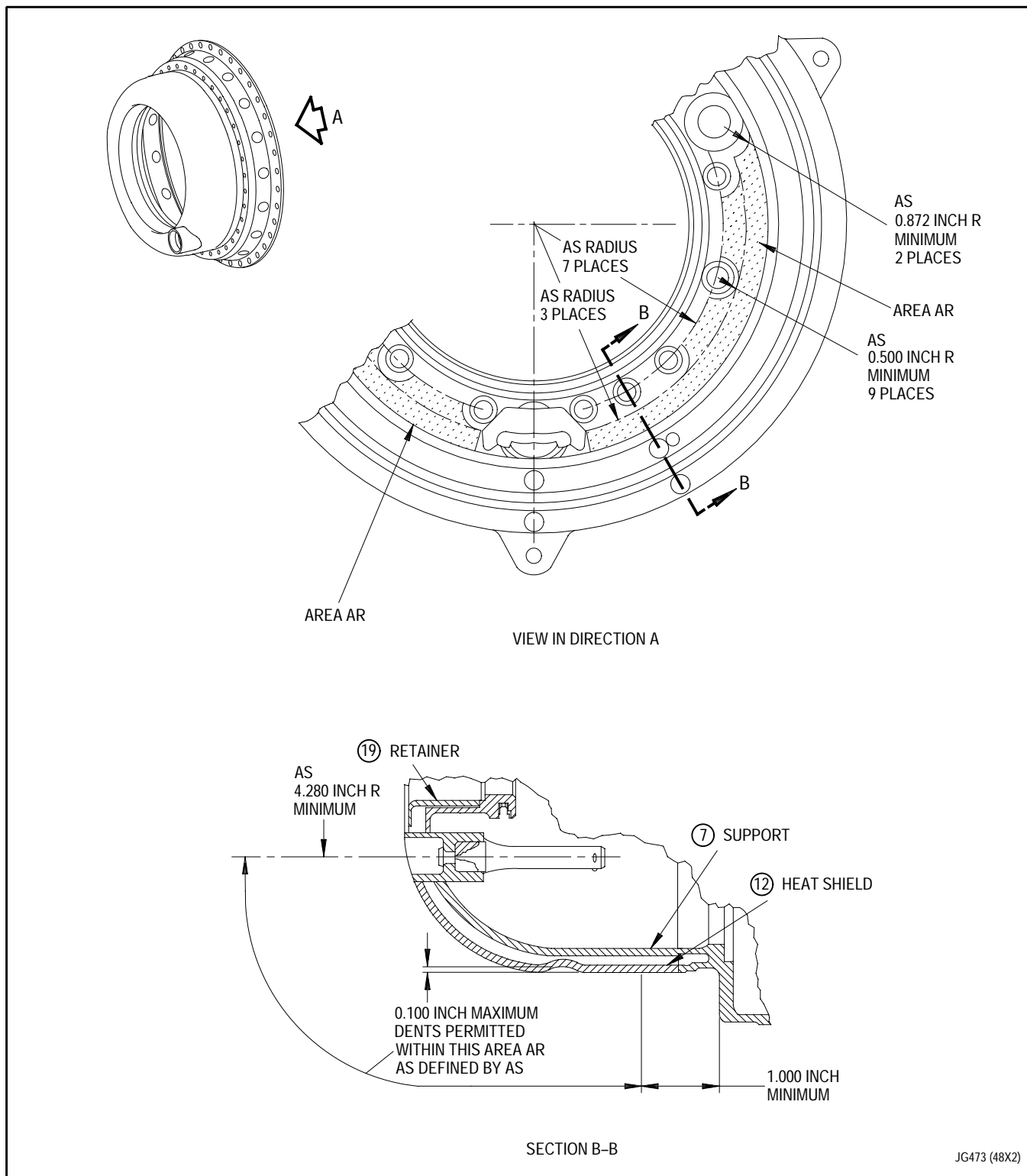


Figure 2. Retainer, Support, and Heat Shield Dent Limits

WORK PACKAGE

TECHNICAL PROCEDURES

RING ASSEMBLY, AIR SEALING, NO. 4 BEARING, FRONT (SINGLE LAND) -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	25	4	18	5	0
2 - 3	0			6	25

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

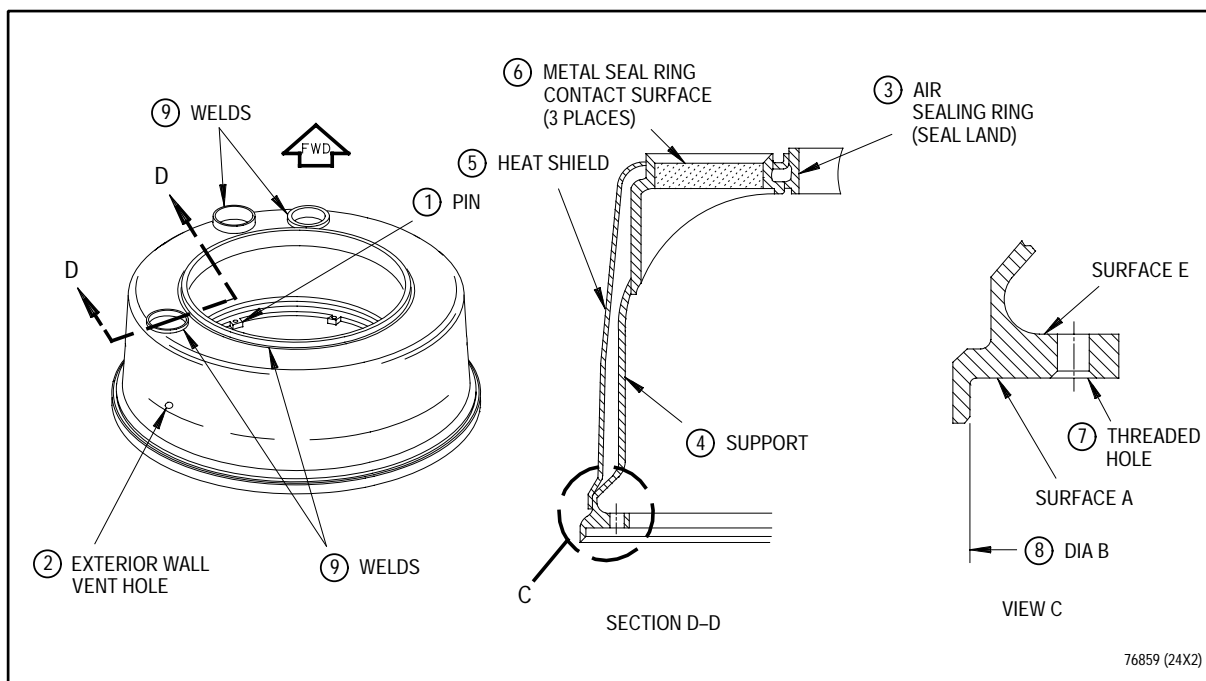
1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing front air sealing ring assembly.

2. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (SINGLE LAND) - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing front air sealing ring assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect air sealing ring assembly for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect air sealing ring assembly per figure 1.
- d. Dimensionally inspect air sealing ring assembly per figure 1.

**NOTE**

All dimensions apply when Surface A and Diameter B are flat within 0.001 inch total and round within 0.005 inch in free state or constrained. Constraint contact allowed only on Surfaces A and E, and Diameter B.

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Pin -			
Wear, damage	Not serviceable	Not reparable	Replace pin per WP 433 00.
Hole wear	Not serviceable	Reparable	Weld repair per WP 433 00.

Figure 1. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Exterior wall vent hole -			
Fluid trapped between inner and outer wall.	Not serviceable	Reparable	Drain as much fluid as possible.
3. Air sealing ring (seal land) -			
Wear	Per WP 801 00, Reference 3043.	7.343 inch diameter	Plasma spray per WP 433 00.
4. Support -			
Cracks	Not serviceable	2.000 inches long maximum	Weld repair per WP 433 00.
Surface damage	Not serviceable	0.010 inch deep and 0.050 inch wide maximum	Weld repair per WP 433 00.
5. Heat shield -			
Cracks	Not serviceable	Reparable	Weld repair per WP 433 00.
Dents	0.125 inch depth, 0.500 inch width maximum, six places	Reparable	Weld repair per WP 433 00.
Surface damage	Not serviceable	a. 0.010 inch depth maximum b. Over 0.010 inch depth and less than 0.050 inch wide	Buff per WP 433 00. b. Weld repair or patch per WP 433 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
6. Metal seal ring contact surface - Abrasion wear including grooves, nicks, and gouges	360°, 0.005 inch below adjacent surface. Remove raised metal by honing before measuring. Measure with dial indicator having 0.038 to 0.040 inch diameter point. Traverse the surface axially.	a. 0.025 inch deep b. 0.026 to 0.031 inch deep	a. Plasma spray per WP 433 00. b. Sleeve repair per WP 433 00.
7. Threaded hole - Wear	Not serviceable	Repairable	Weld repair per WP 433 00.
8. Diameter B - Wear	Per WP 801 00, Reference 3227.	Repairable	Plasma spray per WP 433 00.
9. Welds - Cracks	Not serviceable	Repairable	Weld repair per WP 433 00.

WORK PACKAGE

TECHNICAL PROCEDURES

FLANGE - NO. 4 BEARING AIR SEALING RING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	25	6 Blank	25		

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing front air sealing flange.

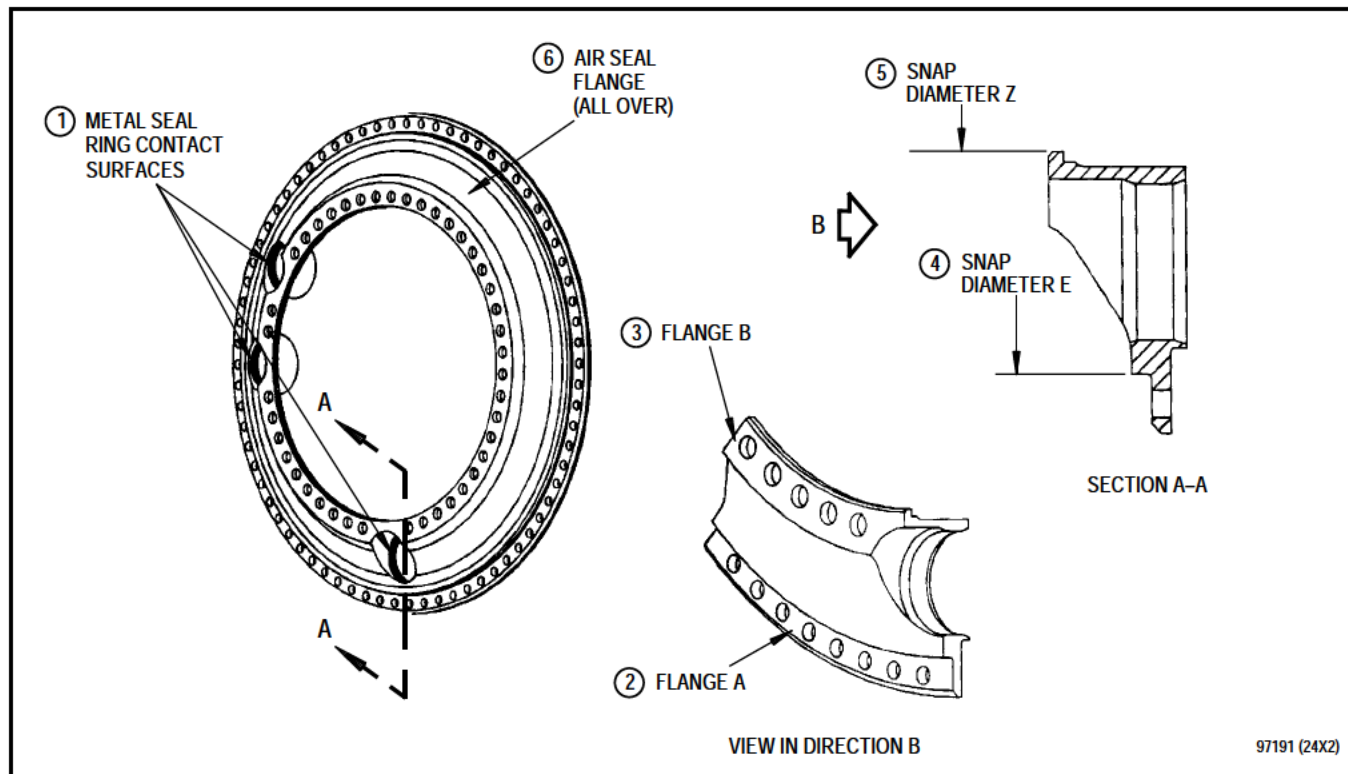
2. NO. 4 BEARING FRONT AIR SEALING FLANGE - INSPECTION.

(See Figure 1.)

- a. Ensure No. 4 bearing front air sealing flange has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect front air sealing flange. Refer to T.O. 2J-F100-9.
- c. Visually inspect front air sealing flange per figure 1.

- d. Inspection definitions are as follows:

- Discrete discontinuity: Well defined individual recess, cavity, or inclusion.
- Linear discontinuity: Discontinuity with ratio of length to width greater than three. This includes cracks or any discontinuity containing a crack.
- Cluster: Two or more discrete discontinuities separated by less than three times length of largest adjacent discontinuity.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Metal seal ring contact surface -			
Abrasion wear including grooves, nicks, and gouges	360°, 0.010 inch below adjacent surface. Remove raised metal by honing before measuring.	a. 0.025 inch deep	Plasma coat repair per SWP 433 01.
		b. 0.026 to 0.031 inch deep	Sleeve repair per SWP 433 01.
2. Flange A -			
Cracks	Not serviceable	Not repairable	Replace part.
Galling, nicks, scratches, raised material	0.005 inch deep, no raised material	Any amount of raised material	Blend repair per SWP 433 01.
Flatness	Within 0.010 inch	Not repairable	Replace part.

Figure 1. No. 4 Bearing Front Air Sealing Flange - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Flange B -			
Cracks	Not serviceable	Not reparable	Replace part.
Galling, nicks, scratches, raised material	0.005 inch deep, no raised material	Any amount of raised material	Blend repair per SWP 433 01.
Flatness	Within 0.010 inch	Not reparable	Replace part.
4. Snap diameter E -			
Wear	11.280 inch diameter	Not reparable	Replace part.
Out of roundness	0.018 inch	Not reparable	Replace part.
5. Snap diameter Z -			
Wear	7.660 inch diameter	Not reparable	Replace part.
6. Air seal flange (all over) -			
Porosity, voids, shrinkage on flange cast surfaces	Total of 6 discontinuities per square inch. Maximum 0.045 inch non-linear indication is allowed. Maximum of 1 linear indication up to 0.032 inch per square inch. Alternatively: 1 cluster up to 0.375 inch is allowed in any 2.0 square inches provided the maximum non-linear indication within the cluster is 0.032 inch and the maximum linear indication within the cluster is 0.015 inch.	Not reparable	Replace part.
Cracks	Not serviceable	Not reparable	Replace part.
Scratches and nicks	Not serviceable	0.010 inch deep	Blend repair per SWP 433 01.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL, AIR, NO. 4 BEARING, FRONT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					
					29

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal, Air, No. 4 Bearing, Front - Repair - - - - -	WP 438 00
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing front air seal.

MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

2. NO. 4 BEARING FRONT AIR SEAL - INSPECTION.

(See Figures 1 and 2.)

- a. Ensure No. 4 bearing front air seal has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect air seal for cracks on a system currently qualified per

- c. Visually inspect air seal per figure 1.
- d. Dimensionally inspect air seal per figure 1. When inspecting six forward knife-edge seals, take four readings for each knife-edge seal and record average diameter.

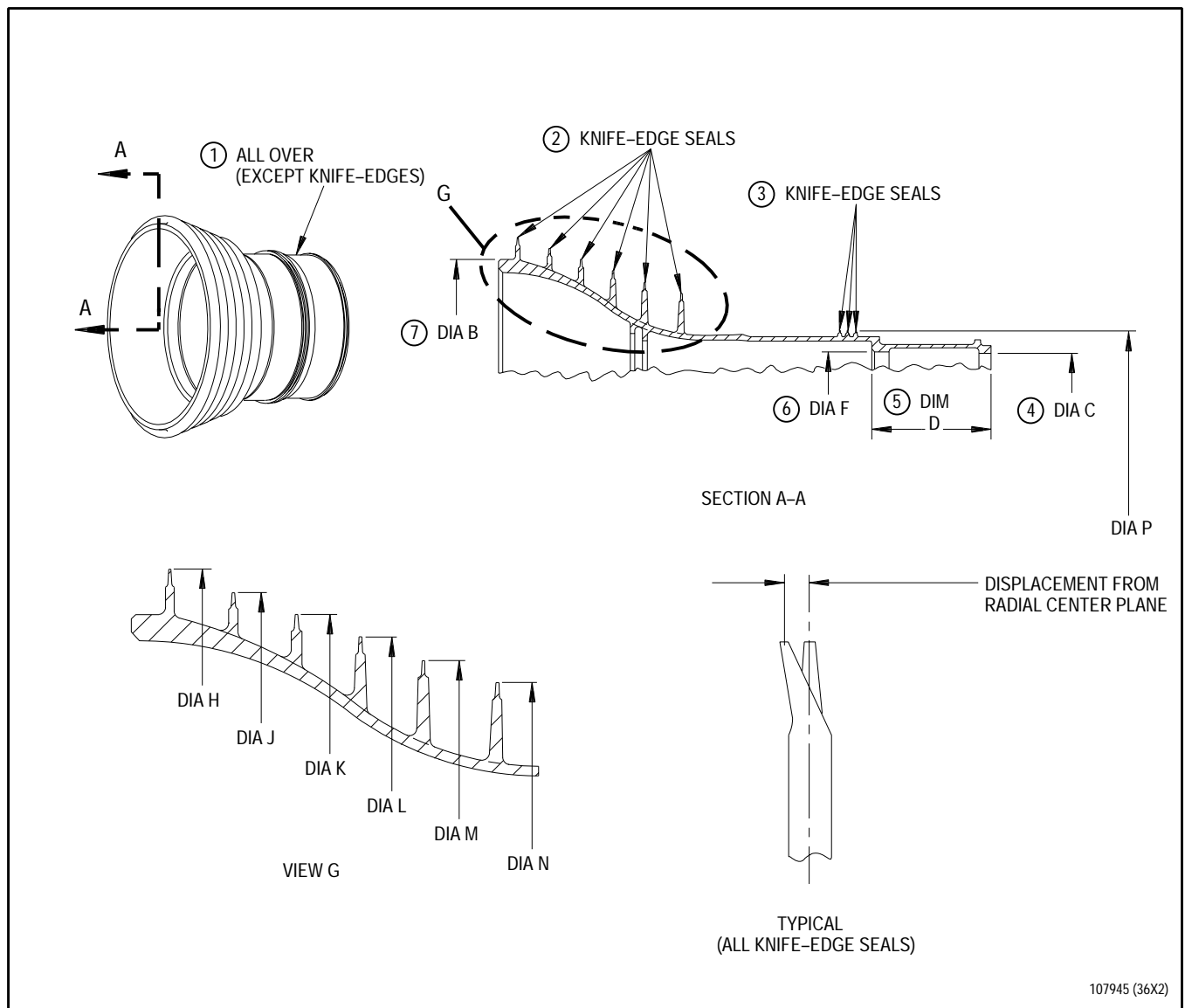


Figure 1. No. 4 Bearing Front Air Seal - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over (except knife-edges) -			
Cracks	Not serviceable	Not repairable	Replace air seal.
2. Knife-edge seals (coated) -			
Bent	0.060 inch maximum displacement from radial center plane. 0.500 inch in length per knife-edge	Reparable if final blend meets blend limits per WP 438 00.	Blend repair per WP 438 00.
Nicks and dents	Not serviceable	Reparable if final blend meets blend limits per WP 438 00.	Blend repair per WP 438 00.
Cracks	Not serviceable	Not repairable	Replace air seal.
Wear	Average minimum serviceable diameters: Dia H 10.613 inches Dia J 10.213 inches Dia K 9.813 inches Dia L 9.413 inches Dia M 9.013 inches Dia N 8.613 inches	Average minimum repairable diameters: Dia H 10.597 inches Dia J 10.197 inches Dia K 9.797 inches Dia L 9.397 inches Dia M 8.997 inches Dia N 8.597 inches	Strip and recoat per WP 438 00.
Chipped or missing coating	Visible as lost top coating missing from bond coat layer by defined lines of demarcation. See figure 2. Acceptable up to 2.000 inches continuous on any knife-edge or 4.000 inches noncontinuous per air seal.	Any amount	Strip and recoat per WP 438 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Knife-edge seals (uncoated) -			
Small upsets and bends	0.050 inch maximum displacement from radial center plane. 0.500 inch in length per knife-edge.	Reparable if final blend meets blend limits per WP 438 00.	Blend repair per WP 438 00.
Nicks and dents	Not serviceable	Reparable if final blend meets blend limits per WP 438 00.	Blend repair per WP 438 00.
Cracks	Not serviceable	Not reparable	Replace air seal.
Wear	Average minimum serviceable diameter: Dia P 7.281 inches	Not reparable	Replace air seal.
4. Diameter C -			
Wear	Per WP 801 00, Reference 3006	Not reparable	Replace air seal.
5. Dimension D -			
Wear	2.058 inches minimum	Not reparable	Replace air seal.
6. Diameter F -			
Wear	Per WP 801 00, Reference 3005	Not reparable	Replace air seal.
7. Diameter B -			
Wear	Per WP 801 00, Reference 3268	Not reparable	Replace air seal.
Scratches	0.008 inch depth	Not reparable	Replace air seal.
Galling	Not serviceable	Not reparable	Replace air seal.

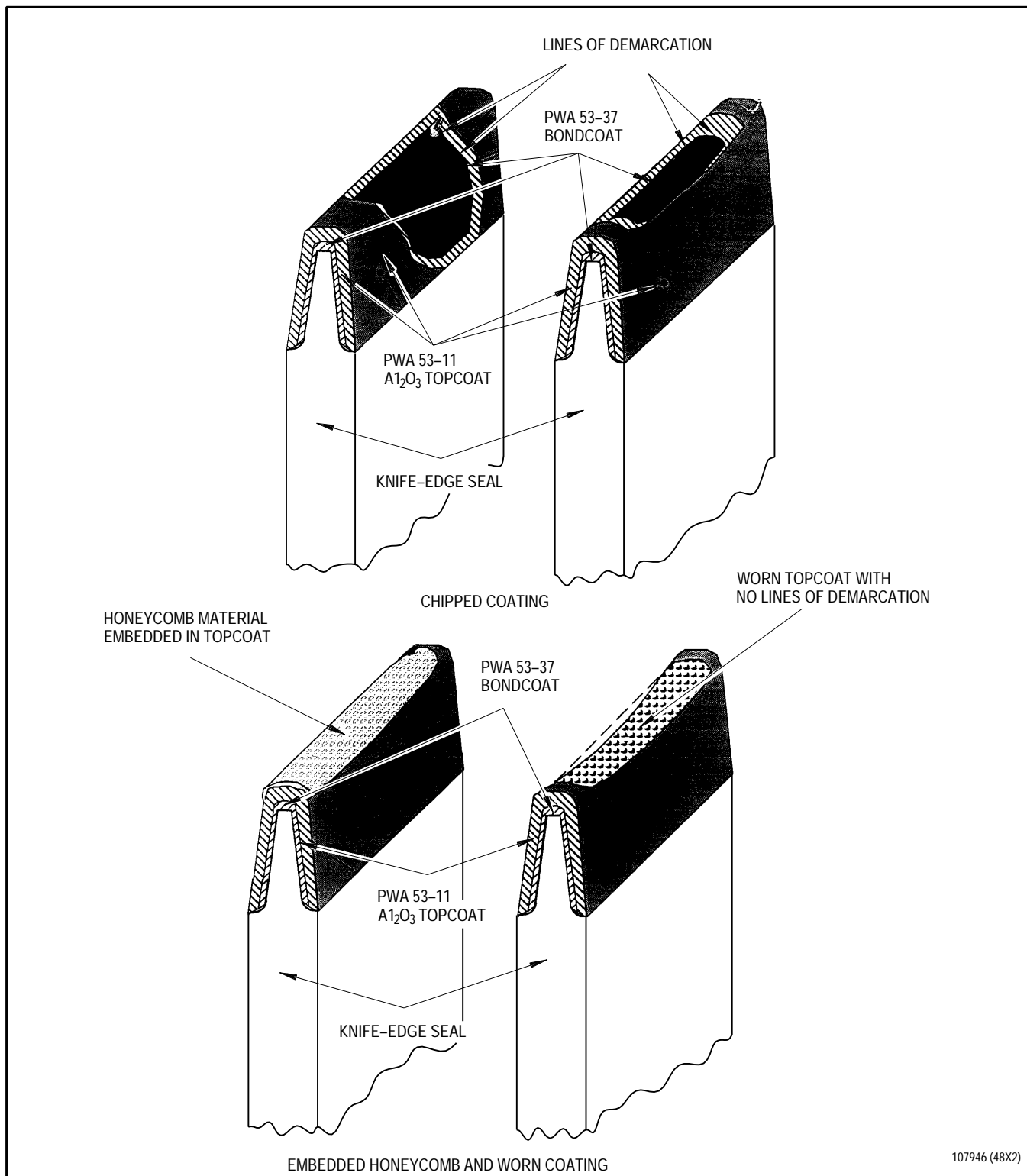


Figure 2. No. 4 Bearing Front Air Seal - Chipped Coating, Embedded Honeycomb and Worn Coating

WORK PACKAGE**TECHNICAL PROCEDURES****SYNCHRONIZING LINKAGE,
REAR COMPRESSOR VARIABLE STATOR VANES -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 24

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2A	26	9	0	12 - 13	22
2B Blank Added	20	10	18	14 - 15	20
3 - 5	26	10A Added	25	16 - 17	26
6	0	10B Blank Added	25	18	20
7 - 8	26	11	0	19 - 20	26

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Standard Fluorescent Penetrant Inspection - - - - -	SPOP 62
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

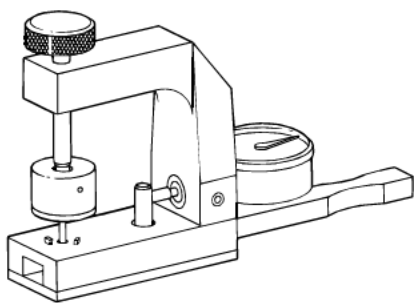
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

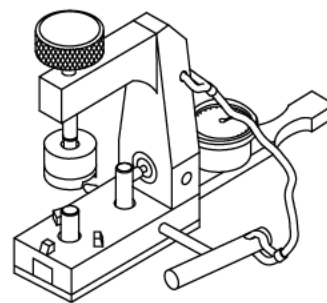
Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR STATOR SYNCHRONIZING ARM ASSEMBLY - INSPECTION	
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669
4	INLET, FOURTH, FIFTH, AND SIXTH STAGE REAR COMPRESSOR STATOR RIGID CONNECTING LINK ASSEMBLIES - INSPECTION	
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669
10	INTERNAL BELLCRANK ASSEMBLY - INSPECTION	
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669
12	SELF-ALIGNING BEARING - INSPECTION	
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669
	GAGE, UNIBALL RADIAL WEAR MEASURING (0.1875 BRG) - -	PWA 55642
	GAGE, UNIBALL RADIAL WEAR MEASURING (0.250 BRG) - - -	PWA 55644

ILLUSTRATED SUPPORT EQUIPMENT



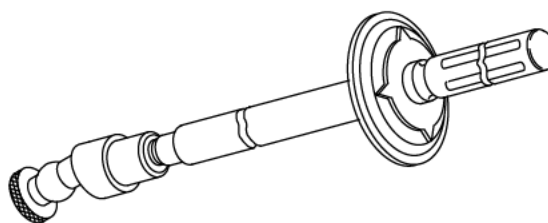
PWA 55642 -C

Figure T1. PWA 55642 GAGE



PWA 55644 -C

Figure T2. PWA 55644 GAGE



PWA 55669 -C

Figure T3. PWA 55669 GAGE

1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor variable stator vanes synchronizing linkage.

2. REAR COMPRESSOR STATOR SYNCHRONIZING ARM ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Inspect rear compressor stator synchronizing arm assembly per figure 1.

NOTE

There are two sizes self-aligning bearings, 0.190 inch ID and 0.250 inch ID.

- b. Measure radial wear and freedom of movement of bearings (3 and 4) per paragraph 12.

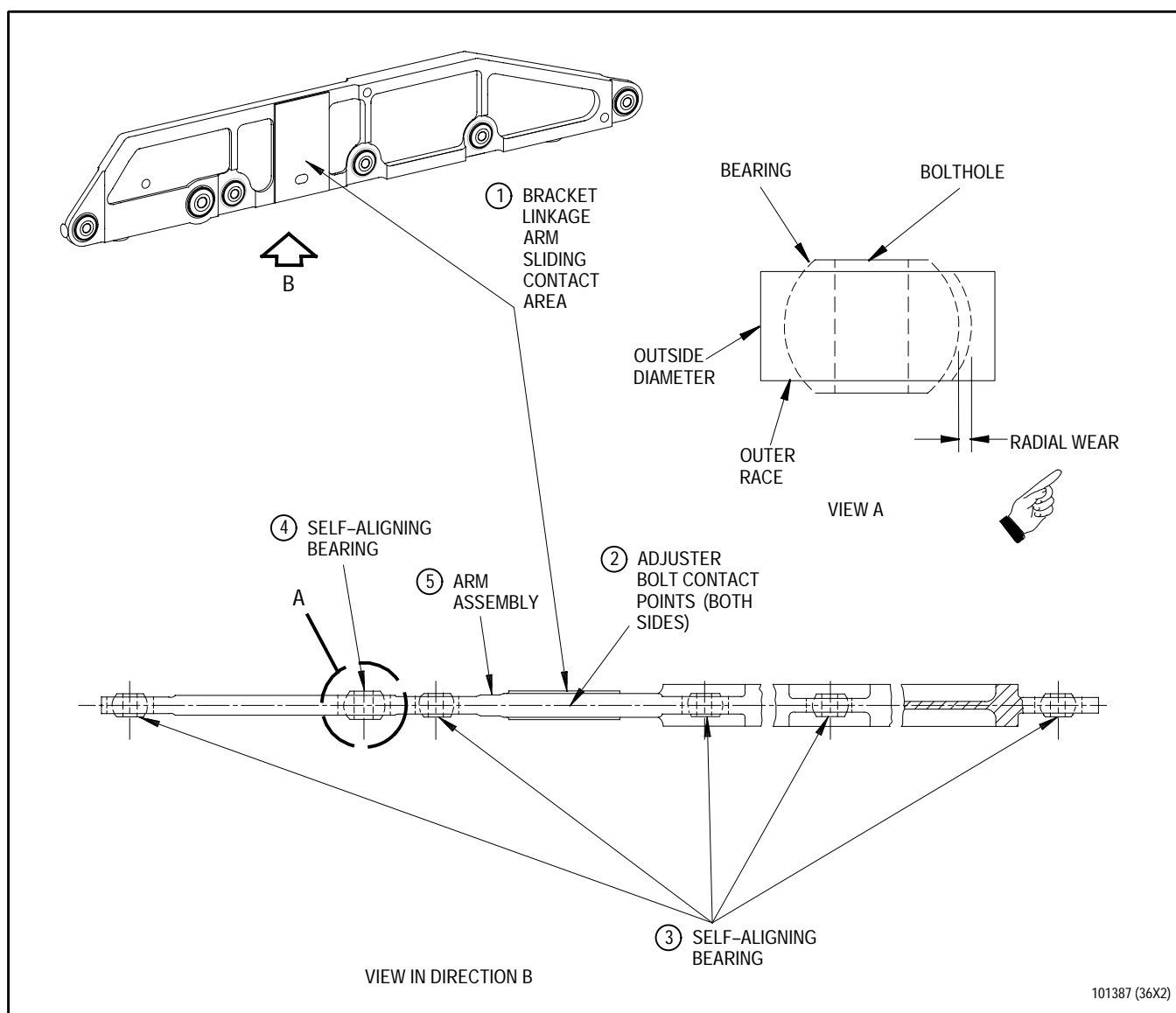


Figure 1. Rear Compressor Stator Synchronizing Arm Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Bracket, linkage arm, sliding contact area -			
Wear	0.005 inch wear depth on sliding contact surface	Not reparable	Replace arm assembly.
2. Adjuster bolt contact points - (both sides)			
Wear	0.015 inch depth	Not reparable	Replace arm assembly.
3. Self-aligning bearing -			
Wear at bolthole surface	0.1905 inch maximum diameter	Not reparable	Replace bearing per WP 435 00.
Galling on bearing surface	Galling on ball not acceptable. Marks or discoloration acceptable if no perceptible depth into bearing surface can be seen.	Not reparable	Replace bearing per WP 435 00.
Radial wear	0.005 inch	Not reparable	Replace bearing per WP 435 00.
Freedom of movement	Ball shall move through 9° minimum cone angle with maximum torque of 5 pound-inches using PWA 55669 gage.	Not reparable	Replace bearing per WP 435 00.

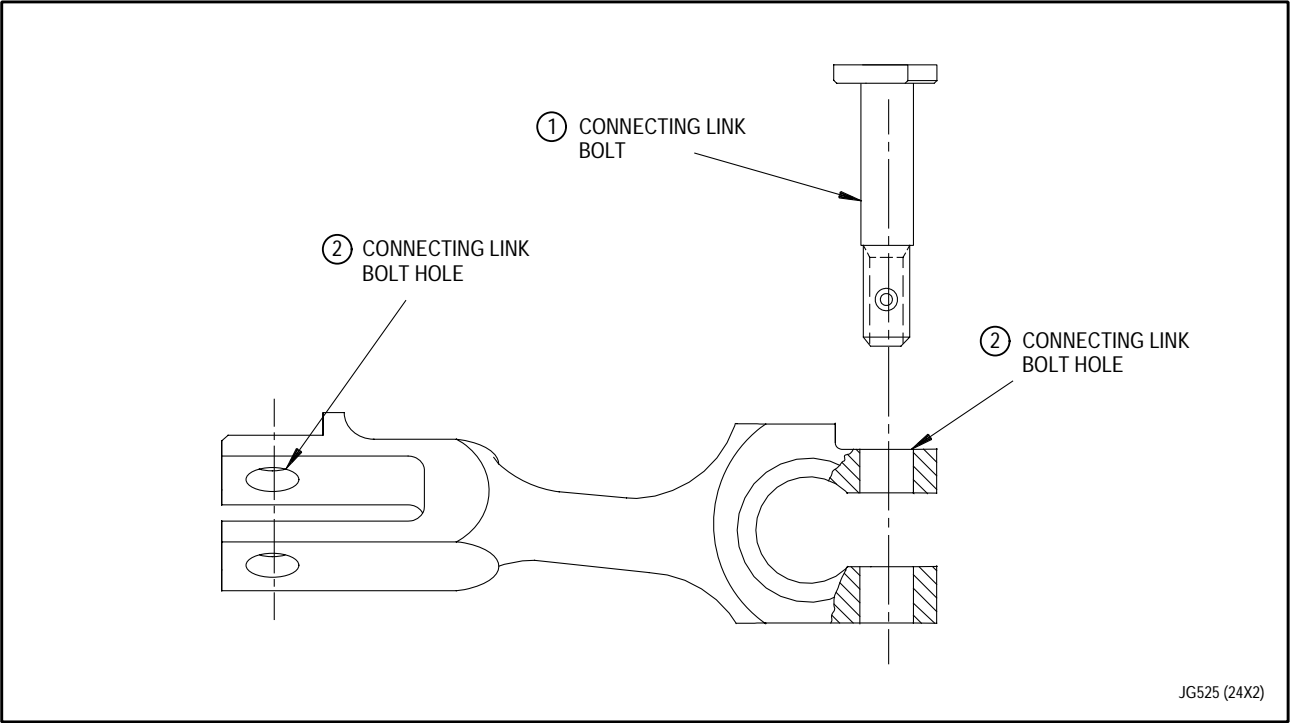
Legend for figure 1 (continued)

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4.	Self-aligning bearing -			
	Wear at bolthole surface	0.2505 inch maximum diameter	See corrective action.	Replace bearing per WP 435 00.
5.	Arm assembly -			
	Cracked	Not serviceable	Not reparable	Replace arm assembly.
	Nicks, pits, dents	Not serviceable	0.020 inch depth after blend	Blend per WP 435 00.

3. REAR COMPRESSOR STATOR RIGID
CONNECTING LINK (DRIVE) AND BOLT -
INSPECTION.

(See Figure 2.)

- a. Inspect rear compressor stator
rigid connecting link and bolt.
(See figure 2.)



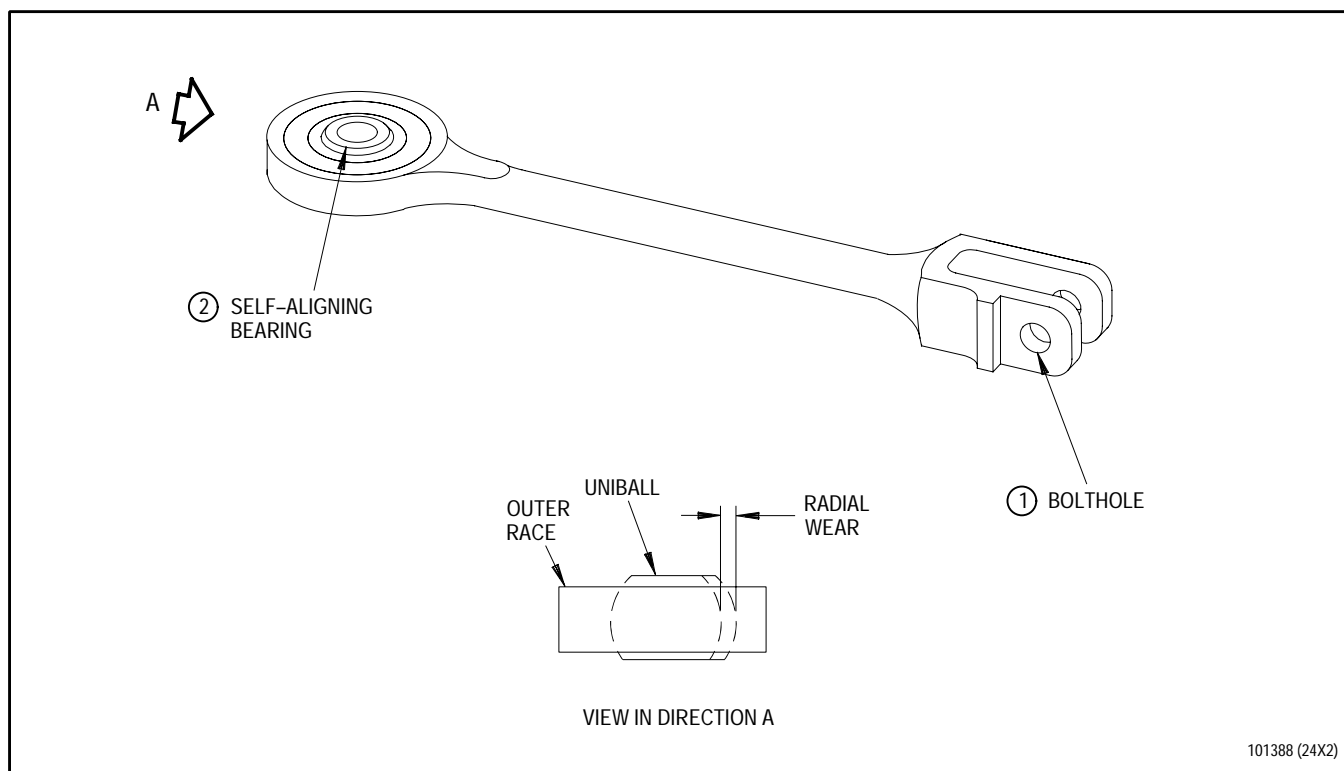
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Connecting link bolt - Wear	0.2478 inch minimum diameter	Not reparable	Replace connecting link bolt.
2. Connecting link bolt hole - Wear	0.2505 inch maximum diameter	Not reparable	Replace connecting link.

Figure 2. Rear Compressor Stator Rigid Connecting Link (Drive) and Bolt - Inspection

4. INLET, FOURTH, FIFTH, AND SIXTH STAGE REAR COMPRESSOR STATOR RIGID CONNECTING LINK ASSEMBLIES - INSPECTION.

(See Figure 3.)

- a. Inspect rear compressor stator rigid connecting link assemblies. See figure 3.
- b. Measure radial wear and freedom of movement of bearings per paragraph 12.



**Figure 3. Inlet, Fourth, Fifth, and Sixth Stage Rear Compressor
Stator Rigid Connecting Link Assemblies - Inspection**

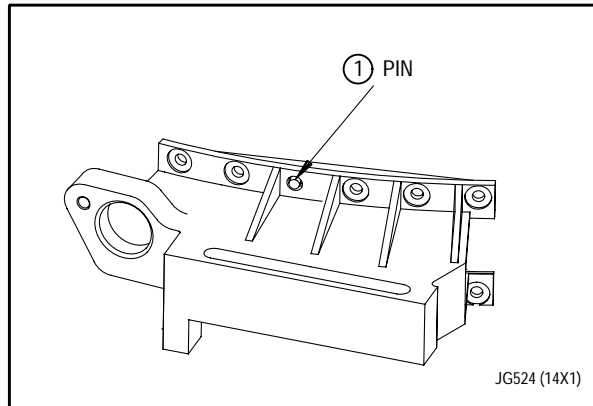
Legend for figure 3

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Bolthole -			
Wear	0.1905 inch maximum diameter	See corrective action.	Replace connecting link assembly.
2. Self-aligning bearing -			
Wear at bolthole surface	0.1905 inch maximum diameter	See corrective action.	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Galling or wear on bearing surface	Galling or wear on ball not serviceable. Marks or discoloration serviceable if no perceptible depth into bearing surface can be seen.	See corrective action.	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Radial wear	0.005 inch	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Freedom of movement	Ball shall move through 9° minimum cone angle with a maximum torque of 5 pound-inches using PWA 55669 gage.	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.

5. REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY - INSPECTION.

(See Figure 4.)

- a. Inspect stator linkage arm
bracket assembly.
(See figure 4.)



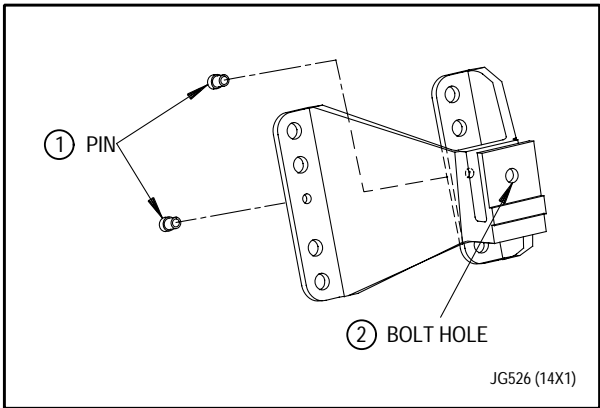
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Pin - Damage	Not serviceable	Not reparable.	Replace pin per WP 435 00.

Figure 4. Rear Compressor Stator Linkage Arm Bracket Assembly - Inspection

6. REAR COMPRESSOR STATOR LINKAGE
ARM BRACKET ASSEMBLY - INSPECTION.

(See Figure 5.)

- a. Ensure rear compressor stator linkage arm bracket assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect bracket assembly for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Inspect bracket assembly per figure 5.



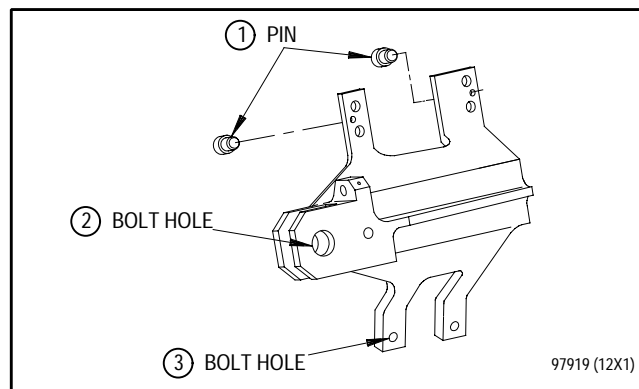
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pin -			
Loose	Not serviceable	Not repairable	Replace pin per WP 435 00.
Bent	Not serviceable	Not repairable	Replace pin per WP 435 00.
Worn	0.005 inch	Not repairable	Replace pin per WP 435 00.
2. Bolt hole -			
Wear	0.1905 inch maximum diameter	See corrective action.	Replace bracket.

Figure 5. Rear Compressor Stator Linkage Arm Bracket Assembly - Inspection

6A. REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY (FIXED 6TH STAGE VANES) - INSPECTION.

(See Figure 5A.)

- a. Fluorescent penetrant inspect rear compressor stator linkage arm bracket assembly per SPOP 62. Refer to T.O. 2-1-111.
- b. Inspect assembly. See figure 5A.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pin -			
Loose	Not servicable	Not reparable	Replace pin per WP 435 00.
Bent	Not servicable	Not reparable	Replace pin per WP 435 00.
Worn	0.005 inch	Not reparable	Replace pin per WP 435 00.
2. Bolt hole -			
Wear	Not servicable	Not reparable	Replace bracket.
3. Bolt hole -			
Wear	Not servicable	Not reparable	Replace bracket.

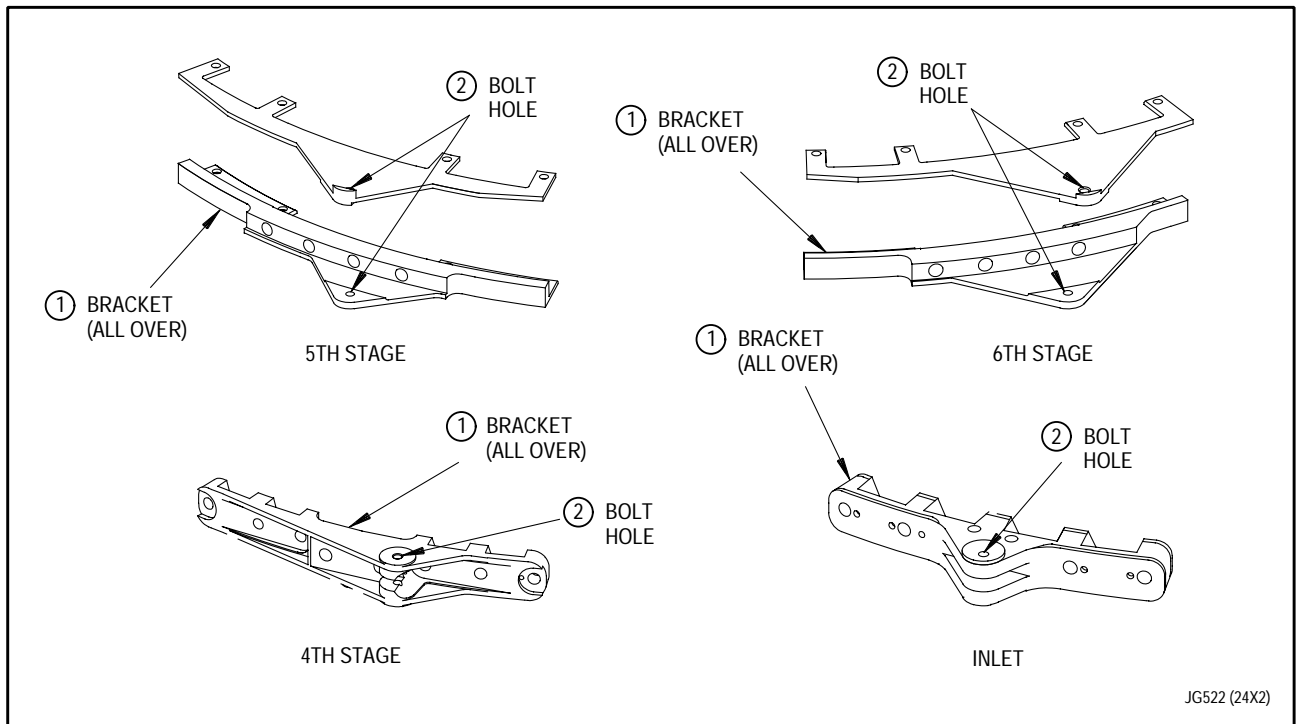
Figure 5A. Rear Compressor Stator Linkage Arm Bracket Assembly (Fixed 6th Stage Vanes) - Inspection

7. INLET, FOURTH, FIFTH, AND SIXTH STAGE REAR COMPRESSOR STATOR SYNCHRONIZING BRACKETS - INSPECTION.

(See Figure 6.)

- a. Visually inspect rear compressor stator synchronizing brackets.
(See figure 6.)

- b. Dimensionally inspect brackets.
(See figure 6.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Bracket (all over) -			
Nicks and dents	0.010 inch depth	See corrective action.	Replace bracket.
2. Bolt hole -			
Wear	0.1905 inch maximum diameter	See corrective action.	Replace bracket.

Figure 6. Inlet, Fourth, Fifth, and Sixth Stage Rear Compressor Stator Synchronizing Brackets - Inspection

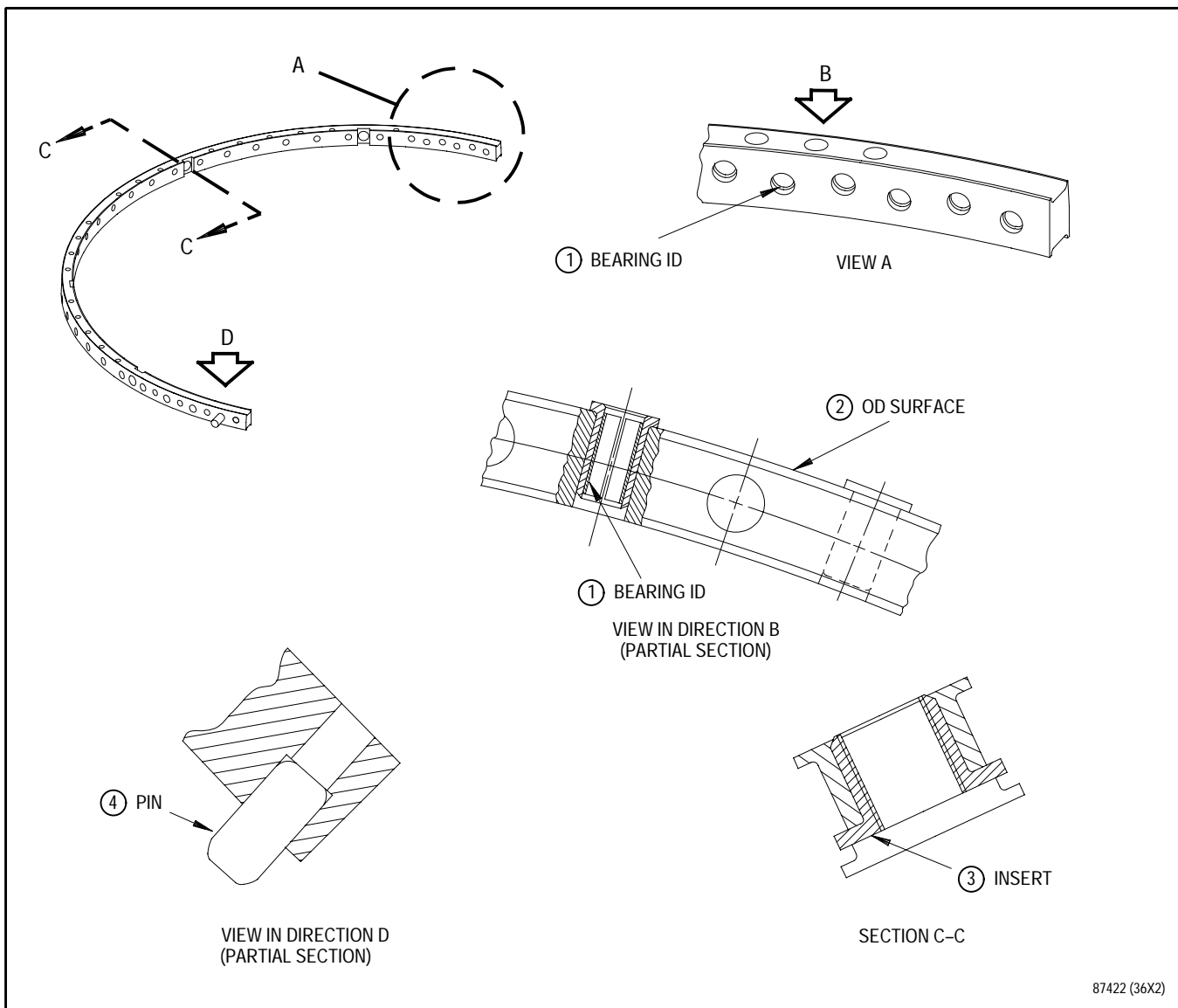
8. INLET, FOURTH, FIFTH, AND SIXTH STAGE REAR COMPRESSOR STATOR SYNCHRONIZING RING ASSEMBLIES - INSPECTION.

(See Figure 7.)

- a. Ensure rear compressor stator synchronizing ring assemblies have been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect ring assemblies for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Inspect ring assemblies per figure 7.



87422 (36X2)

Figure 7. Inlet, Fourth, Fifth, and Sixth Stage Rear Compressor Stator Synchronizing Ring Assemblies (Typical) - Inspection

Legend for figure 7

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Bearing ID - Wear	0.201 inch maximum diameter	Not reparable	Replace bearing per WP 435 00.
2. OD Surface - Nicks, dents, scratches	0.003 inch depth. No sharp edges.	0.005 inch depth	Blend repair per WP 435 00.
3. Insert (inlet, 4th and 5th stages) - Worn, damaged	Not serviceable	Not reparable	Replace insert per WP 435 00.
4. Pin (inlet and 4th stages) - Missing, damaged	Not serviceable	Not reparable	Replace pin per WP 435 00.

**9. INLET, FOURTH, FIFTH, AND SIXTH STAGE
REAR COMPRESSOR STATOR ARM
ASSEMBLIES - INSPECTION.**

(See Figure 8.)

- a. Inspect arm assemblies per
figure 8.

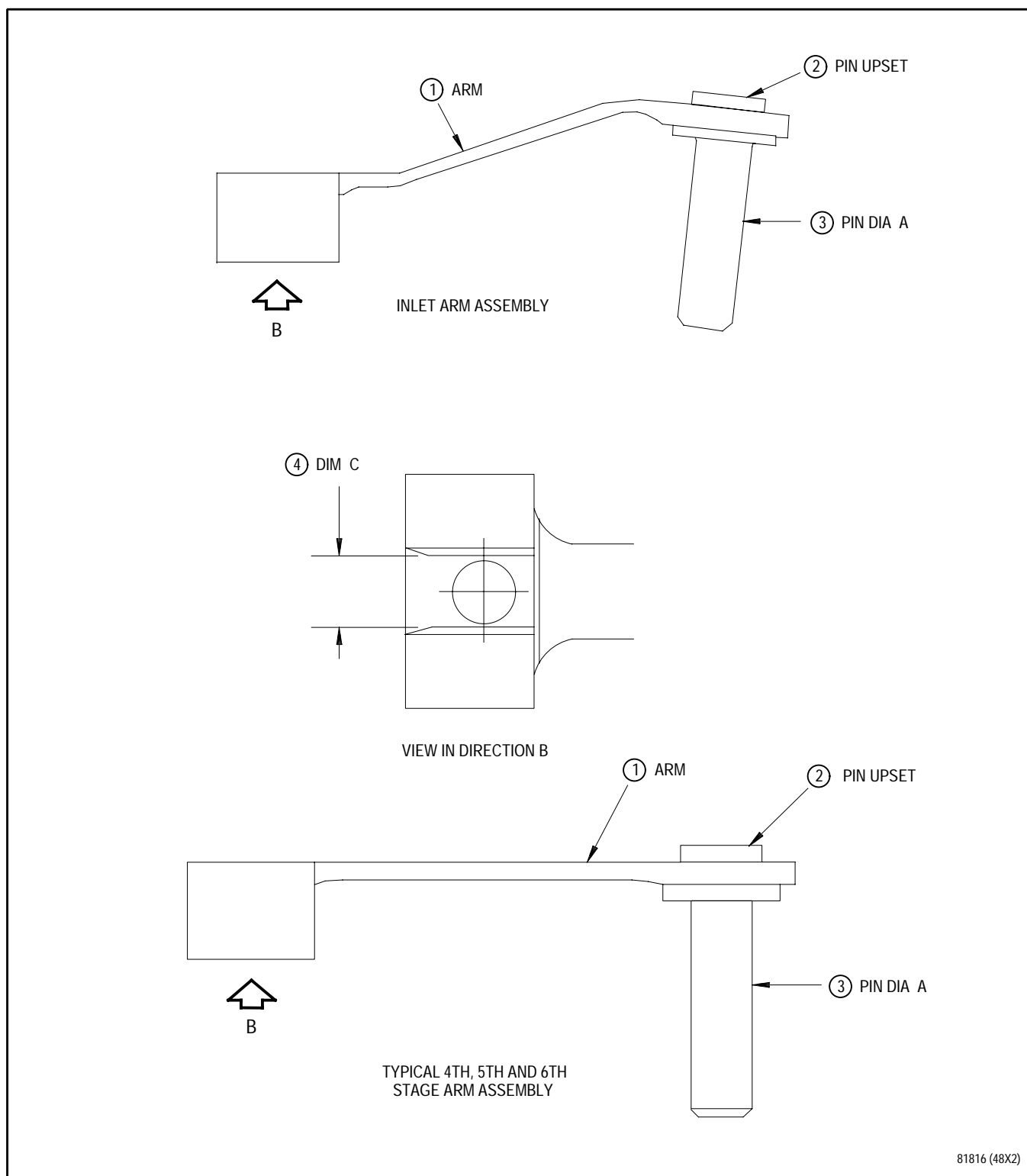


Figure 8. Inlet, Fourth, Fifth, and Sixth Stage Rear Compressor Stator Arm Assemblies - Inspection

Legend for figure 8

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Arm -			
Nicks, dents and scratches on arm thin section surfaces and edges	0.005 inch maximum depth by 0.005 inch wide by 0.050 inch long	0.005 inch maximum depth by 0.005 inch wide by 0.050 inch long	Blend smoothly into adjacent surfaces. Blend depth shall not exceed 0.005 inch.
Bends, kinks	Straight section of arm shall be flat within 0.005 inch.	Not reparable	Replace arm assembly.
2. Pin upset -			
Looseness, cracks	Not serviceable	Not reparable	Replace arm assembly.
3. Pin Diameter A -			
Wear	0.1874 inch minimum diameter	See corrective action.	Replace arm assembly.
4. Dimension C -			
Wear	0.2765 inch	Not reparable	Replace arm assembly.

10. INTERNAL BELLCRANK ASSEMBLY - INSPECTION.

(See Figure 9.)

- a. Visually inspect internal bellcrank assembly per figure 9.
- b. Measure radial wear and freedom of movement of bearing(1) per paragraph 12.

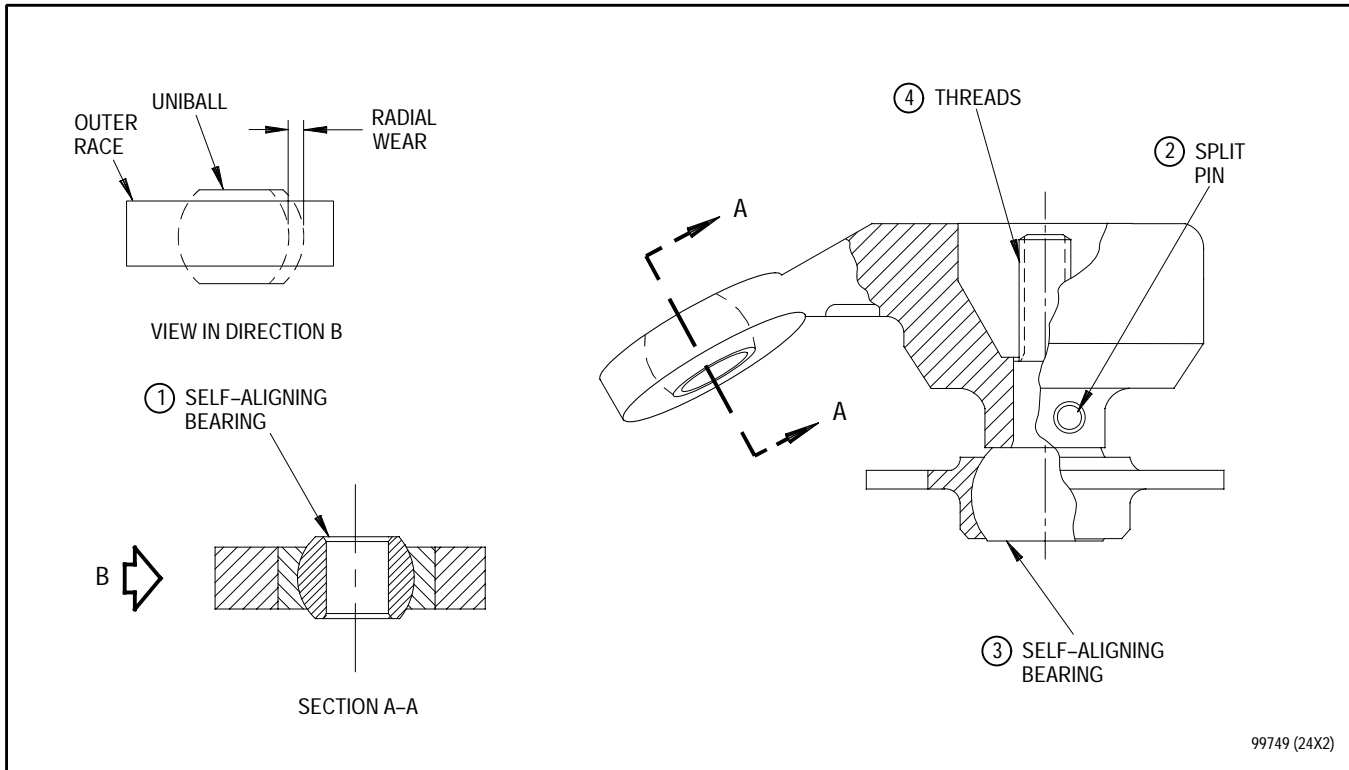


Figure 9. Internal Bellcrank Assembly - Inspection

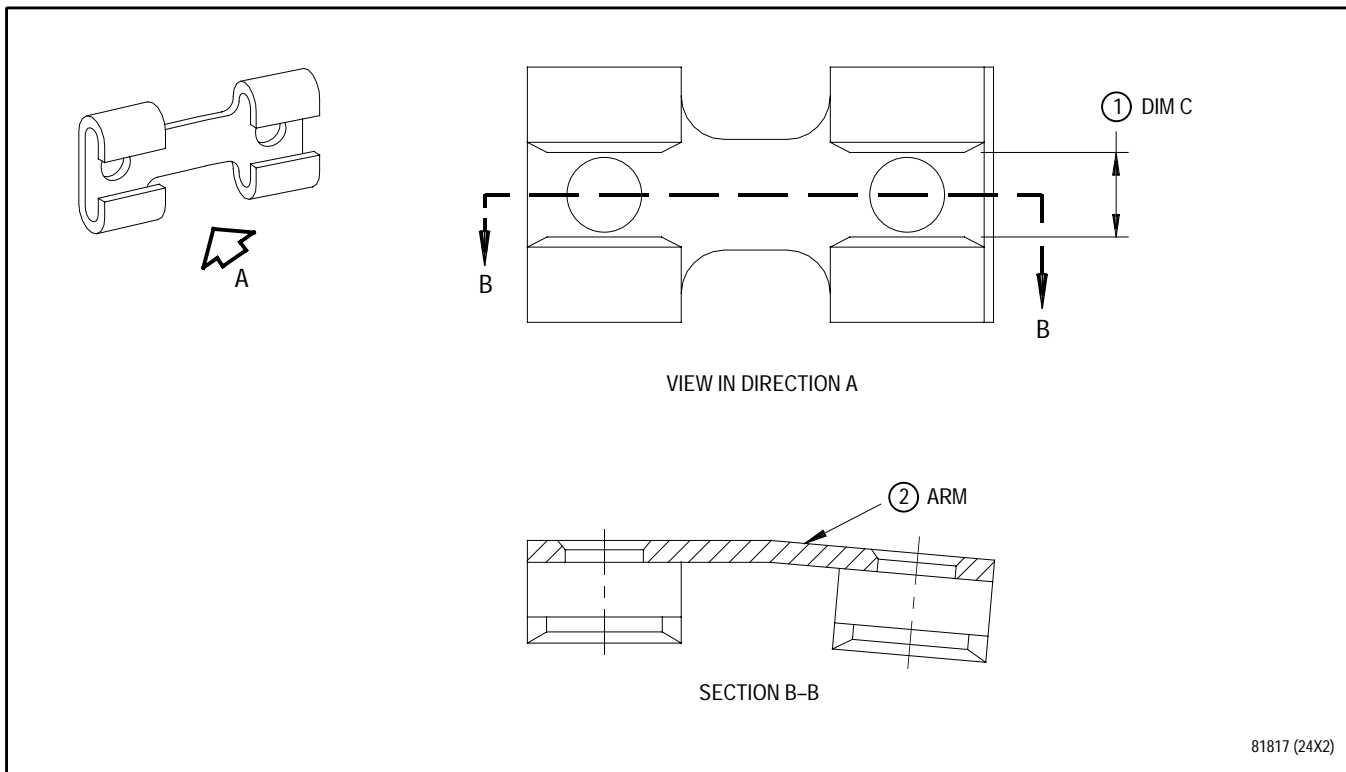
Legend for figure 9

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Self-aligning bearing -			
Galling	Not serviceable	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Marks	Acceptable provided no perceptible depth into bearing surface can be seen.	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Radial wear	0.005 inch	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Freedom of movement	Ball shall move through 9° minimum cone angle with maximum torque of 5 pound-inches using PWA 55669 gage.	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
Wear at bolthole surface	0.2505 inch maximum diameter	Not reparable	Replace bearing per T.O. 2J-F100-53-5, WP 544 00.
2. Split pin -			
Missing, loose, or improperly staked	Not serviceable	Not reparable	Replace internal bellcrank assembly.
3. Self-aligning bearing -			
Radial wear	0.005 inch	Not reparable	Replace internal bellcrank assembly.
4. Threads -			
Damage	Not serviceable	Not reparable	Replace internal bellcrank assembly.

11. SIXTH STAGE COMPRESSOR STATOR VANE LOCKS - INSPECTION.

(See Figure 10.)

- a. Inspect 6th stage compressor stator vane locks per figure 10.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Dimension C - Wear	0.2765 inch	Not reparable	Replace vane lock.
2. Arm - Nicks, dents and scratches on arm thin section surfaces and edges	0.005 inch maximum depth by 0.005 inch wide by 0.050 inch long	0.005 inch maximum depth by 0.005 inch wide by 0.050 inch long	Blend smoothly into adjacent surfaces. Blend depth shall not exceed 0.005 inch.

Figure 10. Sixth Stage Compressor Stator Vane Locks - Inspection

12. SELF-ALIGNING BEARING - INSPECTION.

(See Figure 11.)

- a. Check bearing for binding using PWA 55669 gage. Maximum allowable torque is 5 pound-inches.
- b. Check bearing radial wear as follows using PWA 55642 gage for 0.190 inch ID bearing and PWA 55644 gage for 0.250 inch ID bearing:
 - (1) Back off gage thumbscrew(2) to raise clamp(1).
 - (2) Place bearing(7) on locating pin(6). Secure in place with clamp.
 - (3) Remove T-pin(5). Pull slide handle(4) and adjust dial indicator(3) to zero.
 - (4) Release slide handle and apply slight pressure in opposite direction to remove radial play. Read movement on dial indicator for bearing radial wear.
 - (5) Insert T-pin. Back off thumbscrew and remove part.

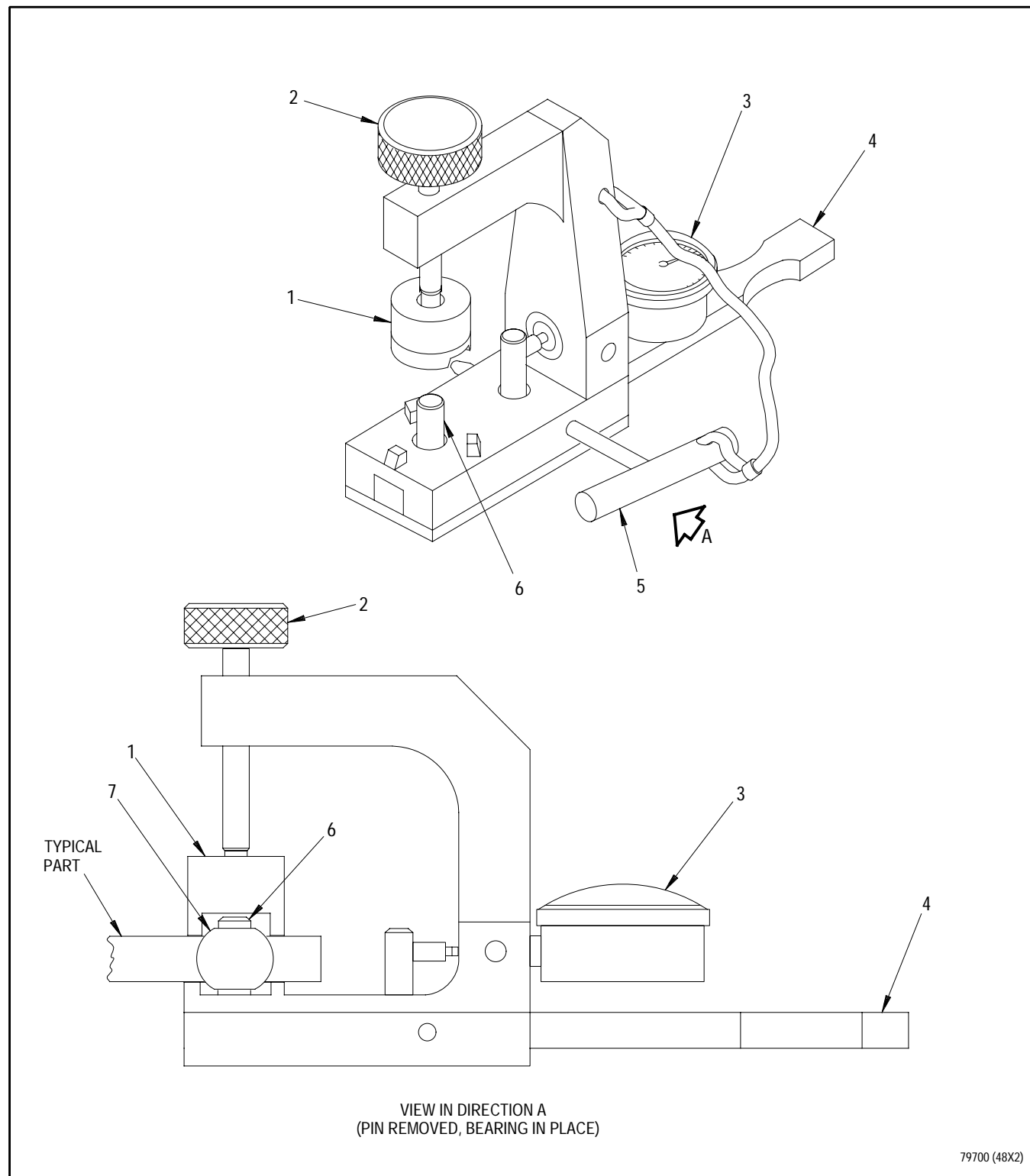


Figure 11. Self-Aligning Bearing Inspection - Typical

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL, AIR, NO. 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	4	18	5	0
2 - 3	0			6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 3 bearing air seal.

2. NO. 3 BEARING AIR SEAL - INSPECTION.

(See Figure 1.)

- a. Ensure No. 3 bearing air seal has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect air seal for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

c. Visually inspect air seal per figure 1.

- d. Dimensionally inspect air seal per figure 1.

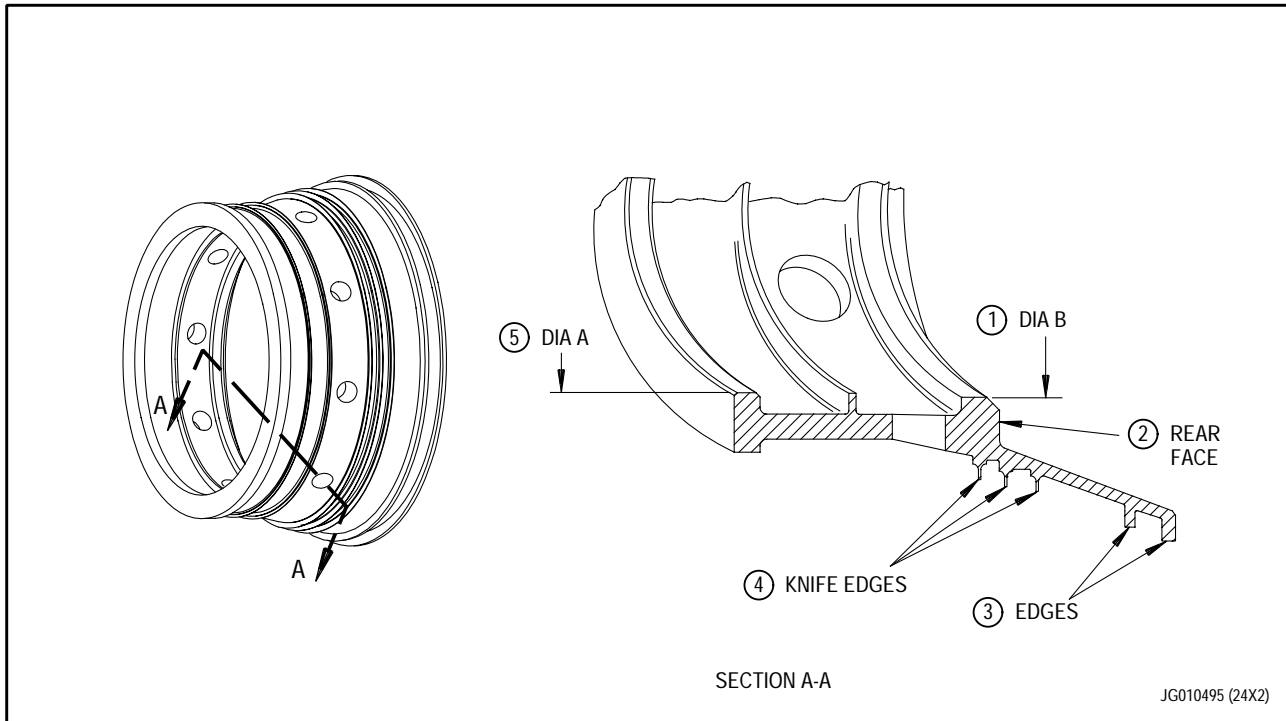


Figure 1. No. 3 Bearing Air Seal - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Diameter B - Wear	Per WP 801 00, Reference 3044.	Reparable	Plasma spray per WP 436 00.
2. Rear face - Wear	Not serviceable	Reparable	Plasma spray per WP 436 00.
3. Edges - Bent	Not serviceable	Not reparable.	Replace seal.
Nicks, dents, cracks	Not serviceable	Not reparable.	Replace seal.
4. Knife edge - Bent	0.060 inch, do not attempt to straighten.	Reparable.	Blend repair per WP 436 00.
Nicks, dents, small cracks	Not serviceable	Reparable	Blend repair per WP 436 00.
Wear	Diameter per WP 801 00, Reference 3141	Not reparable	Replace seal
5. Diameter A - Wear	Per WP 801 00, Reference 2923.	Reparable	Plasma spray repair per WP 436 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, COMPRESSOR STATOR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	2	18	3 - 4	29

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Support Assembly, Compressor Stator - Repair - - - - -	WP 437 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

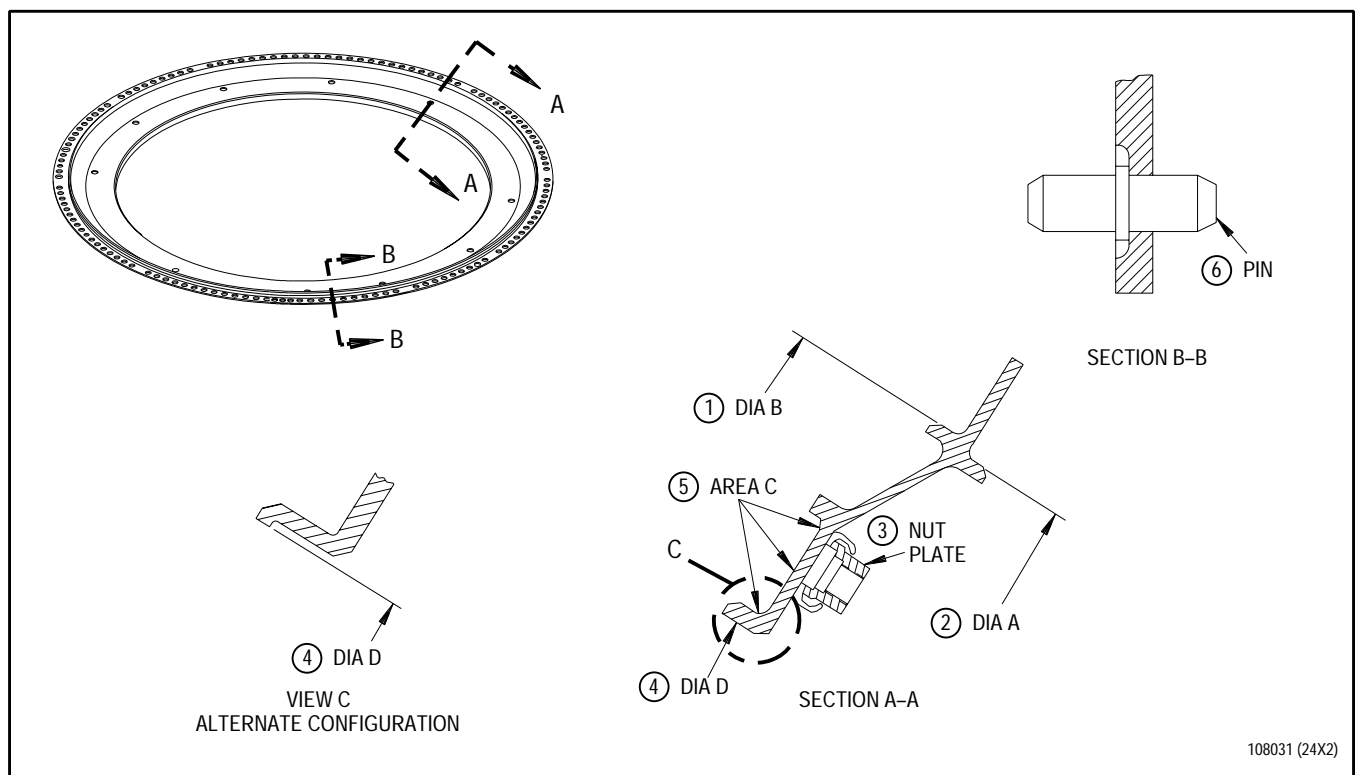
- a. This work package contains instructions for inspection of compressor stator support assembly.

2. COMPRESSOR STATOR SUPPORT ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure compressor stator support assembly has been cleaned per WP 201 00.

- b. Visually inspect stator support assembly per figure 1.
- c. Fluorescent penetrant inspect stator support assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Diameter B - Wear	22.850 inches minimum diameter	22.841 inches minimum diameter	Repair per WP 437 00.
2. Diameter A - Wear	22.677 inches minimum diameter	22.668 inches minimum diameter	Repair per WP 437 00.

Figure 1. Compressor Stator Support Assembly - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Nut plate - Damaged	Not serviceable	Not reparable	Replace nut plate per WP 437 00.
4. Diameter D - Wear	19.111 inches diameter	Not reparable	Replace support.
5. Area C - Wear	0.005 inch	Not reparable	Replace support.
6. Pin - Loose, damaged	Not serviceable	Not reparable	Remove pin.

WORK PACKAGE**TECHNICAL PROCEDURES****NO. 4 BEARING INNER RACE AND REAR COMPRESSOR
DRIVESHAFT BEARING JOURNAL DIAMETER -****INTERFERENCE FIT MEASUREMENT USING PWA 57856 GAGE****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	9	22	11	22
2 - 7	22	10	31	12 Blank	22
8	31				

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

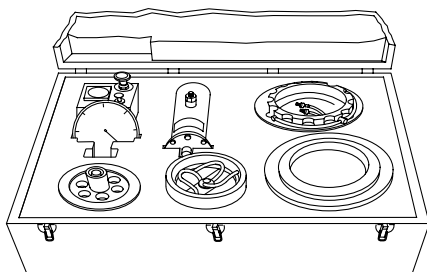
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

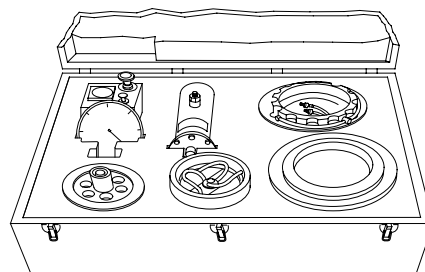
Paragraph	Function - Tool Nomenclature	Tool Number
3	MATCHING NO. 4 BEARING INNER RACE INSIDE DIAMETER AND REAR COMPRESSOR DRIVESHAFT BEARING JOURNAL FOR CORRECT INTERFERENCE FIT	
	GAGE, INSPECTION - - - - -	PWA 57856 OR
	GAGE, NO. 4 BEARING ID AND REAR COMPRESSOR JOURNAL DIAMETER - - - - -	PWA 55226
4	REAR COMPRESSOR DRIVESHAFT NO. 4 BEARING JOURNAL - MEASUREMENT	
	GAGE, INSPECTION - - - - -	PWA 57856 OR
	GAGE, NO. 4 BEARING ID AND REAR COMPRESSOR JOURNAL DIAMETER - - - - -	PWA 55226
5	NO. 4 BEARING INNER RACE INSIDE DIAMETER - MEASUREMENT	
	GAGE, INSPECTION - - - - -	PWA 57856 OR
	GAGE, NO. 4 BEARING ID AND REAR COMPRESSOR JOURNAL DIAMETER - - - - -	PWA 55226

ILLUSTRATED SUPPORT EQUIPMENT



PWA 55226 -C

Figure T1. PWA 55226 GAGE



PWA 57856 -C

Figure T2. PWA 57856 GAGE

1. INTRODUCTION.

a. This work package contains instructions for use of PWA 57856 gage for following:

- Matching No. 4 bearing inner race ID and rear compressor driveshaft bearing journal for correct interference fit.
- Rear compressor driveshaft bearing journal measurement.
- No. 4 bearing inner race ID measurement.

2. PRELIMINARY INSTRUCTIONS.

- a. Rear compressor driveshaft bearing journal can be measured while still in core module after No. 4 bearing has been removed.
- b. No. 4 bearing inner race can be measured individually.

3. MATCHING NO. 4 BEARING INNER RACE INSIDE DIAMETER AND REAR COMPRESSOR DRIVESHAFT BEARING JOURNAL FOR CORRECT INTERFERENCE FIT.

(See Figures 1 and 2.)

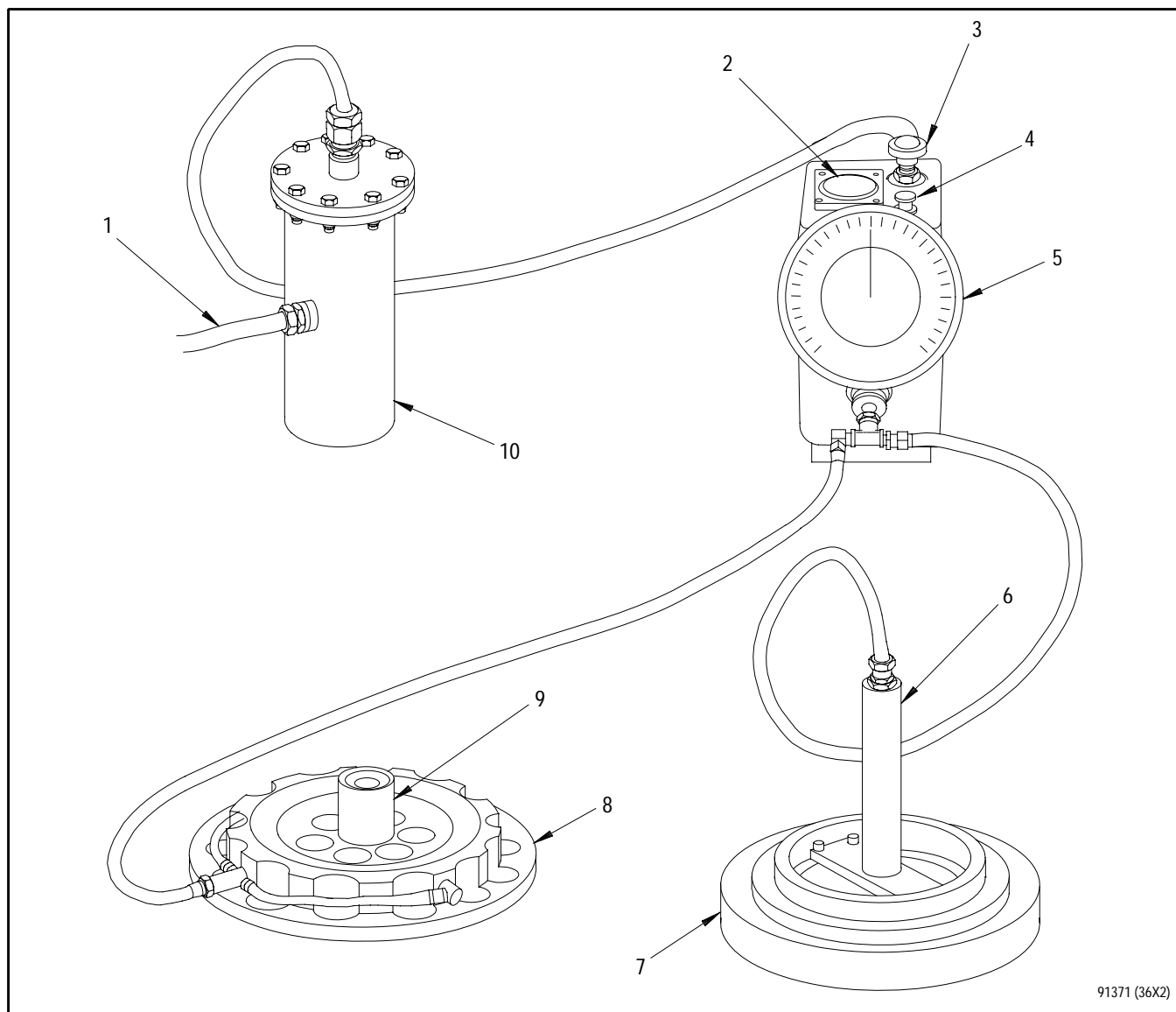
a. Measure No. 4 bearing inner race and rear compresor driveshaft for correct interference fit using PWA 57856 gage as follows:

- (1) Connect gage to 40 to 150 psig air supply(1, figure 1).
- (2) Adjust pressure regulator knob(3) to set master pressure gage(2) to SET. Gage hand can be anywhere between limit lines on dial.
- (3) Ensure all air line connections are not leaking air and O-ring seals are in place. No leakage permitted.

NOTE

Two master ring and disk master sets are included in PWA 57856 gage. Detail-6 set is used for F100-PW-229 hardware measurement.

- (4) Insert air plug(6) into detail-6 master ring(7).
- (5) Install air ring(8) onto detail-6 disk master(9).
- (6) Turn zero adjustment knob(4) until gage(5) indicates zero.



91371 (36X2)

1. Air supply
2. Master pressure gage
3. Pressure regulator knob
4. Zero adjustment knob
5. Dimensionair gage
6. Air plug
7. Detail-6 master ring
8. Air ring
9. Detail-6 disk master
10. Air/oil filter

Figure 1. No. 4 Bearing Inside Diameter and Rear Compressor Journal Diameter Gage (PWA 57856)

(7) Insert air plug(5, figure 2) into No. 4 bearing inner race(6), aligning any one of three air jets with land between scallops.

(8) Guide air ring(2) over rear compressor driveshaft(1) until aligned with journal diameter.

NOTE

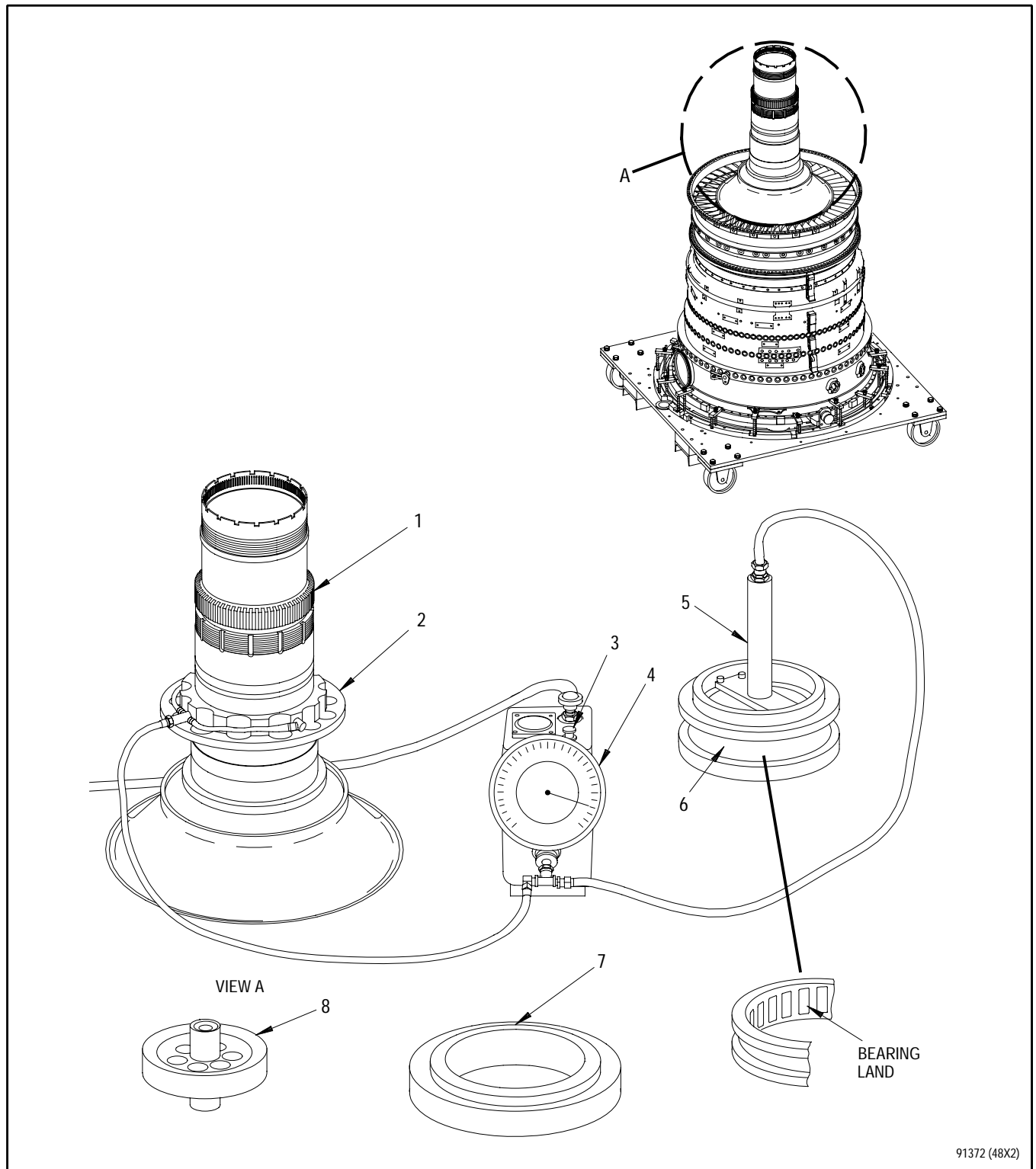
Each graduation on dial of gage(4) is equal to 0.000025 inch.

(9) Read gage(4). Indicator must have moved in clockwise direction and indicate minimum of 0.003 inch for part match-up to be acceptable.

(10) Substitute bearings as necessary for acceptable match-up.

Legend for figure 2

1. Rear compressor driveshaft
2. Air ring
3. Zero adjustment knob
4. Dimensionair gage
5. Air plug
6. No. 4 bearing inner race
7. Detail-6 master ring
8. Detail-6 disk master



91372 (48X2)

Figure 2. No. 4 Bearing Inside Diameter and Rear Compressor Journal Diameter Gage (PWA 57856) - Interference Fit Measurement

4. REAR COMPRESSOR DRIVESHAFT NO. 4 BEARING JOURNAL - MEASUREMENT.

(See figure 1 and Figure 3.)

- a. Measure rear compressor driveshaft bearing journal diameter using PWA 57856 gage as follows:

- (1) Connect gage to 40 to 150 psig air supply(1, figure 1).
- (2) Adjust pressure regulator knob(3) to set master pressure gage(2) to SET. Gage hand can be anywhere between limit lines on dial.

NOTE

Two master ring and disk master sets are included in PWA 57856 gage. Detail-6 set is used for F100-PW-229 hardware measurement.

- (3) Insert air plug(6) into detail-6 master ring(7).
- (4) Install air ring(8) onto detail-6 disk master(9).

NOTE

- PWA 57856 and PWA 55226 gages require different settings for zero adjustment knob.
 - Each graduation on dial of gage(4) is equal to 0.000025 inch.
- (4a) If using PWA 57856 gage, adjust zero adjustment knob(4) to set hand of gage(5) to indicate zero.

- (5) If using PWA 55226 gage, adjust zero adjustment knob(4) to set hand of gage(5) to indicate 0.0007 inch to left of zero. (Hand turned in counterclockwise direction from zero.)

- (6) Guide air ring(2, figure 3) over rear compressor driveshaft(1) until aligned with journal diameter.

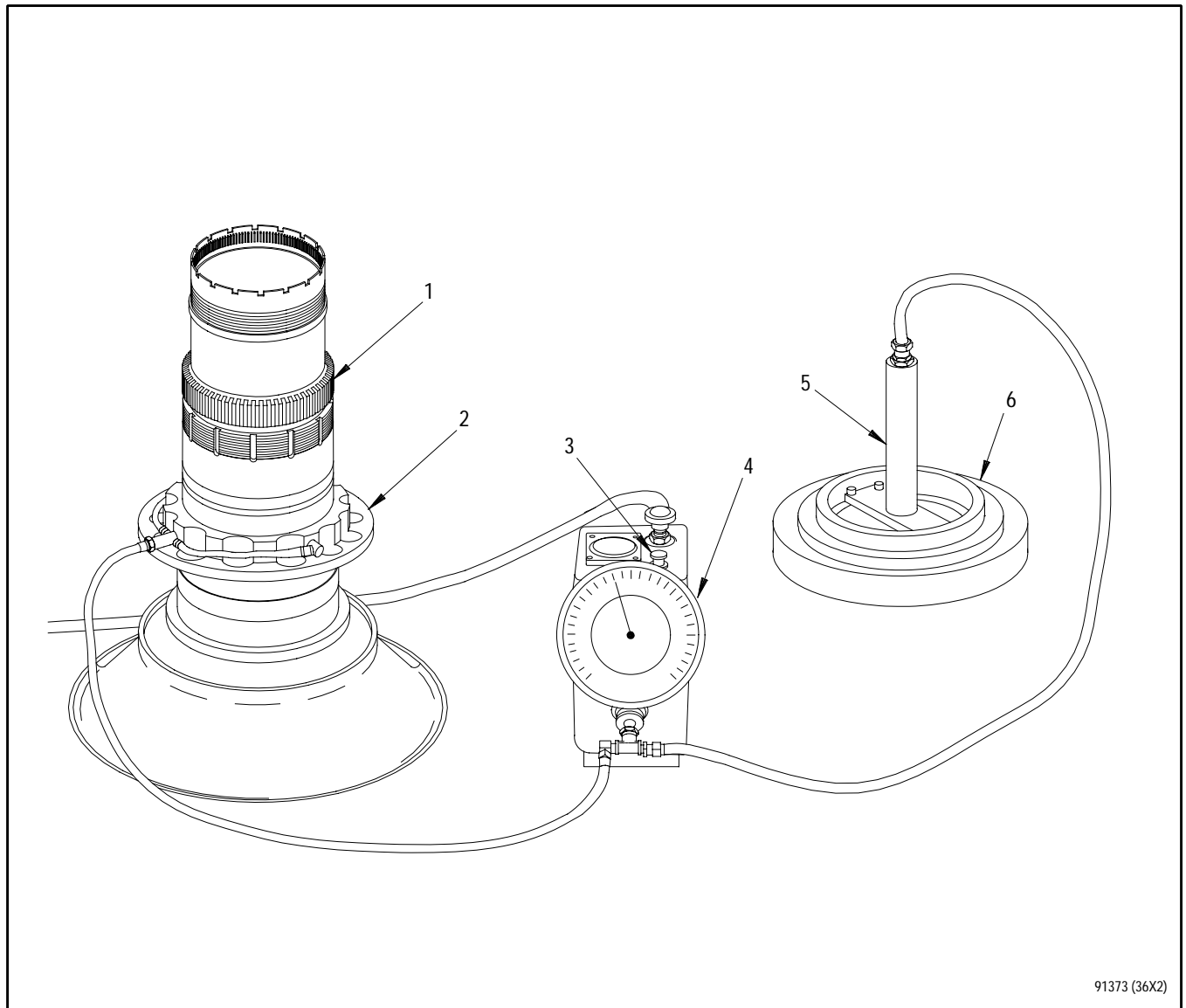
- (7) Determine journal diameter as follows:

- (a) If reading on gage(4) is counterclockwise deviation from zero, diameter of journal is 6.4989 inch minus gage reading.

- (b) If reading on gage(4) is clockwise deviation from zero, diameter of journal is 6.4989 inch plus gage reading.

- b. Refer to WP 801 00, Reference 3009. Reject driveshaft if journal diameter is not within limits.

- c. Tag driveshaft with journal diameter for core engine final assembly.



1. Rear compressor driveshaft
2. Air ring
3. Zero adjustment knob
4. Dimensionair gage
5. Air plug
6. Detail-6 master ring

Figure 3. Rear Compressor Driveshaft No. 4 Bearing Journal - Measurement

5. NO. 4 BEARING INNER RACE INSIDE DIAMETER - MEASUREMENT.

(See figure 1 and Figure 4.)

- a. Measure No. 4 bearing inner race ID using PWA 57856 gage as follows:

- (1) Connect gage to 40 to 150 psig air supply(1, figure 1).
- (2) Adjust pressure regulator knob(3) to set master pressure gage(2) to SET. Gage hand can be anywhere between limit lines on dial.

NOTE

Two master ring and disk master sets are included in PWA 57856 gage. Detail-6 set is used for F100-PW-229 hardware measurement.

- (3) Insert air plug(6) into detail-6 master ring(7).
- (4) Install air ring(8) onto detail-6 disk master(9).

NOTE

- PWA 57856 and PWA 55226 gages require different settings for zero adjustment knob.
 - Each graduation on dial of gage(5) is equal to 0.000025 inch.
- (4a) If using PWA 57856 gage, adjust zero adjustment knob(4) to set hand of gage(5) to indicate zero.

- (5) If using PWA 55226 gage, adjust zero adjustment knob(4) to set hand of gage(5) to indicate 0.0008 inch to left of zero. (Hand turned in counterclockwise direction from zero.)

- (6) Insert air plug(3, figure 4) into No. 4 bearing inner race(4) aligning any one of three air jets with land between scallops.

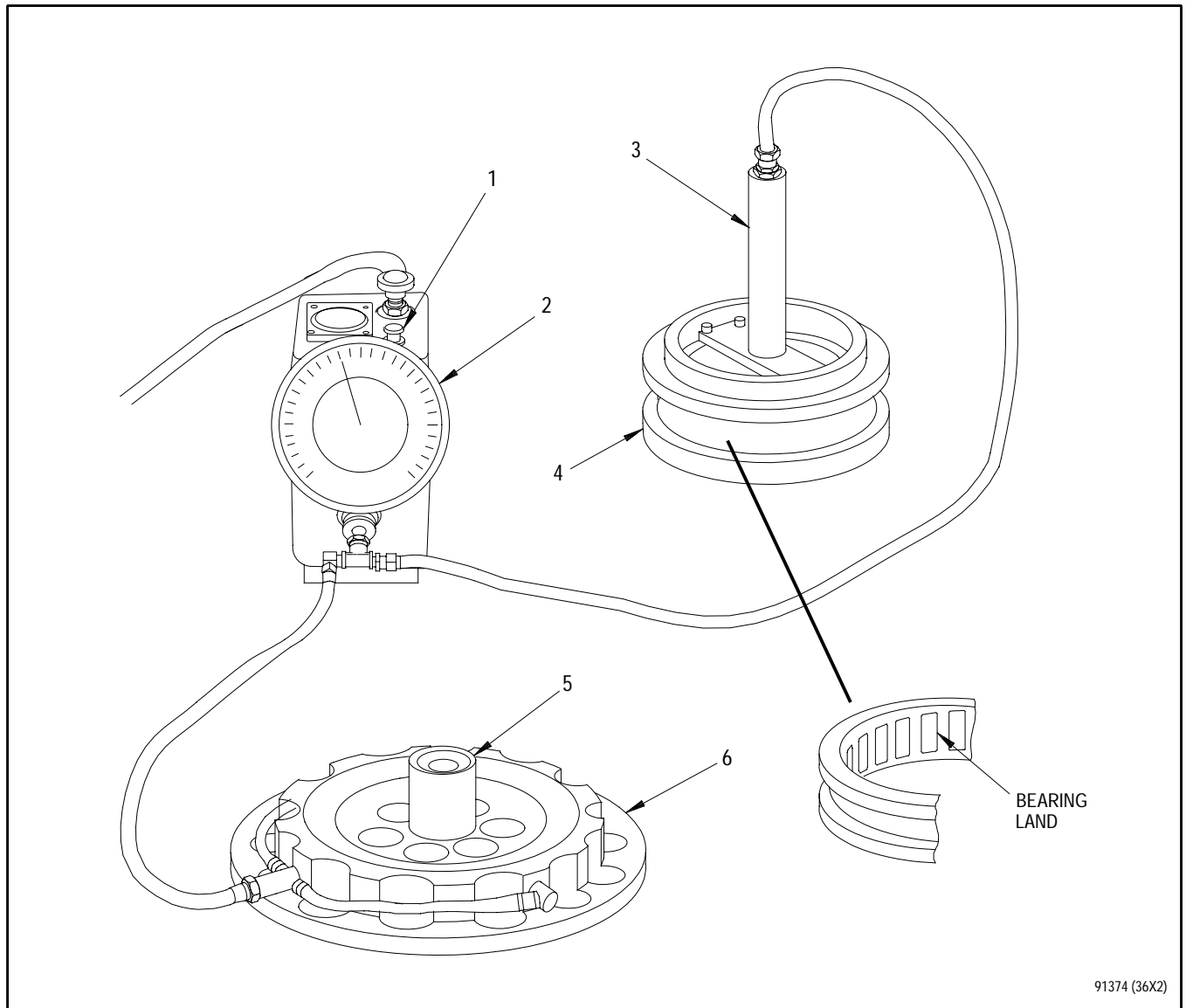
- (7) Determine inner race ID as follows:

- (a) If reading on gage(2) is counterclockwise deviation from zero, ID of inner race is 6.4959 inch plus gage reading.

- (b) If reading on gage(2) is clockwise deviation from zero, ID of inner race is 6.4959 inch minus gage reading.

- b. Refer to WP 801 00, Reference 3009. Reject bearing if inner race ID is not within limits.

- c. Tag bearing with inner race ID for core engine final assembly.



1. Zero adjustment knob
2. Dimensionair gage
3. Air plug
4. No. 4 bearing inner race
5. Detail-6 disk master
6. Air ring

Figure 4. No. 4 Bearing Inner Race Inside Diameter - Measurement

WORK PACKAGE**TECHNICAL PROCEDURES****BEARINGS -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	6	29	7	18
3	14	6A Added	29	8	0
4	29	6B Blank Added	29	9	18
5	14			10	29

REFERENCE MATERIAL REQUIRED

Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
No. 4 Bearing Inner Race and Rear Compressor Driveshaft	
Bearing Journal Diameter - Interference Fit Measurement	
Using PWA 57856 Gage - - - - -	WP 338 00
Bearings - Repair - - - - -	WP 439 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

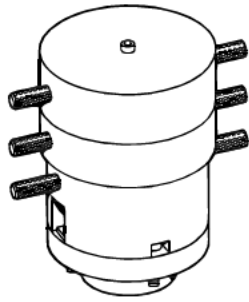
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

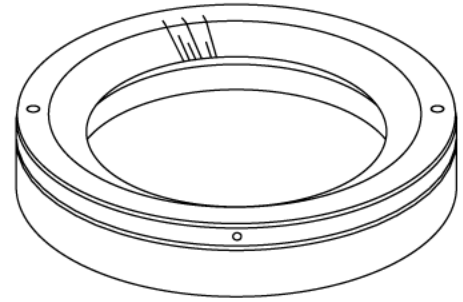
Paragraph	Function - Tool Nomenclature	Tool Number
2	Bearings - Inspection	
	Weight, Bearing contact angle - - - - -	PWA 20048
	Ring, Graduated No. 2 bearing contact angle - - - - -	PWA 51579
	Adapter, No. 2 bearing contact angle - - - - -	PWA 51580
	Adapter, No. 3 bearing contact angle - - - - -	PWA 51581
	Ring, Graduated No. 3 bearing contact angle - - - - -	PWA 56596
		or
		PWA 51582
3	No. 4 Bearing - Inspection	
	Fixture - - - - -	PWA 53738

ILLUSTRATED SUPPORT EQUIPMENT



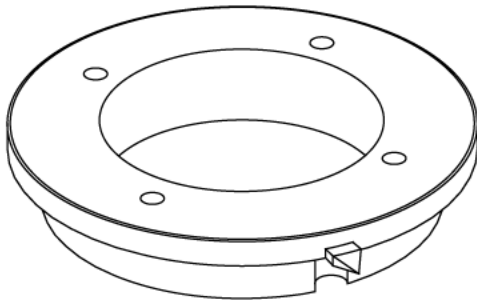
PWA20048-C

Figure T1. PWA 20048 Weight



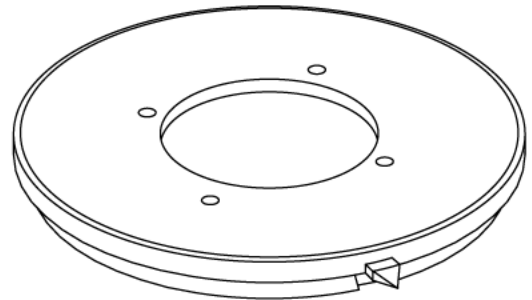
PWA 51579 -C

Figure T2. PWA 51579 Ring



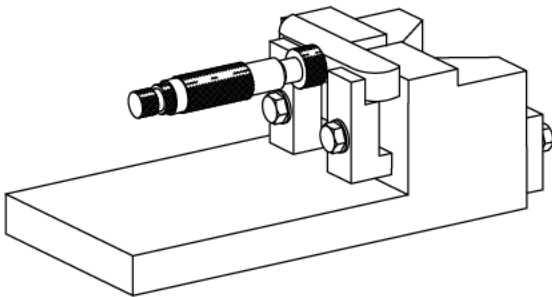
PWA 51580 -C

Figure T3. PWA 51580 Adapter



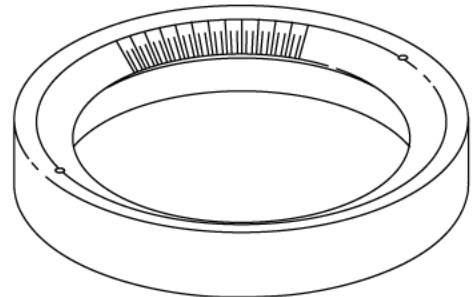
PWA 51581 -C

Figure T4. PWA 51581 Adapter



PWA 53738 -C

Figure T5. PWA 53738 Fixture



PWA 51582 -C

Figure T6. PWA 56596 Ring

1. INTRODUCTION.

- a. This work package contains instructions for inspection of roller and ball bearings.

2. BEARINGS - INSPECTION.

(See Tables 1, 2, 3, 3A, and 3B.)



- To prevent damage, do not mix bearing components of one bearing with those of another during this or any subsequent handling.
- Do not mark functional or nonfunctional surfaces of bearings to prevent bearing damage and stack-up deviation.

NOTE

Do not magnetic particle inspect bearings.

- a. Inspect roller bearings per table 1 and T.O. 2-1-111, and inspect No. 4 bearing per additional requirements in paragraph 3.
- b. Inspect ball bearings per tables 2, 3, 3A, and 3B and T.O. 2-1-111.
- c. Inspect oil holes (slots) to ensure they are open. Remove any obstruction which may be present.
- d. Repair unserviceable bearings per WP 439 00.

Table 1. Roller Bearings Limits

Part No.	Identification (Location)	Acceptable Bore Dimension	Internal Radial Clearance	Load in Pounds
4059297	No. 4	6.49570 6.49615	0.0053 0.0063	44
4059298	No. 4	6.49570 6.49615	0.0053 0.0063	44
4059299	No. 4	6.49570 6.49615	0.0053 0.0063	44
4000606	Gearbox drive bevel gearshaft, upper	1.2793 1.2797	0.0020 0.0028	11
4000607	Gearbox drive bevel gearshaft, upper	1.2793 1.2797	0.0020 0.0028	11
4057330	Gearbox drive shaft, upper	1.2793 1.2797	0.0020 0.0028	11
4061007	No. 4	6.49500 6.49615	0.0053 0.0063	44
4057425	Gearbox drive bevel gearshaft, upper	1.2793 1.2797	0.0020 0.0028	44

Table 2. Ball Bearings Limits

Part No.	Location	Acceptable Bore Dimension	Contact Angle/ Load (lbs)	PWA Tool Number
4075346 4075347 4075348	No. 2	4.33045 4.33070	29 32 (60)	51579 Ring 51580 Adapter 20048 Weight
4081020 4081023 4081024	No. 2	4.33045 4.33070	28 31 (60)	51579 Ring 51580 Adapter 20048 Weight
4075315 4075317	No. 3	6.1021 6.1026	30 33 (60)	56596 Ring 51581 Adapter 20048 Weight

Table 3. Gearbox Drive Ball Bearings - Limits

Part No.	Location	Acceptable Bore Dimension	Internal Radial Clearance	Contact Angle/ Load (lbs)	Load in Pounds Radial
4000609	Gearbox drive bevel gearshaft lower	2.5589 2.5593	0.0048 0.0059	25°30' (11) 22°30'	33
40000610	Gearbox drive bevel gearshaft lower	2.5589 2.5593	0.0042 0.0058	25°30' (11) 22°30'	33
4056149	Gearbox drive gearshaft lower	2.5589 2.5593	0.0042 0.0058	25°30' (11) 22°30'	33
4061870	Gearbox drive gearshaft lower	2.5589 2.5593	0.0042 0.0058	25°30' (11) 22°30'	33

Table 3A. No. 2 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBAEAD	JGDFGAA	Cage	Plating flaking/peeling
EEBBAEAD	JGDFGAB	Cage	Plating wear
EEBBAEAD	JGDFGAC	Cage	Out of round
EEBBAEAD	JGDFGAD	Cage	Cracks
EEBBAEAD	JGDFGAE	Inner ring	Galling
EEBBAEAD	JGDFGAF	Inner ring	Brinelling
EEBBAEAD	JGDFGAG	Inner ring	Pitting
EEBBAEAD	JGDFGAH	Inner ring	Dents/nicks
EEBBAEAD	JGDFGAJ	Inner ring	Scratches, scuffs, and scoring
EEBBAEAD	JGDFGAK	Inner ring	Skidding
EEBBAEAD	JGDFGAL	Inner ring	Spalling
EEBBAEAD	JGDFGAM	Ball	Heat discoloration
EEBBAEAD	JGDFGAN	Ball	Brinelling
EEBBAEAD	JGDFGAP	Ball	Pitting
EEBBAEAD	JGDFGAQ	Ball	Dents/nicks
EEBBAEAD	JGDFGAR	Ball	Scratches, scuffs, and scoring
EEBBAEAD	JGDFGAS	Ball	Skidding

Table 3B. No. 3 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBAP	JGDFGAA	Cage	Plating flaking/peeling
EEBBAP	JGDFGAB	Cage	Plating wear
EEBBAP	JGDFGAC	Cage	Out of round
EEBBAP	JGDFGAD	Cage	Cracks
EEBBAP	JGDFGAE	Inner ring	Galling
EEBBAP	JGDFGAF	Inner ring	Brinelling
EEBBAP	JGDFGAG	Inner ring	Pitting
EEBBAP	JGDFGAH	Inner ring	Dents/nicks
EEBBAP	JGDFGAJ	Inner ring	Scratches, scuffs, and scoring
EEBBAP	JGDFGAK	Inner ring	Skidding
EEBBAP	JGDFGAL	Inner ring	Spalling
EEBBAP	JGDFGAM	Ball	Heat discoloration
EEBBAP	JGDFGAN	Ball	Brinelling
EEBBAP	JGDFGAP	Ball	Pitting
EEBBAP	JGDFGAQ	Ball	Dents/nicks
EEBBAP	JGDFGAR	Ball	Scratches, scuffs, and scoring
EEBBAP	JGDFGAS	Ball	Skidding

3. NO. 4 BEARING - INSPECTION.

(See Figures 1 and 2, table 1 and Table 4.)

- a. Inspect bearing dimensionally and visually per table 1 and T.O. 2-1-111. Refer to WP 338 00.

(1) Repair unserviceable bearing per WP 439 00.

- b. Definitions (in lieu of those in T.O. 2-1-111):

- Burnishing - Mechanical smoothing of a surface, sometimes accompanied by discoloration of contact area. Continued burnishing may result in wear.

- Wear - Removal of metal from a surface, resulting in a perceptible step or rough, sharp edges.
- Roller End Burnishing - Burnishing on roller end faces occurring as circular band(s) which may be either offset or concentric with respect to longitudinal axis of roller. See figure 1.

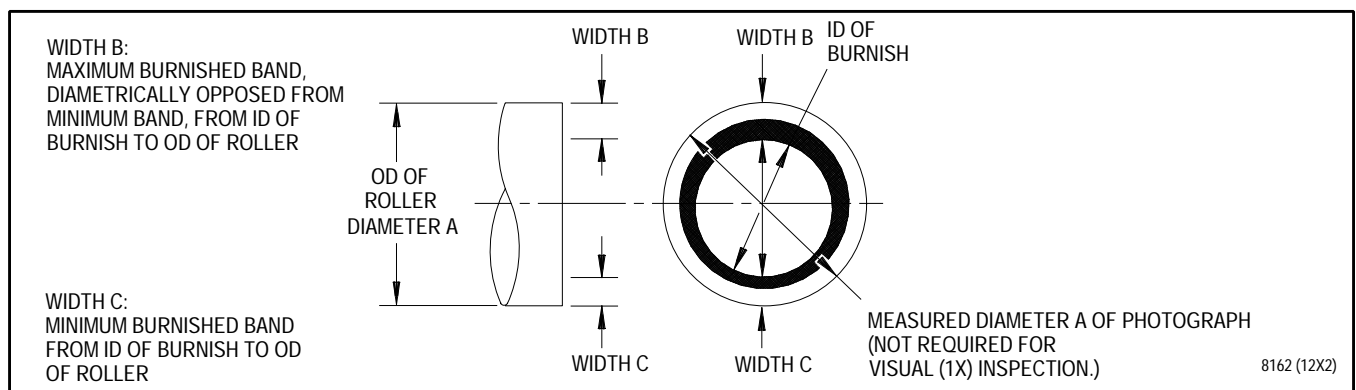


Figure 1. No. 4 Bearing Roller End Burnish - Photographic Inspection

- c. Inspect roller end burnishing as follows:

NOTE

Visual examination may indicate that no offset roller end burnishing exists. When this cannot be determined visually, it is permissible to select roller in question and obtain a photograph enlargement. Using this enlargement, roller end wear can be calculated.

(See Option II.)

- (1) Mechanical bearing roller end burnish inspection - Option I (No magnification). See figure 2.

- (a) Install standard depth micrometer (Starrett No. 449A-3A or equivalent) with 1 - 2 inch blade, into PWA 53738 end burnish inspection fixture.
- (b) Set roller bearing, with burnished end up on platform of PWA 53738 fixture, and adjust platform so that bearing end will be approximately 1/4 inch above V-slot surface of fixture.
- (c) Adjust depth micrometer to OD of bearing (A, figure 2), and record reading.
- (d) Readjust fixture platform to bring roller bearing end to a point just below depth micrometer blade.

- (e) Rotate bearing until area of widest gap (B) between ID of burnished band and OD of burnished band micrometer. (Magnifying glass may be used.)

- (f) Adjust micrometer blade tip to nearest ID of burnished band (shall be as close as possible) and record reading (C).

- (g) Adjust micrometer blade tip to nearest ID of narrow burnished band (180° from widest gap) and record reading (D).

- (h) Adjust micrometer to OD of bearing (180° from widest gap) and record reading (E).

- (i) Calculate offset by subtracting (A) from (C) and (D) from (E). Difference is offset dimension.

- (j) Example: Dimension C (1.392 inches) minus Dimension A (1.333 inches) = 0.059 inch
Dimension E (1.763 inches) minus Dimension D (1.711 inches) = 0.052 inch
Solution: 0.059 - 0.052 = 0.007 inch offset.

- (2) Photographic bearing roller end burnish inspection - Option II (Enlargement). See figure 1.

- (a) Select questionable roller and obtain photographic enlargement, approximately 10X, taken with camera lens perpendicular to, and centered over roller axis.
- (b) On the photograph, measure maximum burnished band (diametrically opposed from minimum band) from ID of burnish to OD of roller, (Width B).
- (c) Measure minimum burnished band from ID of burnish to OD of roller, (Width C).
- (d) On the photograph, measure Diameter A, (OD of roller).

NOTE

With the following calculation it is not necessary to have an exact 10X photograph.

- (e) Calculate offset as follows:

NOTE

Actual roller diameter (nominal) is 0.6299 inches.

- 1 Determine magnification factor (M) by dividing 0.6299 inch into Diameter A dimension.
- 2 Subtract Width C dimension from Width B dimension.
- 3 Divide magnification factor (M) from step 1 into value obtained in step 2. The result is amount of offset.

4 Example:

Diameter A (from photo) = 6.758 inches

Width B = 0.595 inch

Width C = 0.520 inch

Magnification factor (M) = $\frac{6.758}{0.6299} = 10.729$

Offset = $\frac{0.595 - 0.520}{10.729} = 0.007 \text{ inch}$

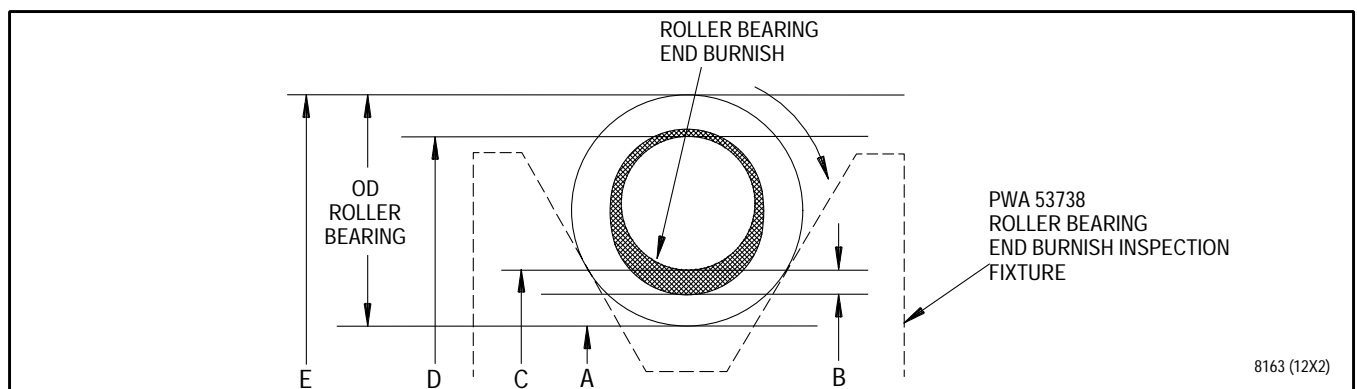


Figure 2. No. 4 Bearing Roller End Burnish - Mechanical Inspection

(3) No. 4 bearing limits and disposition as follows:

- (a) Roller end wear is acceptable, unless a step of 0.0005 inch or larger, or rough or sharp edges are present.
- (b) Offset of burnished bands is acceptable, up to 0.015 inch.

(c) Repair unacceptable bearings per WP 439 00. Repair conditions, as described in T.O. 2-1-111, require proprietary repair and are identified by task code in table 4. Refer to T.O. 2J-F100-53-1, WP 603 00 for qualified repair source list (QRSLS).

d. Note serviceability of bearing end wear on serviceable tag, DD Form 1574.

Table 4. No. 4 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBFU	JGDFGAA	Outer ring	Unacceptable hardness
EEBBFU	JGDFGAB	Outer ring	Heat discoloration
EEBBFU	JGDFGAC	Outer ring	Galling
EEBBFU	JGDFGAD	Outer ring	Brinelling
EEBBFU	JGDFGAE	Outer ring	Cracks
EEBBFU	JGDFGAF	Outer ring	Pitting
EEBBFU	JGDFGAG	Outer ring	Dents/nicks
EEBBFU	JGDFGAH	Outer ring	Scratches, scuffs, and scoring
EEBBFU	JGDFGAJ	Outer ring	Skidding
EEBBFU	JGDFGAK	Outer ring	Spalling
EEBBFU	JGDFGAL	Outer ring	Heat discoloration
EEBBFU	JGDFGAM	Roller	Galling
EEBBFU	JGDFGAN	Roller	Heat discoloration
EEBBFU	JGDFGAP	Roller	Brinelling
EEBBFU	JGDFGAQ	Roller	Pitting
EEBBFU	JGDFGAR	Roller	Nicks/dents
EEBBFU	JGDFGAS	Roller	Scratches, scuffs, and scoring
EEBBFU	JGDFGAT	Roller	Skidding
EEBBFU	JGDFGAU	Roller	Spalling
EEBBFU	JGDFGAV	Roller	End wear
EEBBFU	JGDFGAW	Inner race	Inner diameter wear
EEBBFU	JGDFGAX	Cage	Plating flaking/peeling
EEBBFU	JGDFGAY	Cage	Plating wear
EEBBFU	JGDFGAZ	Cage	Out of round
EEBBFU	JGDFGBA	Cage	Cracks
EEBBFU	JGDFGBB	Cage	Pitting
EEBBFU	JGDFGBC	Cage	Nicks/dents

WORK PACKAGE

TECHNICAL PROCEDURES

MANIFOLD ASSEMBLIES, FUEL SUPPLY, LEFT AND RIGHT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	8
2	-	3	.	.	0
4	-	8	.	.	8

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of left and right fuel supply manifold assemblies (typical PN 4078195 and 4078196).

2. LEFT AND RIGHT FUEL SUPPLY MANIFOLD ASSEMBLIES - INSPECTION.

(See Figure 1.)

- a. Pressure test left and right fuel supply manifold assemblies per paragraph 3.
- b. Visually inspect manifold assemblies for surface damage and wear. (See figure 1.)
- c. Inspect the manifold inlet and brazed joints.

(1) Fluorescent penetrant inspect first three inches of manifold inlet. Refer to

T.O. 2J-F100-9. No cracks allowed.

NOTE

Pay particular attention to the inlet ferrule braze.

(2) Visually inspect manifold assembly and fuel supply tube braze joints using a 10x glass and white light. No cracks allowed.

d. Condemn manifold assembly if more than eight details of manifold assembly require replacement.

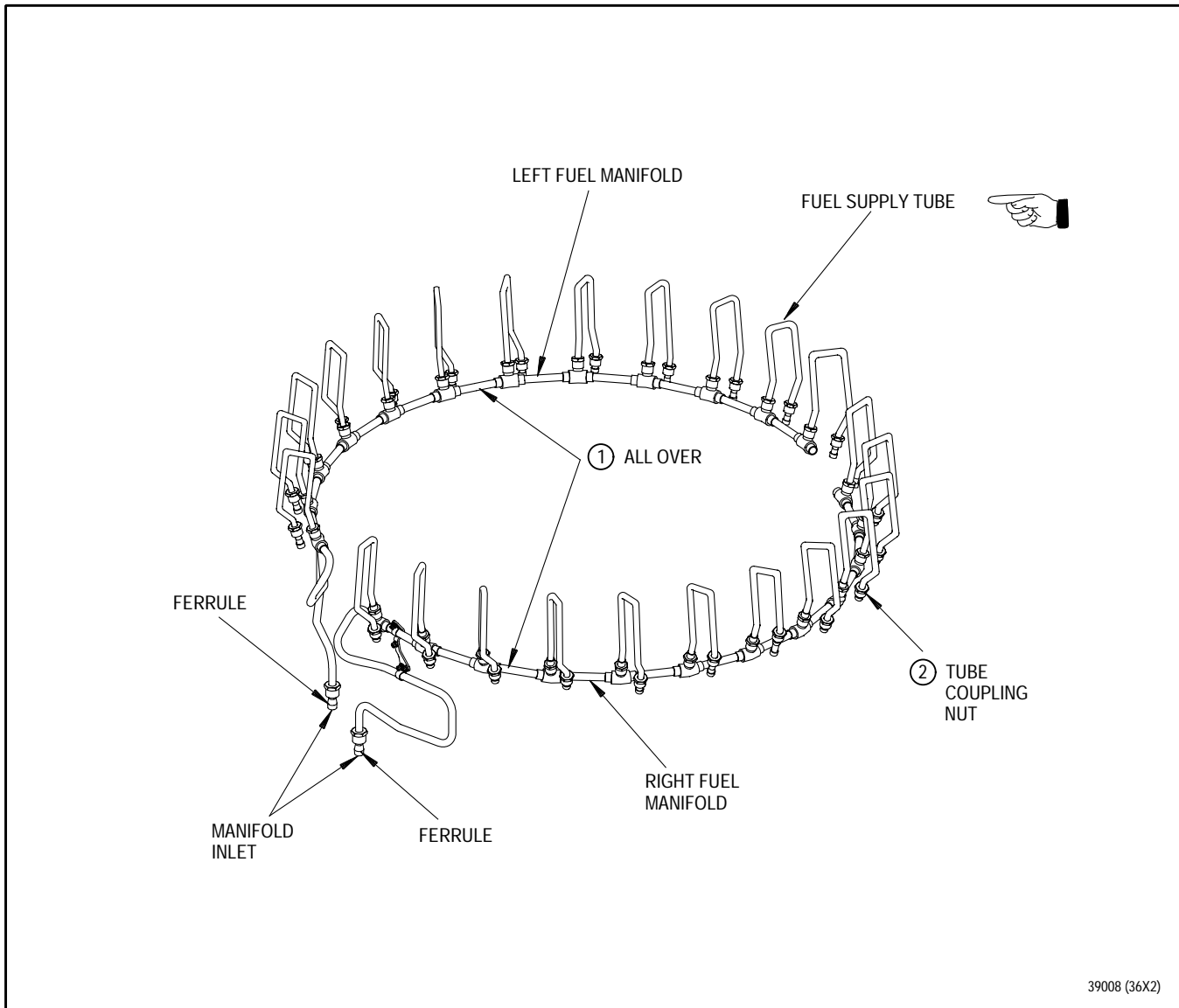


Figure 1. Left and Right Fuel Supply Manifold Assemblies - Inspection (Sheet 1 of 2)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over Manifold and Fuel Supply Tubes Except in Area A -			
Cracks	Not serviceable	Not repairable	Replace manifold.
Dents	1. 0.005 inch depth. 2. No dent has sharp edges or corners with radius less than 0.060 inch.	Not repairable	Replace manifold.
Flattening	Flattening due to bends or twisting shall not exceed 0.038 inch.	Not repairable	Replace manifold.
Nicks and gouges	0.003 inch depth	0.005 inch depth	Blend per WP 440 00.
Manifold assembly wear sleeves	0.004 inch depth	Not repairable	Replace manifold.

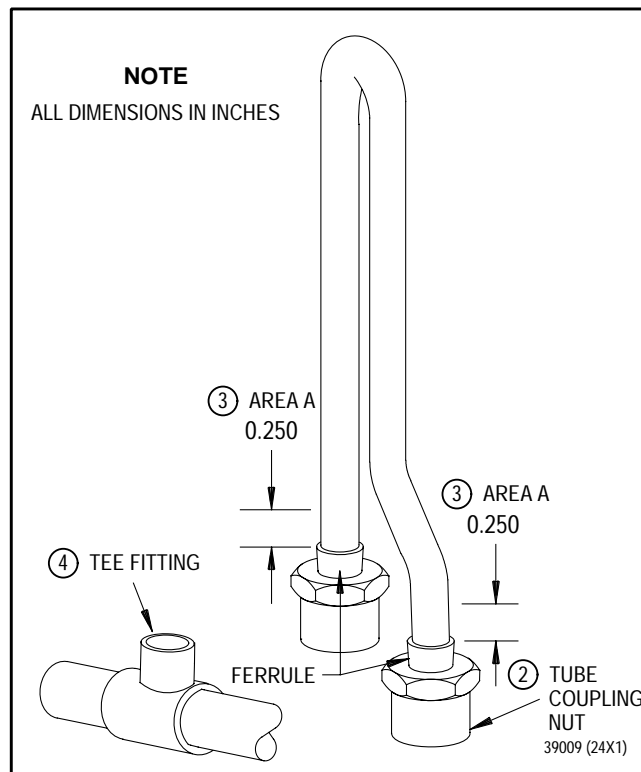


Figure 1. Left and Right Fuel Supply Manifold Assemblies - Inspection (Sheet 2 of 2)

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - (continued) Chafing	0.003 inch depth chafe shall not extend more than 180 degrees of tube circumference.	0.005 inch depth	Blend per WP 440 00.
Scratches	0.003 inch depth	0.005 inch depth	Blend per WP 440 00.
Pits	Visible corrosion pits and minor isolated pitting is acceptable provided depth does not exceed 0.002 inch.	Blend isolated pits or clusters of pits to 0.005 inch depth	Blend per WP 440 00.
2. Tube coupling nut - Corrosion	Visible corrosion on exterior of coupling nuts acceptable, provided depth does not exceed 0.010 inch.	Not reparable	Replace manifold.
3. Area A - Fuel Supply Tube - Tube Surface within 0.250 inch from Ferrule (See figure 1.) Cracks	Not serviceable	Not reparable	Replace fuel supply tube.
Dents	1. 0.002 inch depth. 2. No dent has sharp edges or corners with radius less than 0.060 inch.	Not reparable	Replace fuel supply tube.
Flattening	Not serviceable	Not reparable	Replace fuel supply tube

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Area A - (continued)			
Nicks and gouges	0.002 inch depth	Not reparable	Replace fuel supply tube.
Chafing	Not serviceable	Not reparable	Replace fuel supply tube.
Scratches, Axial orientation	0.003 inch depth	Not reparable	Replace fuel supply tube.
Scratches, Circum- ferential orientation	Not serviceable	Not reparable	Replace fuel supply tube.
Scratches, Polishing marks of no measureable depth	Any amount, any direction	-	-
Pits	Visible corrosion pits and minor isolated pitting is acceptable provided depth does not exceed 0.002 inch.	Not reparable	Replace fuel supply tube.
Clamps (Metal band and Fiberglass cushion type)			
Cracks	Not serviceable	Not reparable	Replace clamp
Fractured through	Not serviceable	Not reparable	Replace manifold assembly, all fuel supply tubes, clamps on affected side.
Bent, distorted	Not serviceable	Not reparable	Replace clamp
Loose or missing reinforcement tab	Not serviceable	Not reparable	Replace clamp

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Area A - (continued)			
Clamps (Fiberglass cushion type)			
Fiberglass cushion			
Missing	Not serviceable	Not repairable	Replace clamp
Fraying	Slight fraying of ends acceptable	Not repairable	Replace clamp
Brackets			
Fractured through	Not serviceable	Not repairable	Replace manifold assembly, all fuel supply tubes, clamps on affected side.
Cracks	Not serviceable	Not repairable	Replace bracket
4. Tee fitting -			
Conical seat impressions	0.003 inch depth provided impressions are uniform and there is evidence of sealing around the full circumference.	Not repairable	Replace manifold.

3. LEFT AND RIGHT FUEL SUPPLY MANIFOLD ASSEMBLIES - PRESSURE TEST.

- a. Cap or plug manifold openings with locally manufactured plugs or caps.
- b. Pressurize manifold to ten psi maximum with air and immerse in water tank.

- c. Pressure check using standard pressure checking procedure. Required test pressure of 1500 psi shall be held for minimum of one minute. No leakage in any amount, or deformation due to test pressure is acceptable.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL RING, METAL (PN 4077824 AND PN 4036955) -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

T.O. 2J-F100-53-7

WP 341 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

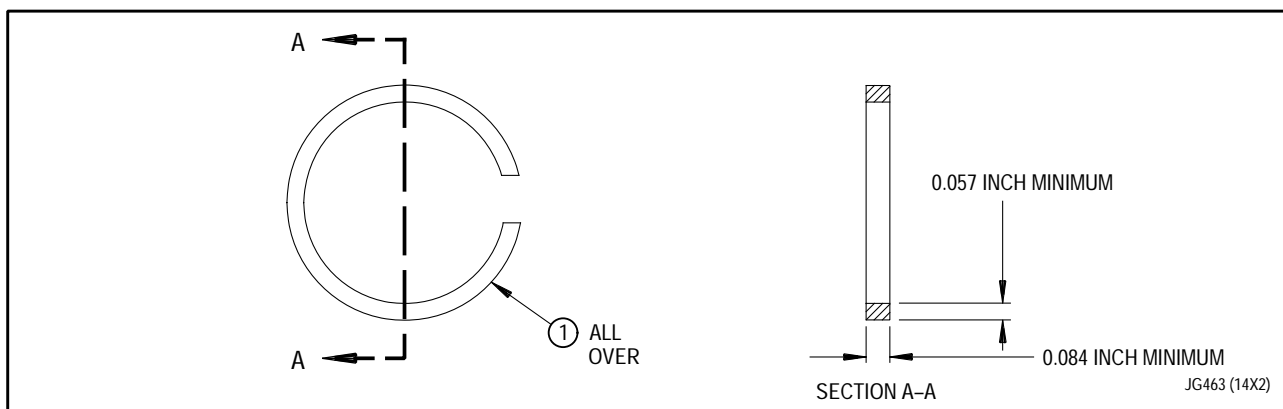
1. INTRODUCTION.

- a. This work package contains instructions for inspection of PN 4077824 and 4036955 metal seal rings.

2. METAL SEAL RING (PN 4077824) - INSPECTION.

(See Figure 1.)

- a. Dimensionally inspect metal seal ring. (See figure 1.)



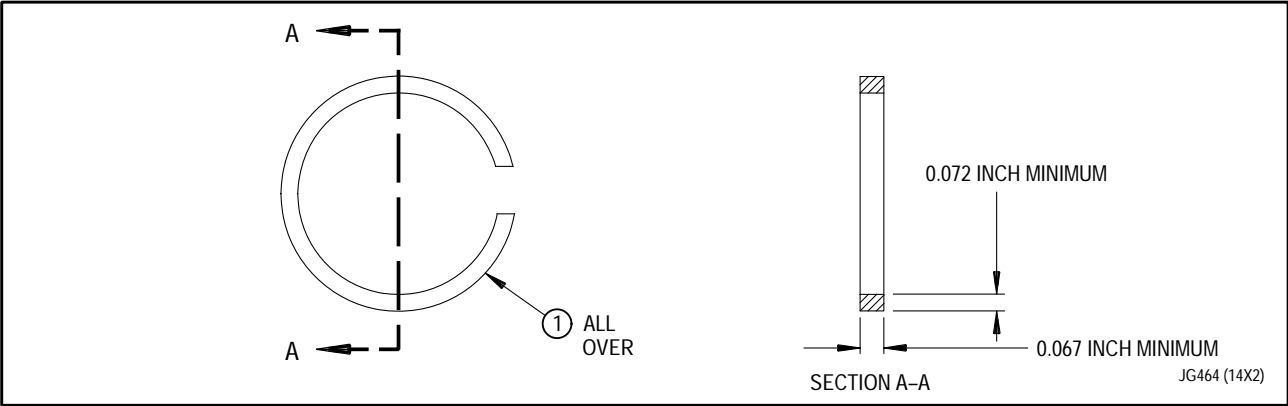
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Wear	<p>a. 0.057 inch minimum width</p> <p>b. 0.084 inch minimum height</p>	Not repairable	Replace seal ring.

Figure 1. Metal Seal Ring (PN 4077824) - Wear Limits

3. METAL SEAL RING (PN 4036955) -
INSPECTION.

(See Figure 2.)

- a. Dimensionally inspect metal seal ring. (See figure 2.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Wear	a. 0.072 inch minimum width b. 0.067 inch minimum height	Not repairable	Replace seal ring.

Figure 2. Metal Seal Ring (PN 4036955) - Wear Limits

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL RINGS, NO. 2, 3, AND 4 BEARING METAL -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

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10 Blank					
	0				
	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2, 3, and 4 bearing metal seal rings.

2. NO. 2, 3, AND 4 BEARING METAL SEAL RINGS - INSPECTION.

(See Figures 1, 2, and 3.)

b. Dimensionally inspect metal seal rings. (See figure 1, 2, or 3.)

a. Visually inspect metal seal rings. (See figure 1, 2, or 3.)

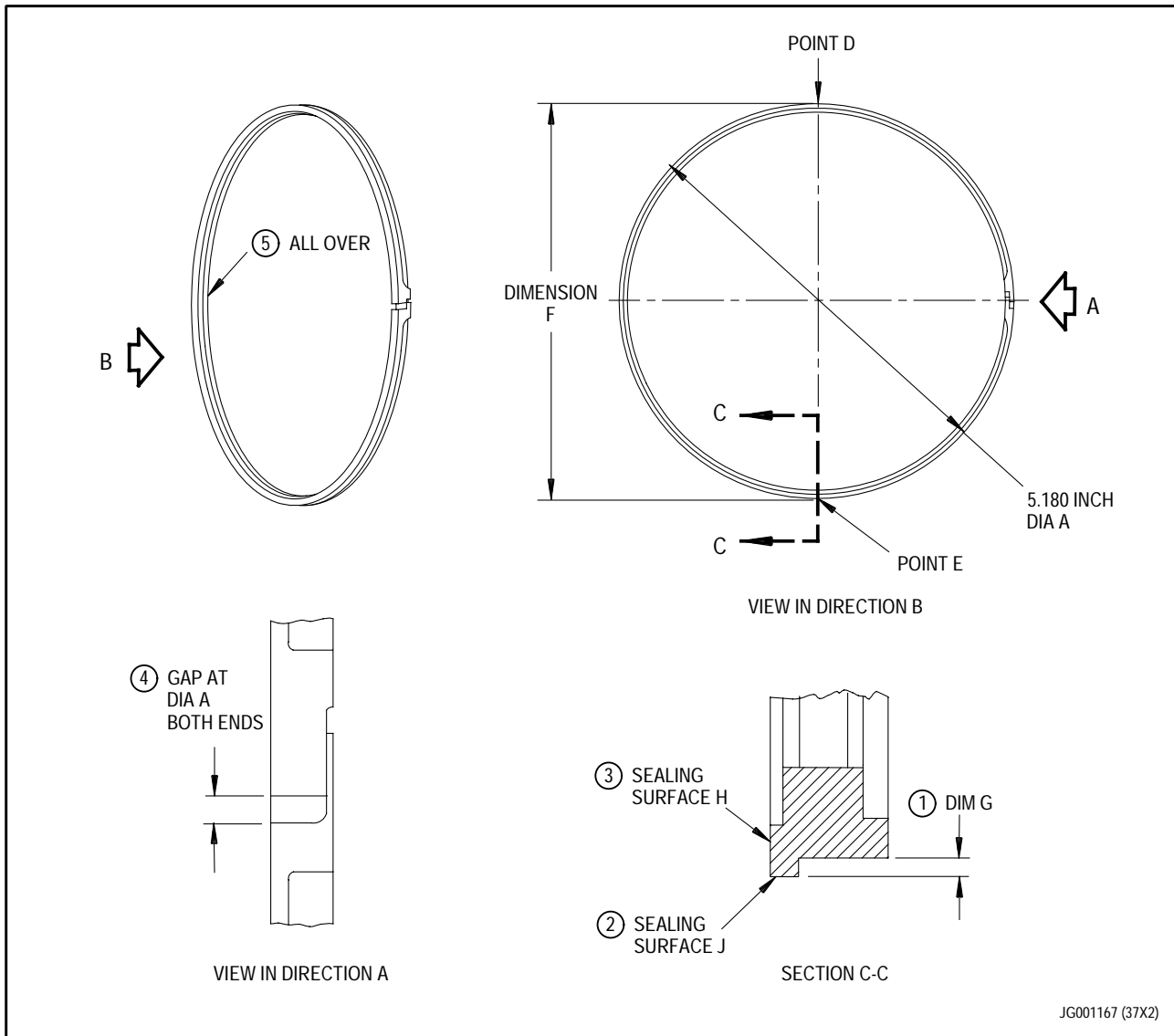


Figure 1. Metal Seal Ring (No. 2 Bearing Seal Sealing Ring) (PN 4001629) - Inspection

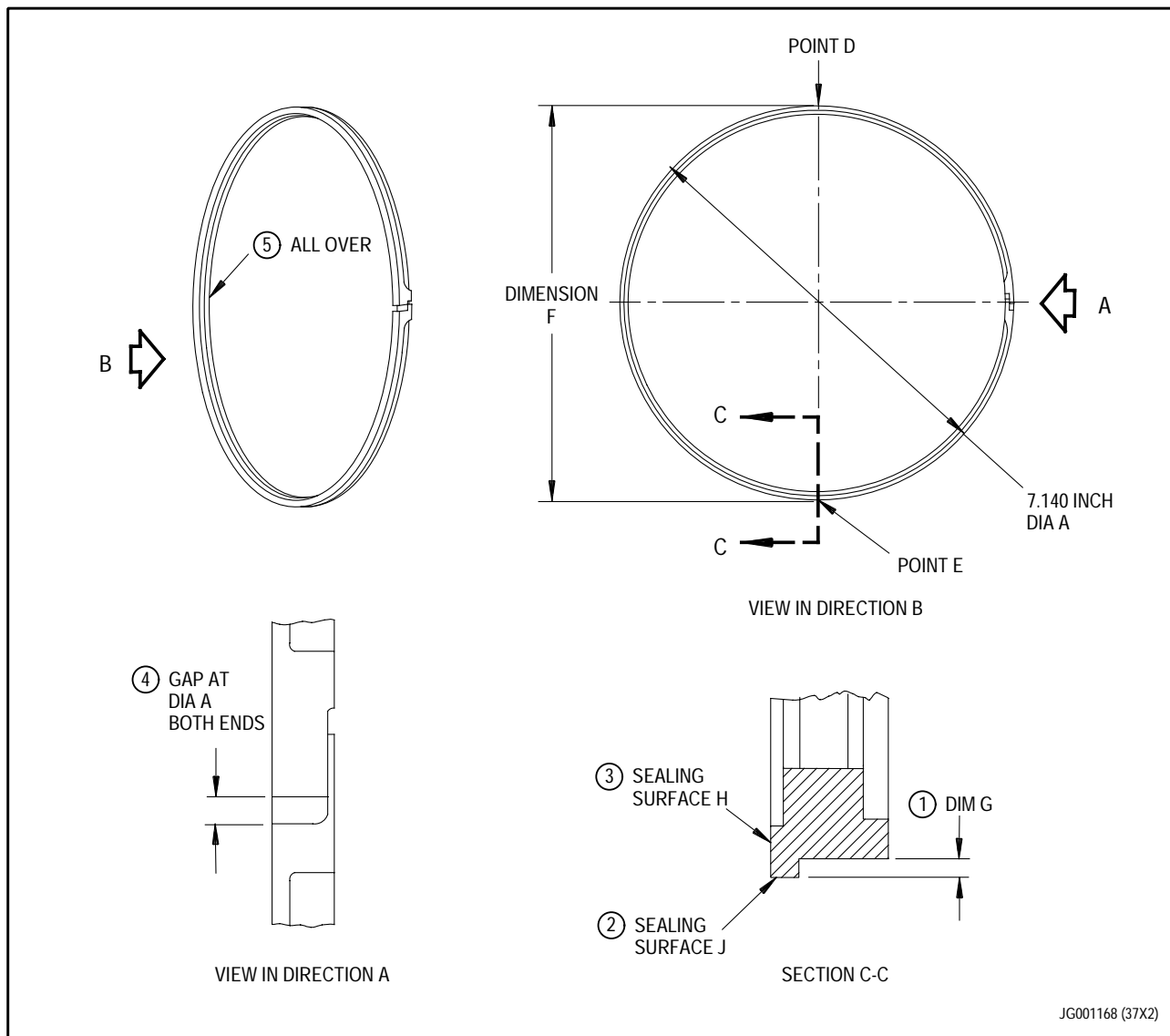
Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Dimension G - Wear	0.015 inch	See corrective action.	Replace ring.
2. Sealing Surface J - Nicks, dents, scratches	Not serviceable	See corrective action.	Replace ring.
3. Sealing Surface H - Nicks, dents, scratches	Not serviceable	See corrective action.	Replace ring.

NOTE

Dimension F shall equal Diameter A with 1.5 to 3.0 pound load applied at Points D and E.

4. Gap at Diameter A Both Ends -	Per WP 801 00, Reference 2918.	See corrective action.	Replace ring.
5. All over - Cracks	Not serviceable	See corrective action.	Replace ring.



Legend for figure 2

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Dimension G - Wear	0.015 inch	Not reparable	Replace ring.
2. Sealing Surface J - Nicks, dents, scratches	Not serviceable	Not reparable	Replace ring.
3. Sealing Surface H - Nicks, dents, scratches	Not serviceable	Not reparable	Replace ring.

NOTE

Dimension F shall equal Diameter A with 1.5 to 3.0 pound load applied at Points D and E.

4. Gap at Diameter A Both Ends -	Per WP 801 00, Reference 2914.	Not reparable	Replace ring.
5. All over - Cracks	Not serviceable	Not reparable	Replace ring.

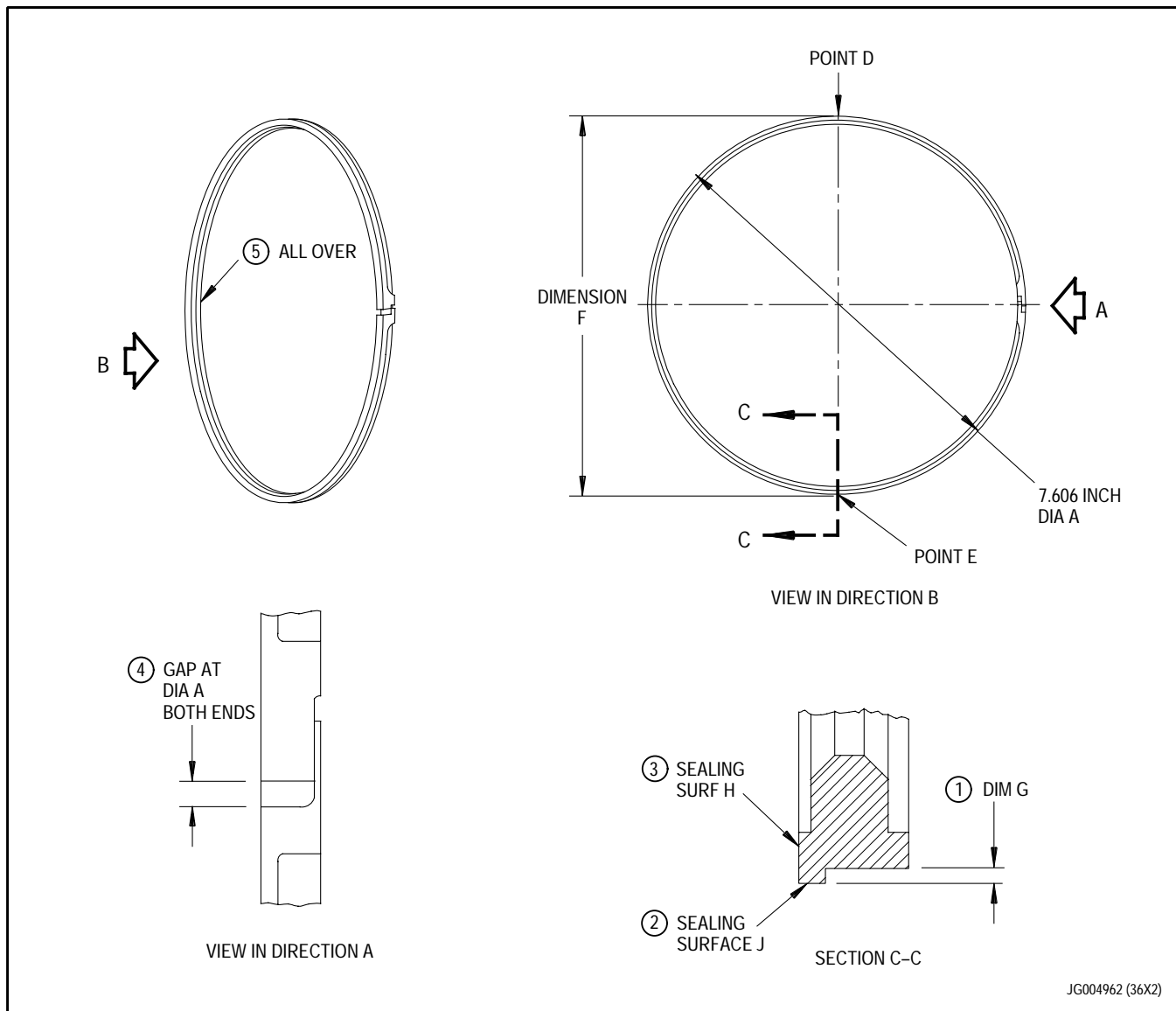


Figure 3. Metal Seal Ring (No. 4 Bearing Seal Sealing Ring) (PN 4002454) - Inspection

Legend for figure 3

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Dimension G - Wear	0.015 inch	Not reparable	Replace ring.
2. Sealing Surface J - Nicks, dents, scratches	Not serviceable	Not reparable	Replace ring.
3. Sealing Surface H - Nicks, dents, scratches	Not serviceable	Not reparable	Replace ring.

NOTE

Dimension F shall equal Diameter A with 1.5 to 3.0 pound load applied at Points D and E.

4. Gap at Diameter A Both Ends -	Per WP 801 00, Reference 3016.	Not reparable	Replace ring.
5. All over - Cracks	Not serviceable	Not reparable	Replace ring.

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

SEAL RINGS, NO. 2, 3, AND 4 BEARING METAL -

INSPECTION
AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of No 2, 3, and 4 bearing metal seal rings after volcanic ash ingestion.

2. NO. 2, 3, AND 4 BEARING METAL SEAL RINGS - INSPECTION.

(See Figures 1, 2, and 3.)

- a. Inspect metal seal rings.
(See figures 1, 2, or 3.)

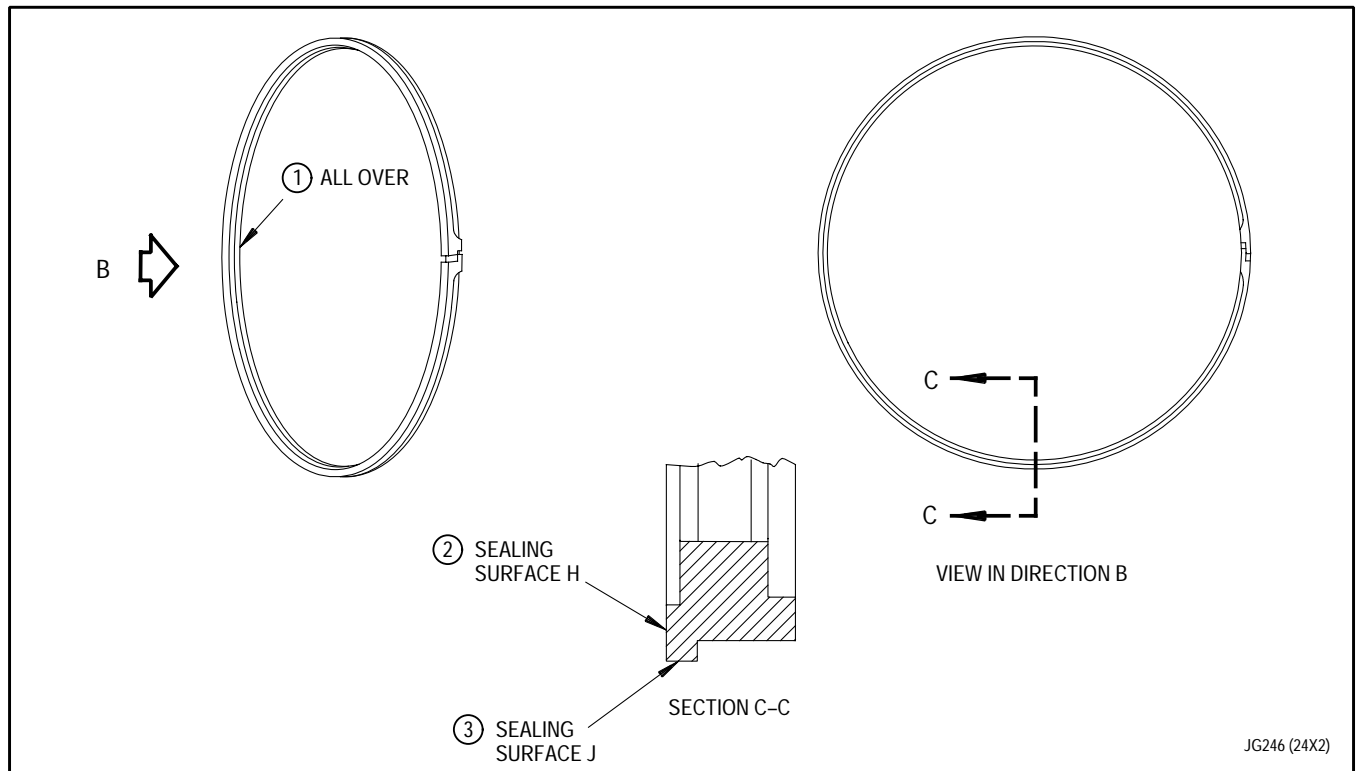


Figure 1. Metal Seal Ring (No. 2 Bearing Seal Sealing Ring) - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not repairable	Replace ring.
2. Sealing Surface H - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.
3. Sealing Surface J - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.

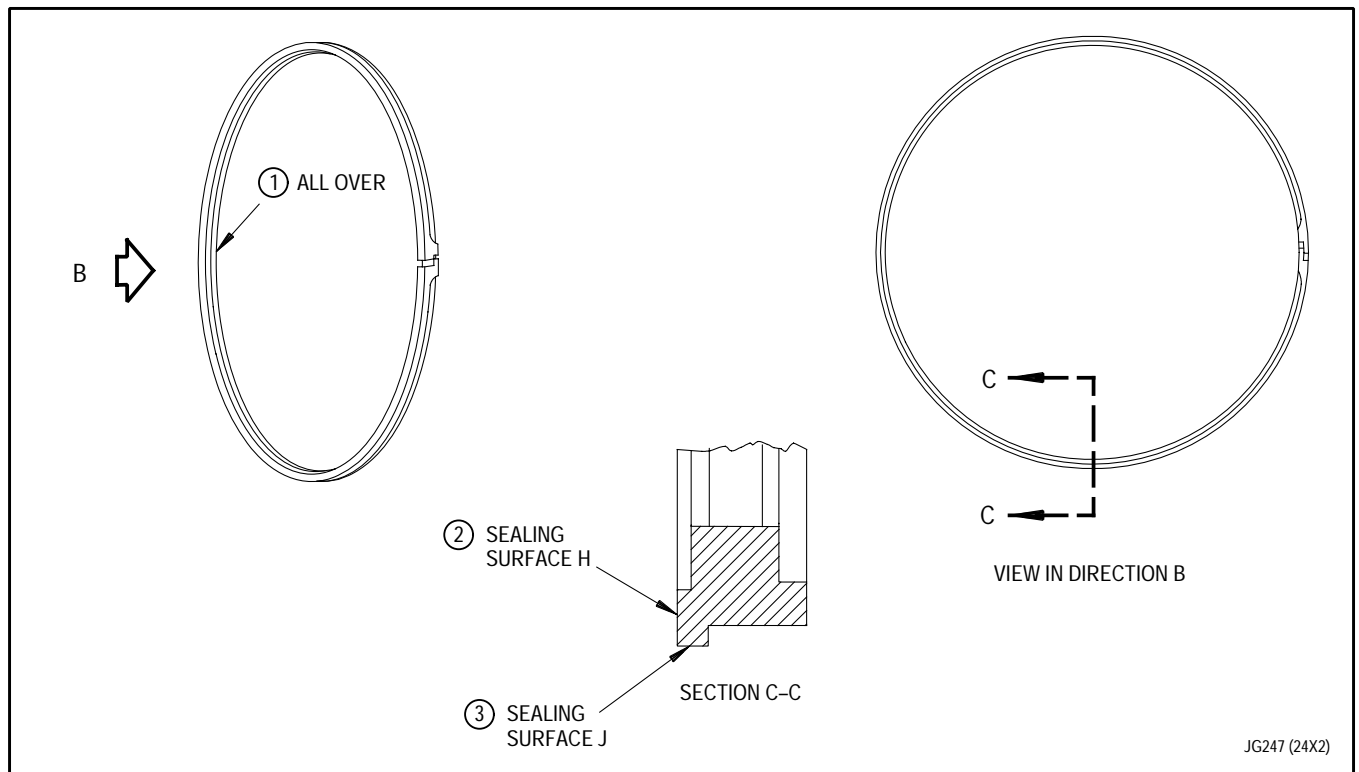


Figure 2. Metal Seal Ring (No. 3 Bearing Seal Sealing Ring) - Inspection

Legend for figure 2

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not repairable	Replace ring.
2. Sealing Surface H - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.
3. Sealing Surface J - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.

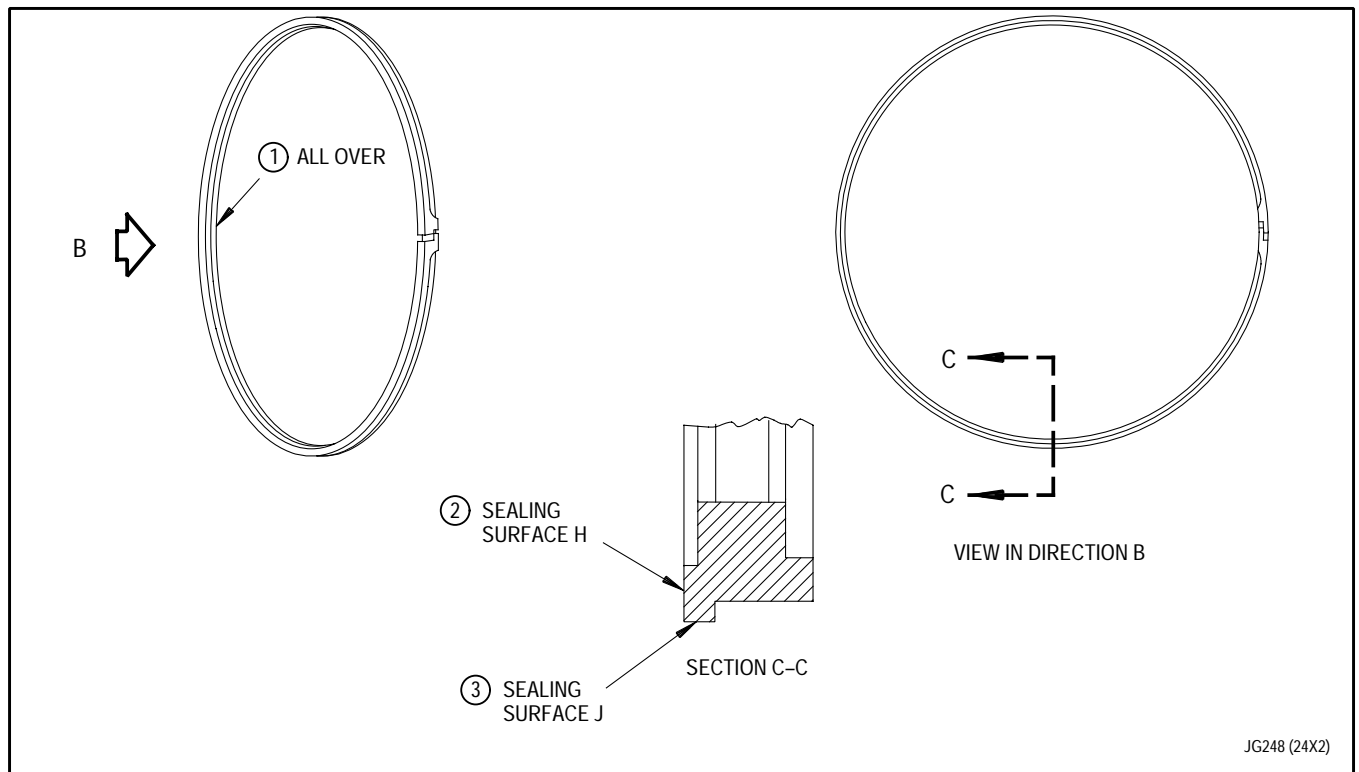


Figure 3. Metal Seal Ring (No. 4 Bearing Seal Sealing Ring) - Inspection

Legend for figure 3

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not repairable	Replace ring.
2. Sealing Surface H - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.
3. Sealing Surface J - Nicks, dents, scratches	Not serviceable	Not repairable	Replace ring.

WORK PACKAGE

TECHNICAL PROCEDURES

BOLT, INTERNALLY RELIEVED -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
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REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

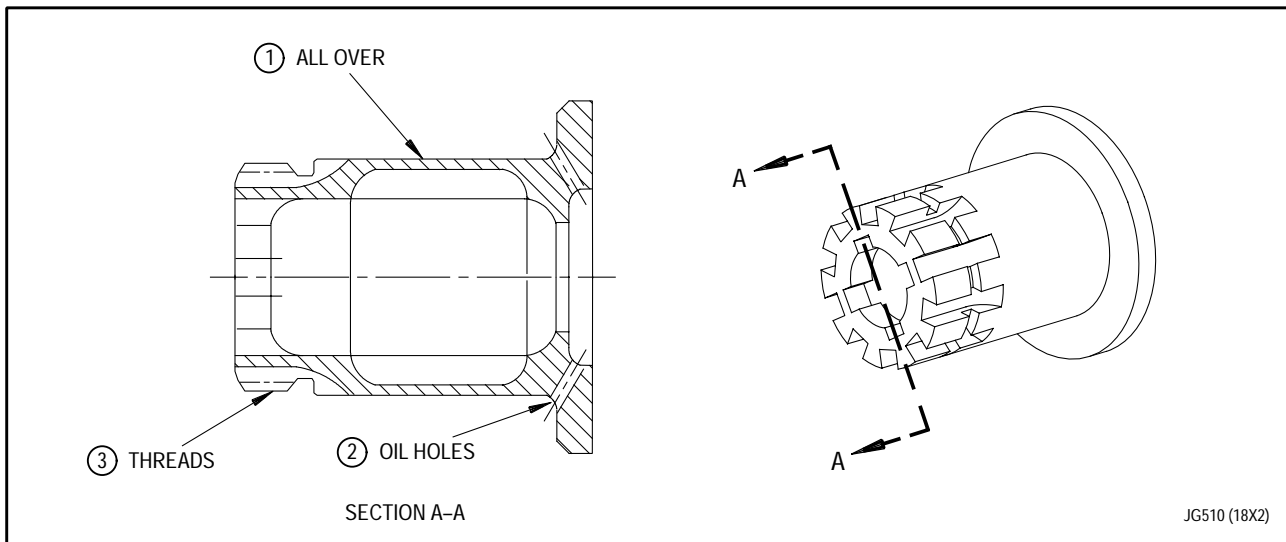
1. INTRODUCTION.

- a. This work package contains instructions for inspection of internally relieved bolt.

2. INTERNALLY RELIEVED BOLT - INSPECTION.

(See Figure 1.)

- a. Inspect internally relieved bolt. (See figure 1.)



JG510 (18X2)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	See corrective action.	Replace bolt.
Pits	0.002 inch depth, 0.010 inch width with maximum of five within a 0.500 inch diameter circle.	See corrective action.	Replace bolt.
Rust/ corrosion	Not serviceable	See corrective action.	Replace bolt.
2. Oil holes -			
Coke/sludge	Not serviceable	See corrective action.	Replace bolt.
3. Threads -			
Pits, galling, deformation	Not serviceable	See corrective action.	Replace bolt.

Figure 1. Internally Relieved Bolt - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

COUPLING, GEARBOX DRIVESHAFT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

T.O. 2J-F100-53-7

WP 344 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of the gearbox driveshaft coupling.

2. GEARBOX DRIVESHAFT COUPLING - INSPECTION.

(See Figure 1.)

- a. Visually inspect gearbox driveshaft coupling. (See figure 1.)

- b. Dimensionally inspect coupling. (See figure 1.)

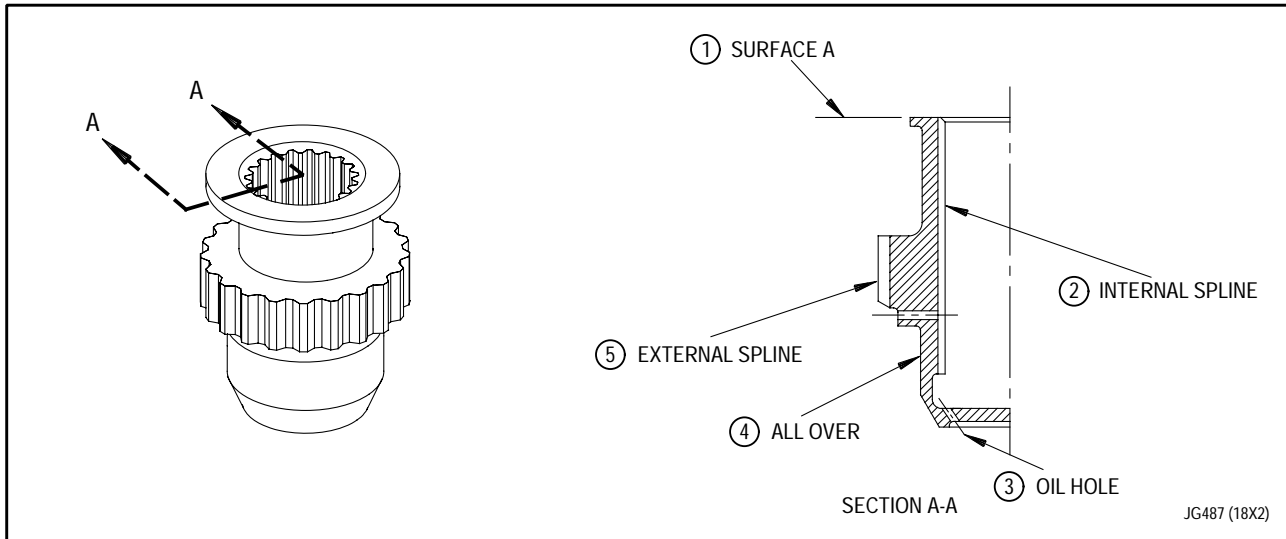


Figure 1. Gearbox Driveshaft Coupling - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Surface A - Circumferential wear	0.005 inch depth and 0.083 inch width	See corrective action.	Replace coupling.
2. Internal spline - Wear	0.001 inch measured at chordal tooth thickness	See corrective action.	Replace coupling.
Pits, spalling, galling, scoring	Not serviceable	See corrective action.	Replace coupling.
3. Oil holes - Coke/ sludge	Not serviceable	See corrective action.	Clean per WP 201 00.
4. All over - Cracks	Not serviceable	See corrective action.	Replace coupling.
Pits	Any amount, to 0.002 inch depth and 0.010 inch width	See corrective action.	Replace coupling.
Rust/ corrosion	Not serviceable	See corrective action.	Clean per WP 201 00.
5. External spline - Wear	0.0012 inch measured at chordal tooth thickness	See corrective action.	Replace coupling.
Pits, spalling, galling, scoring	Not serviceable	See corrective action.	Replace coupling.

WORK PACKAGE

TECHNICAL PROCEDURES

SLEEVE, GEARBOX DRIVE GEARSHAFT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

T.O. 2J-F100-53-7

WP 345 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the inspection of the gearbox drive gearshaft sleeve.

2. GEARBOX DRIVE GEARSHAFT SLEEVE - INSPECTION.

(See Figure 1.)

- a. Visually inspect gearbox drive gearshaft sleeve.

(See figure 1.)

- b. Dimensionally inspect sleeve.

(See figure 1.)

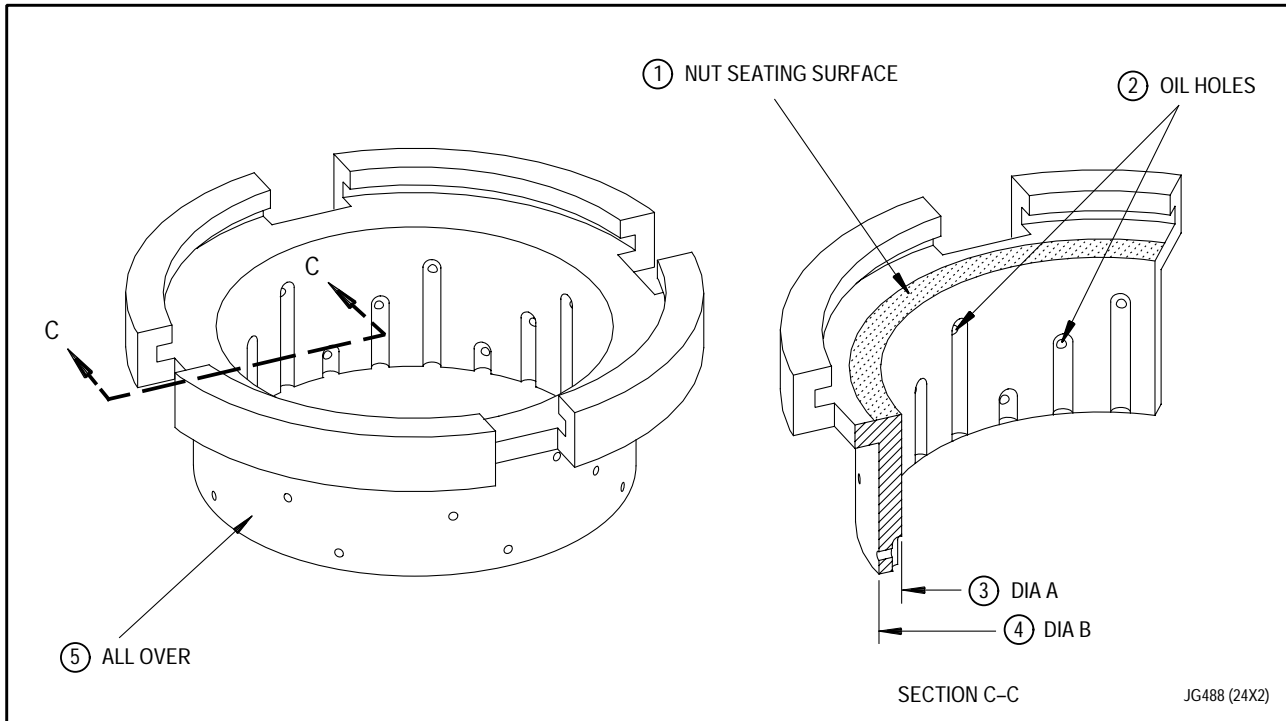


Figure 1. Gearbox Drive Gearshaft Sleeve - Inspection

Legend for figure 1

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1.	Nut sealing surface - Wear	0.003 inch depth	See corrective action.	Replace sleeve.
2.	Oil holes - Blockage	Not serviceable	See corrective action.	Remove blockage.
3.	Diameter A - Wear	2.2990 inch diameter	See corrective action.	Replace sleeve.
4.	Diameter B - Wear	2.5603 inch diameter	See corrective action.	Replace sleeve.
5.	All over - Corrosion	Not serviceable	See corrective action.	Clean per WP 201 00.

WORK PACKAGE

TECHNICAL PROCEDURES

RING, RETAINING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	0				
4 Blank	0				

T.O. 2J-F100-53-7

WP 346 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

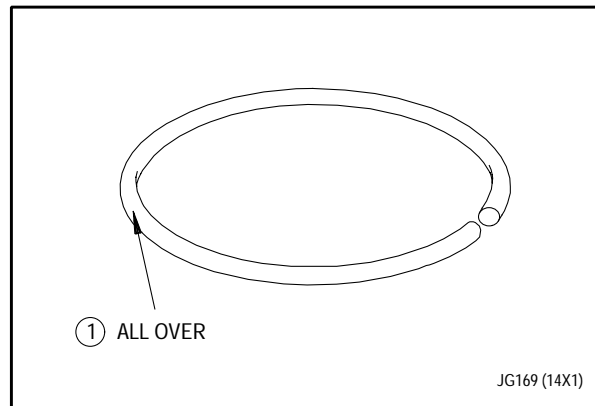
1. INTRODUCTION.

- a. This work package contains instructions for inspection of the retaining ring as part of the No. 2 bearing and coupling assembly.

2. RETAINING RING - INSPECTION.

(See Figure 1.)

- a. Inspect retaining ring.
(See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over - Cracks, distortion, resiliency	Not serviceable	See corrective action.	Replace ring.

Figure 1. Retaining Ring - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

WASHER, SEAL ASSEMBLY, NO. 3 BEARING, REAR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					0

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

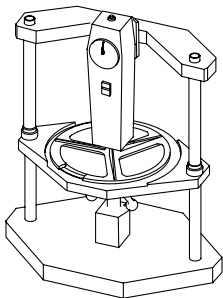
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing Rear Seal Assembly Washer (PN 4035878) - Inspection	
	Fixture, Washer compression check - - - -	PWA 55568

ILLUSTRATED SUPPORT EQUIPMENT



PWA 55568 -C

Figure T1. PWA 55568 Fixture

1. INTRODUCTION.

- a. This work package contains instructions for the inspection of the No. 3 bearing rear seal assembly washer.

**2. NO. 3 BEARING REAR SEAL ASSEMBLY
WASHER (PN 4035878) - INSPECTION.**

(See Figure 1.)

- a. Visually inspect No. 3 bearing rear seal assembly washer waves. There shall be six equally spaced waves of approximately equal height. (See figure 1, Sheet 1.) Observable flatness of any wave is cause for rejection.

- b. Check washer spring tension using PWA 55568 fixture as follows:

- (1) Loosen screw(4, figure 1, Sheet 2) in lock collars(3).
- (2) Turn handle(6) (CCW) to lower locating plate(5) for feeler stock clearance.
- (3) Set dial gage to zero and ensure button is in neutral position.
- (4) Place 0.040 feeler stock on recessed part of locating plate(5) in place of the washer, three locations, equally spaced.
- (5) Turn handle(6) slowly (CW) to raise plate(5) so feelers contact press plate(2) until there is a compression reading of two pounds five ounces on dial gage.
- (6) Tighten screw(4) in lock collars(3).
- (7) Lower plate(5) and remove feeler gage stock.
- (8) Position washer on plate(5) ensuring that ID of washer is piloted on the plate ID pilot.
- (9) Raise plate(5) to stops of lock collars(3).
- (10) Read dial for spring rate. Spring rate per WP 801 00, Reference 3956.

- c. Replace defective washers. Do not repair defective washers.

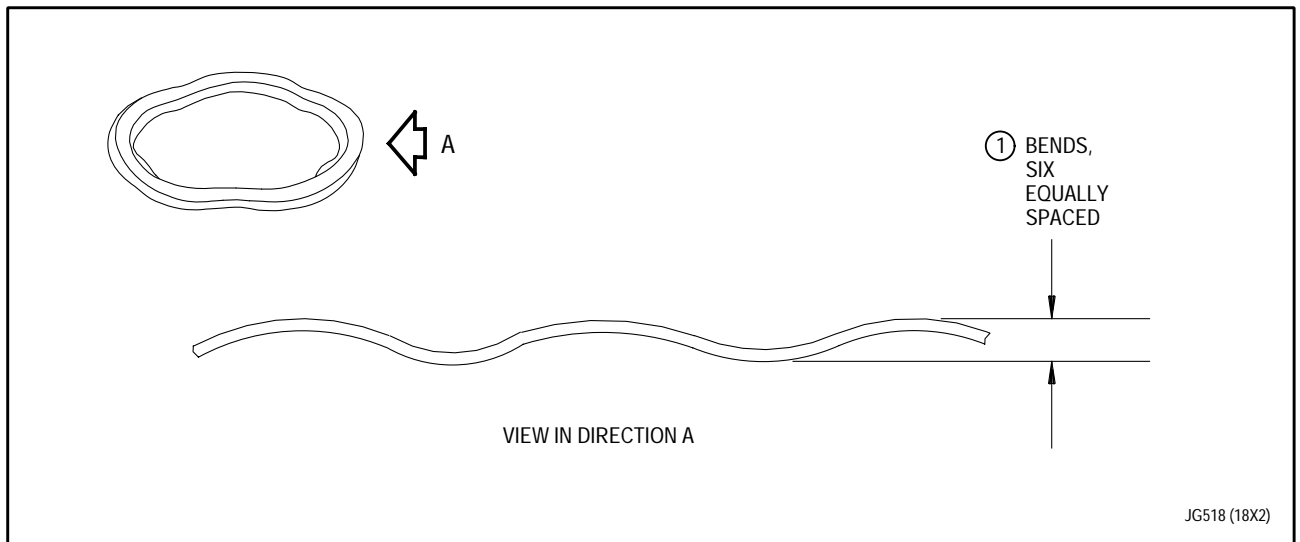


Figure 1. No. 3 Bearing Rear Seal Assembly Washer - Inspection (Sheet 1 of 2)

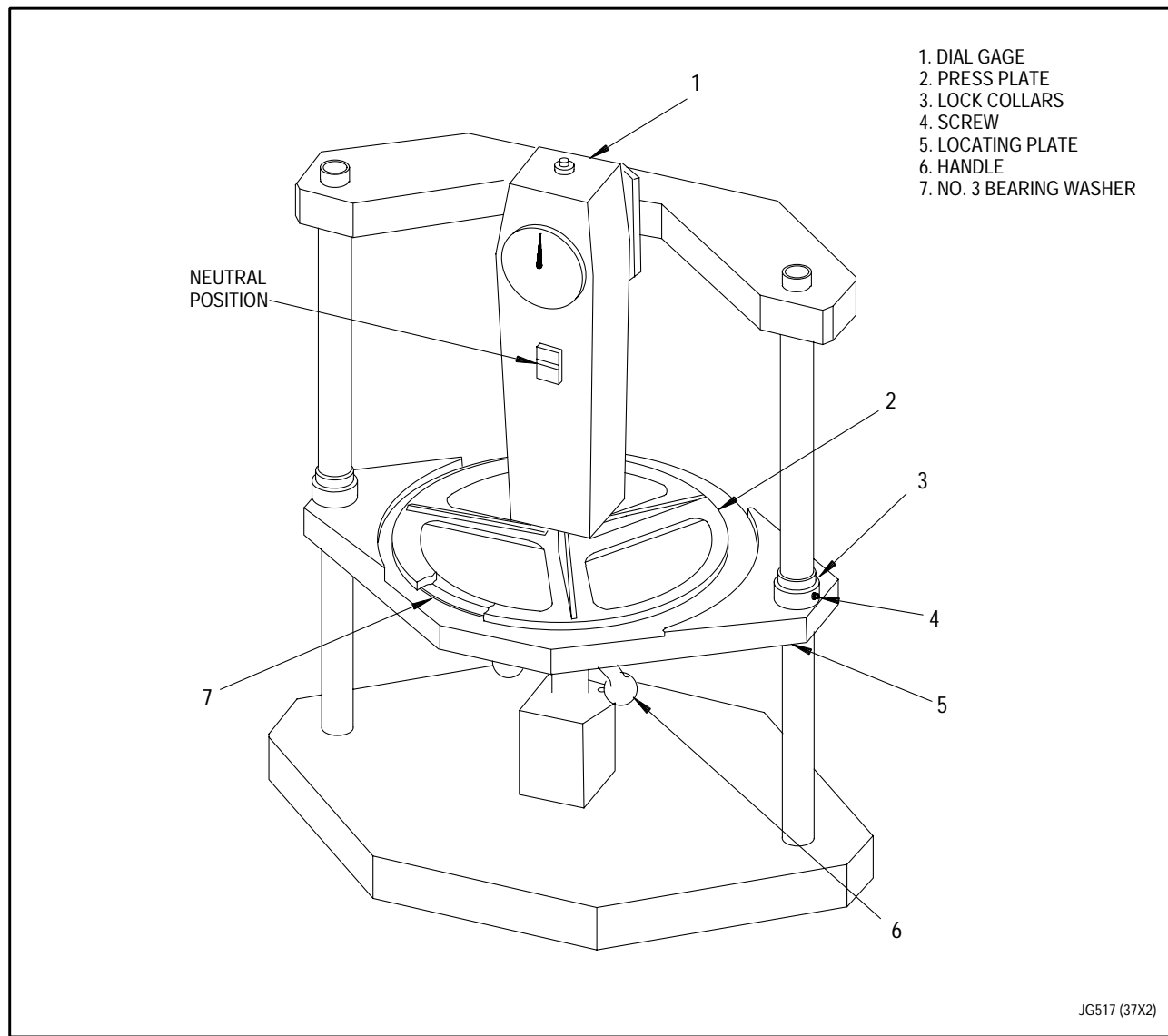


Figure 1. No. 3 Bearing Rear Seal Assembly Washer - Inspection (Sheet 2 of 2)

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, FAN EXIT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	2	0	3 - 4	18

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of fan exit stator.

2. FAN EXIT STATOR - INSPECTION.

(See Figure 1.)

- a. Ensure fan exit stator has been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect fan exit stator for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect fan exit stator per figure 1.

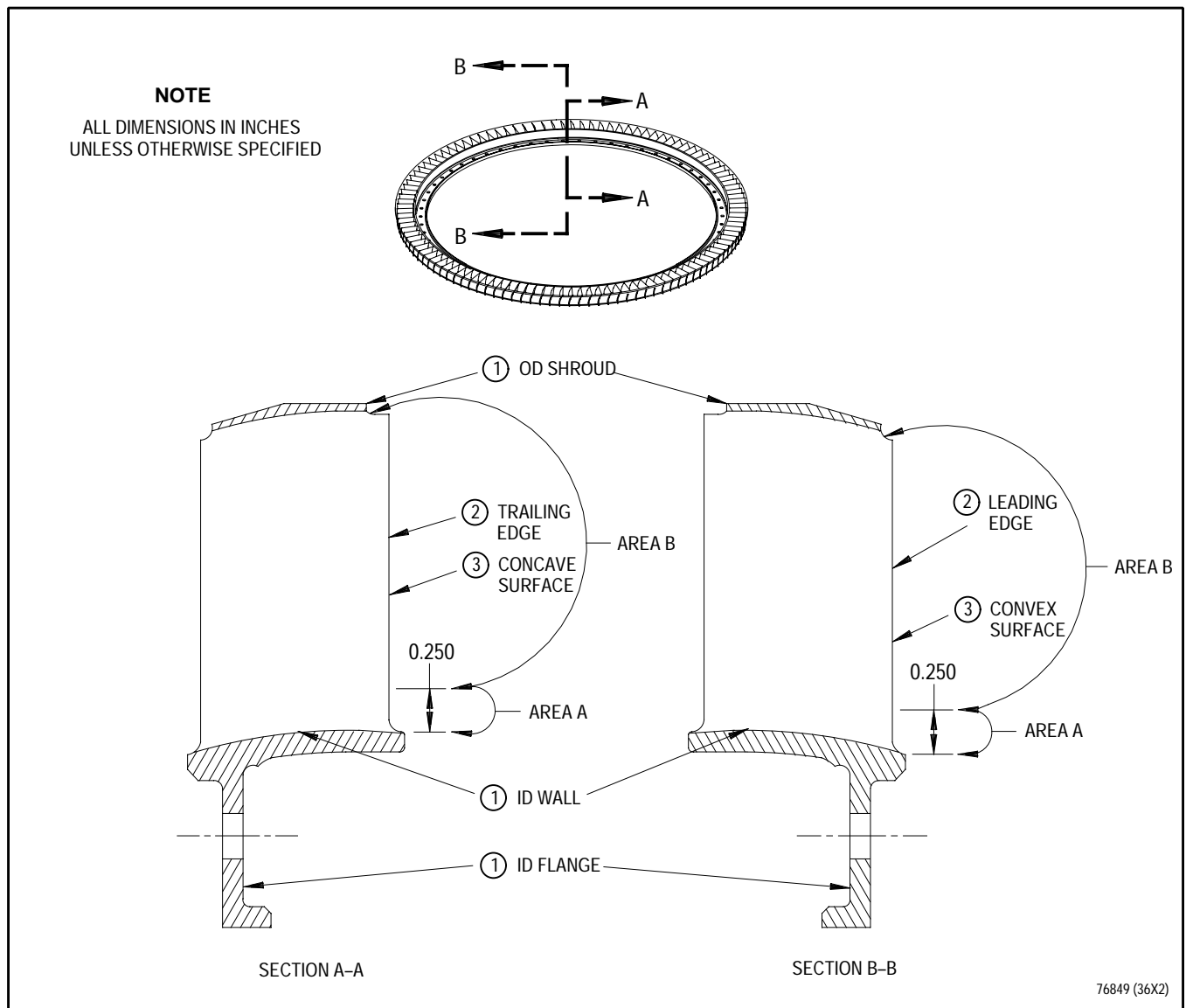


Figure 1. Fan Exit Stator - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
1. OD shroud and ID wall and flange -			
Cracks (in flange at boltholes)	Not serviceable	See corrective action.	Replace stator.
Cracks other than in flange	Not serviceable	See corrective action.	Replace stator.
Impact, damage, nicks, or dents (not permitted in airfoil radii)	Well-rounded damage to depth of 0.010 inch in OD shroud and 0.025 inch in ID wall.	See corrective action.	Replace stator.
2. Vane leading and trailing edge -			
Nicks, dents, bends	Well-rounded damage to depth of 0.010 inch without torn or high metal.	Maximum depth of blend in: Area A: 0.030 inch Area B: 0.050 inch	Blend repair per WP 448 00. If vane is not blendable, replace stator.
Cracks	Not serviceable	Repairable up to maximum depth of blend in: Area A: 0.030 inch Area B: 0.050 inch	Blend repair per WP 448 00. If vane is not blendable, replace stator.
3. Vane convex and concave surfaces -			
Round-bottom dents without cracks	0.005 inch maximum material protrusion on opposite face, 0.020 inch maximum depth.	See corrective action.	Replace stator.
Cracks	Not serviceable	See corrective action.	Replace stator.
Nicks	Not serviceable	See corrective action.	Replace stator.

WORK PACKAGE**TECHNICAL PROCEDURES**

**SUPPORT BRACKET, STRAP AND ACTUATING LINKAGE,
BUMPER AND CARRIAGE, BLEED VALVE;
ELBOW AND SLEEVE, AIR SUPPLY MANIFOLD -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4	18	6 - 7	4
2	0	5	0	8	29
3	29				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE CROCUS	P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of bleed valve actuation system details and air supply manifold elbow and sleeve.

2. BLEED VALVE ACTUATION SYSTEM DETAILS - INSPECTION.

(See Figures 1 and 2.)

- a. Ensure bleed valve actuation system details have been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect bleed valve actuation system details for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect bleed valve actuation system details per figure 1.

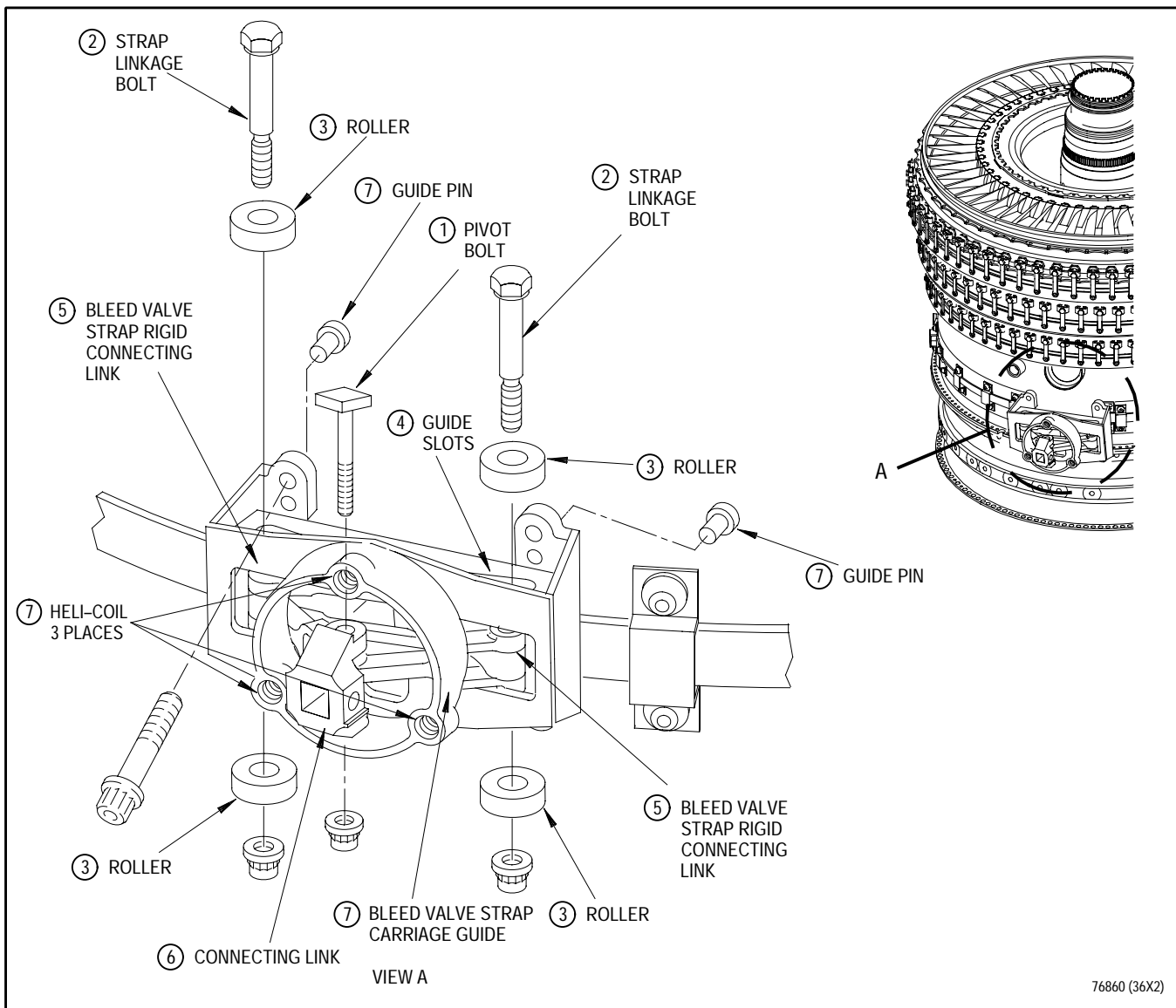


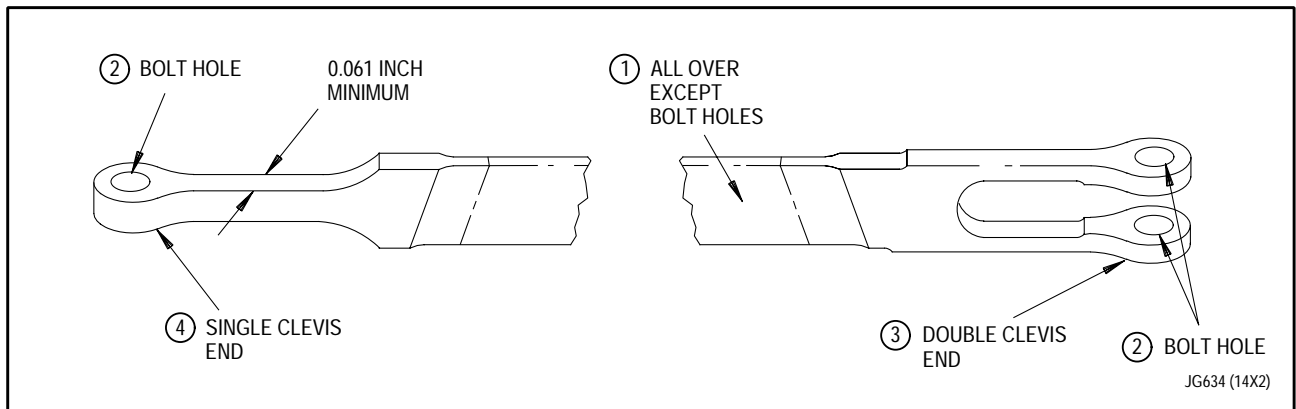
Figure 1. Bleed Valve Actuation System Details - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pivot bolt -			
Bending, pitting, or galling	Not serviceable	None	Replace bolt.
Corrosion or foreign material	0.001 inch maximum depth that can be removed by burnishing with fine crocus cloth, P-C-458	See corrective action.	Replace link.
2. Strap linkage bolt -			
Wear, bending, pitting, or galling	Not serviceable	None	Replace bolt.
Corrosion or foreign material	0.001 inch maximum depth that can be removed by burnishing with fine crocus cloth, P-C-458	See corrective action.	Replace bolt.
3. Rollers OD & ID -			
Wear, pitting, or galling	Not serviceable	See corrective action.	Replace roller.
Corrosion or foreign material	0.001 inch maximum depth that can be removed by burnishing with fine crocus cloth, P-C-458	See corrective action.	Replace roller.
4. Guide slots -			
Wear, pitting, or galling	Not serviceable	See corrective action.	Replace guide.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
5. Bleed valve strap rigid connecting link -			
Wear	Not serviceable	0.010 inch depth after blend	Blend per WP 449 00.
Exterior galling	Slight galling acceptable.	Not repairable	Replace link.
Link bolt holes -			
Corrosion or galling	0.001 inch maximum depth that can be removed by burnishing with fine crocus cloth, P-C-458	Not repairable	Replace link.
6. Connecting link -			
Bolt hole ID and washer face	Not serviceable	Not repairable	Replace link.
Wear, pitting, or galling			
7. Bleed valve strap carriage guide -			
Pin-			
Loose,missing	Not serviceable	Not repairable	Replace pin per WP 449 00.
Heli-Coil (3 places) -			
Galled,missing	Not serviceable	Not repairable	Replace Heli-Coil per T.O. 44-H1-1-117 (Insert MS124696).



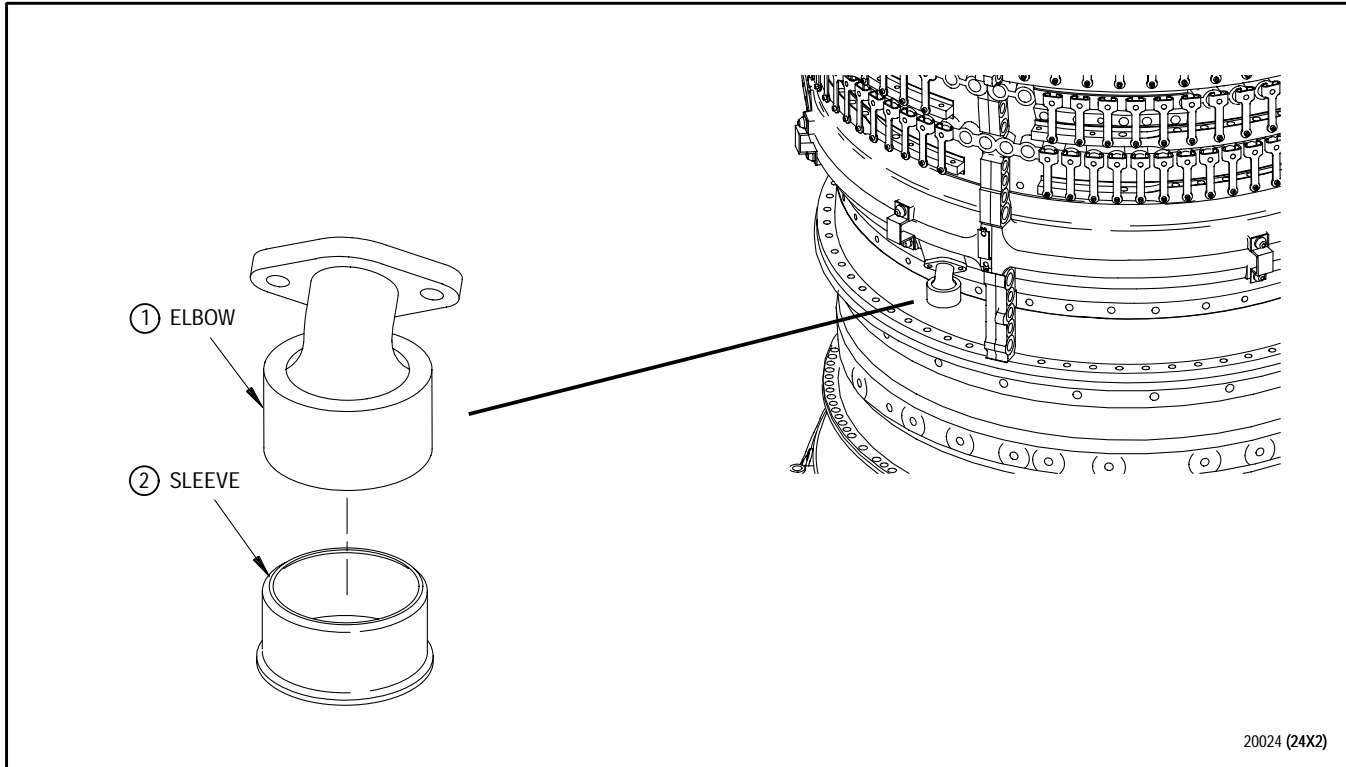
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over except bolt holes - Galling and scratches	0.003 inch depth	Not repairable	Replace strap.
2. Bolt holes - Corrosion of galling or nickel-thallium-boron plate	Not serviceable	Not repairable	Replace strap.
3. Double clevis end - Wear	Not serviceable	Repairable	Lightly blend out area to remove sharp edges per WP 449 00.
4. Single clevis end - Wear	Not serviceable	Repairable	Lightly blend out area to remove sharp edges per WP 449 00.

Figure 2. Bleed Valve Strap Assembly - Inspection

3. AIR SUPPLY MANIFOLD ELBOW AND SLEEVE- INSPECTION.

(See Figure 3.)

- a. Visually inspect air supply manifold elbow and sleeve per figure 3.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Elbow -			
Wear	Slight galling of flange area permitted up to 0.003 inch depth.	Not repairable	Replace elbow.
External dents, pits, scratches	Not serviceable	0.020 inch depth after blend	Blend per WP 449 00.
Bolt hole wear	Not serviceable	Not repairable	Replace elbow.
2. Sleeve -			
Wear	Not serviceable	Not repairable	Replace sleeve per WP 449 00.

Figure 3. Air Supply Manifold Elbow and Sleeve - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

NUT, REAR COMPRESSOR DRIVESHAFT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	22	4	18	5	22
2 - 3	0			6	3

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor driveshaft nut.

2. REAR COMPRESSOR DRIVESHAFT NUT - INSPECTION.

(See Figure 1.)

- a. Ensure rear compressor driveshaft nut has been cleaned per WP 201 00.
- b. Visually inspect driveshaft nut per figure 1.
- c. Fluorescent penetrant inspect driveshaft nut for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. After inspection and repair, apply antigalling compound per WP 450 00.

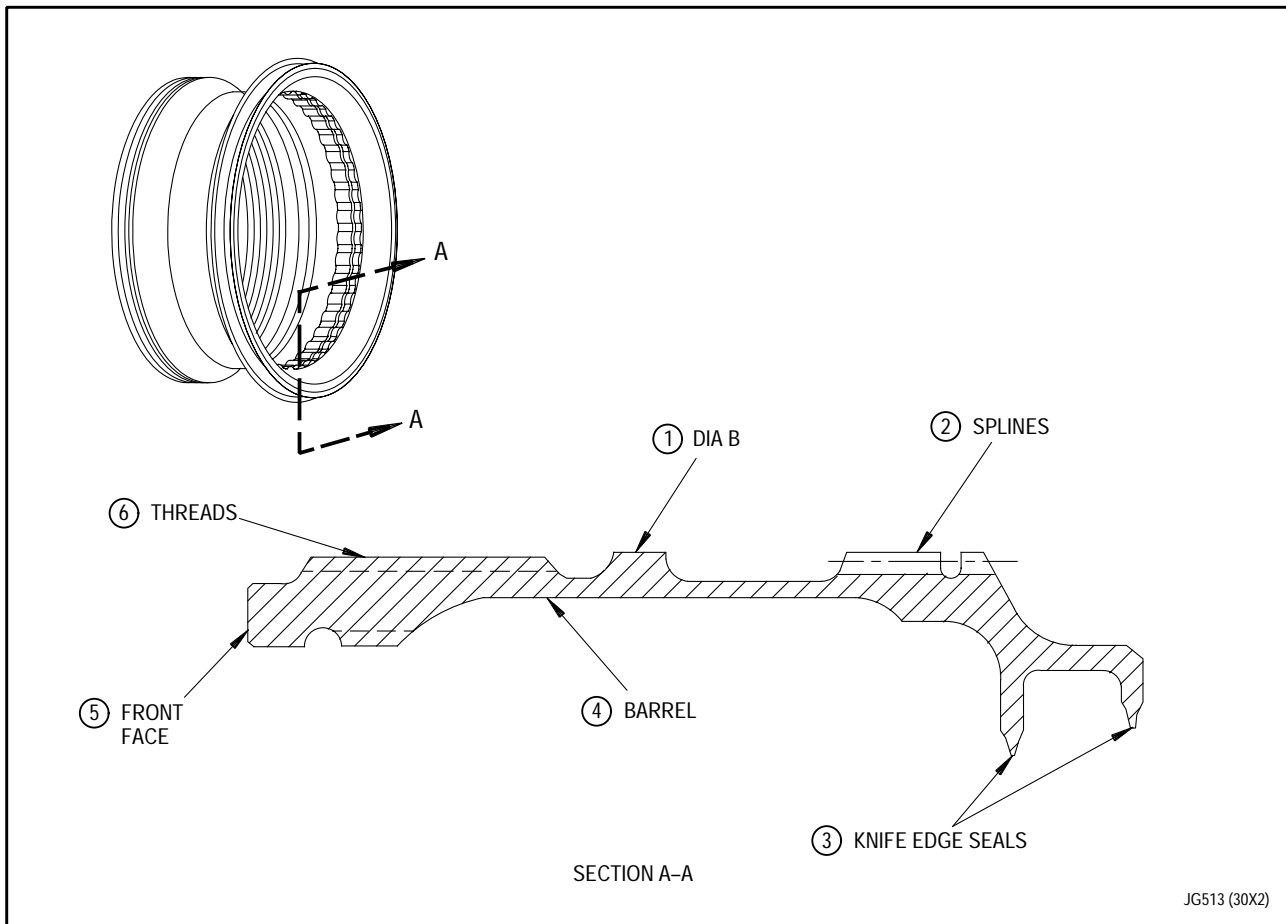


Figure 1. Rear Compressor Driveshaft Nut - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
1. Diameter B (ID mating diameter) - Grooves	Grooves up to 0.003 inch depth and 0.080 inch width are acceptable. No more than two groove patterns are allowed. Per WP 801 00, Reference 3055.	Not reparable	Replace driveshaft nut.
2. Splines - Pits, nicks, dents	Not serviceable	All pick up and high metal shall be removed.	Remove high metal and pick up with fine stone. Blend. Refer to T.O. 2-1-111.
3. Knife-edge seals - Nicks, dents cracks	Not serviceable	Blends shall not exceed the following limits: a. 0.045 inch depth b. 0.200 inch length per blend c. Maximum of 3 blended areas per knife edge d. Adjacent blends on any one knife-edge shall be separated by at least 0.750 inch. e. Blends on adjacent knife-edges shall be separated by at least 1.000 inch axially. f. All corners of blends shall be rounded.	Blend repair. Locally fluorescent penetrant inspect blends. Refer to T.O. 2J-F100-9. If knife-edge damage exceeds maximum blend limits, repair per WP 450 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
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NOTE

If knife-edge seals show excessive wear, distortion or burning, inspect rear compressor drive turbine assembly per T.O. 2J-F100-53-5, WP 122 00 and fan drive turbine module per T.O. 2J-F100-53-5, WP 206 00.

Excessive wear	Not serviceable	Not reparable	Replace driveshaft nut.
Distortion or burning	Not serviceable	Reparable	Repair knife-edges per WP 450 00.

NOTE

If barrel has unusual heat discoloration or dark spots, inspect rear compressor drive turbine assembly and fan drive turbine module. Refer to T.O. 2J-F100-53-5, WP 466 00.

4. Barrel -

Unusual heat discoloration or dark spots	Not serviceable	Not reparable	Replace driveshaft nut.
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5. Front face -

Galling	Not serviceable	0.005 inch in depth	Hand lap per WP 450 00.
Chipped or missing coating	Permissible around outer 0.040 inch of circumference of front face.	Any amount	Replace hard face per WP 450 00.

6. Threads -

Damage	Not serviceable	All pick up and high metal shall be removed.	Remove high metal and pick up with fine stones. Blend. Refer to T.O. 2-1-111.
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WORK PACKAGE**TECHNICAL PROCEDURES****CASE SET, COMPRESSOR,
FOURTH THROUGH NINTH STAGE -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	26	4A Added	25	6	17
2	11	4B Blank Added	25	7	26
3	25	5	25	8	25
4	26				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of the 4th through 9th stage compressor case set.

**2. FOURTH THROUGH NINTH STAGE
COMPRESSOR CASE SET - INSPECTION.**

(See Figure 1.)

- a. Ensure 4th through 9th stage compressor case set has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect compressor case set for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect compressor case set per figure 1.

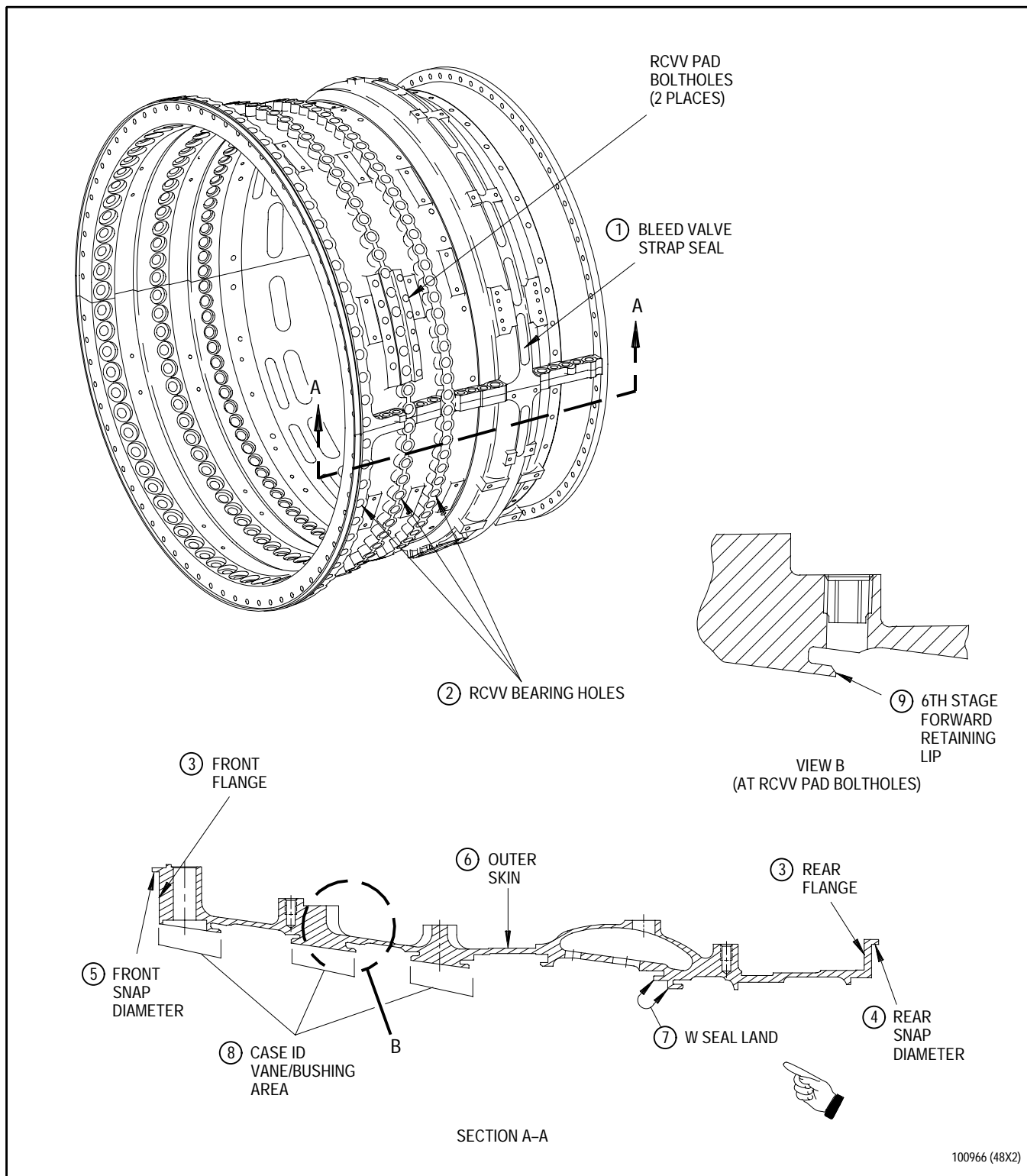


Figure 1. Fourth Through Ninth Stage Compressor Case Set - Inspection (Sheet 1 of 3)

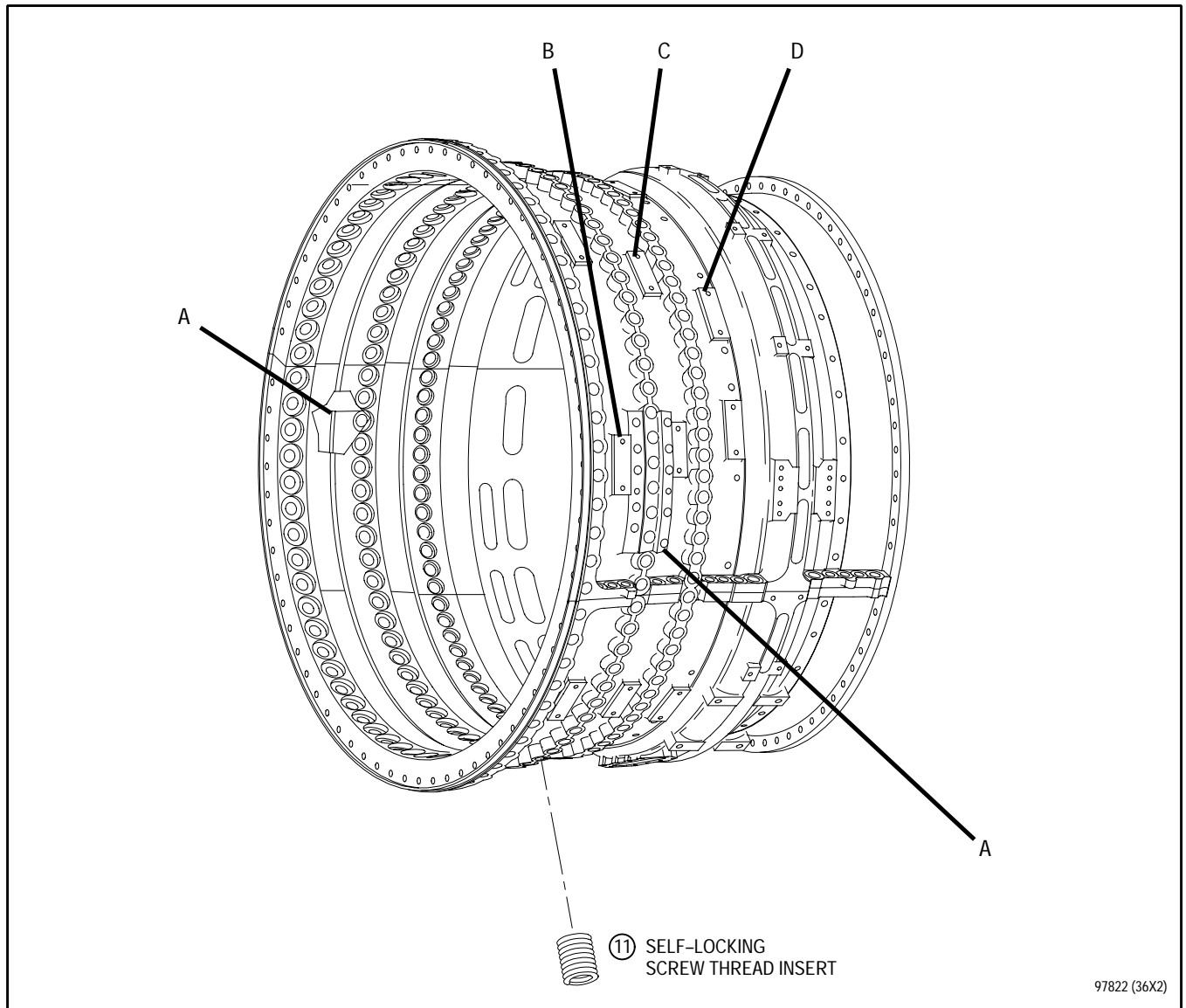


Figure 1. Fourth Through Ninth Stage Compressor Case Set - Inspection (Sheet 2 of 3)

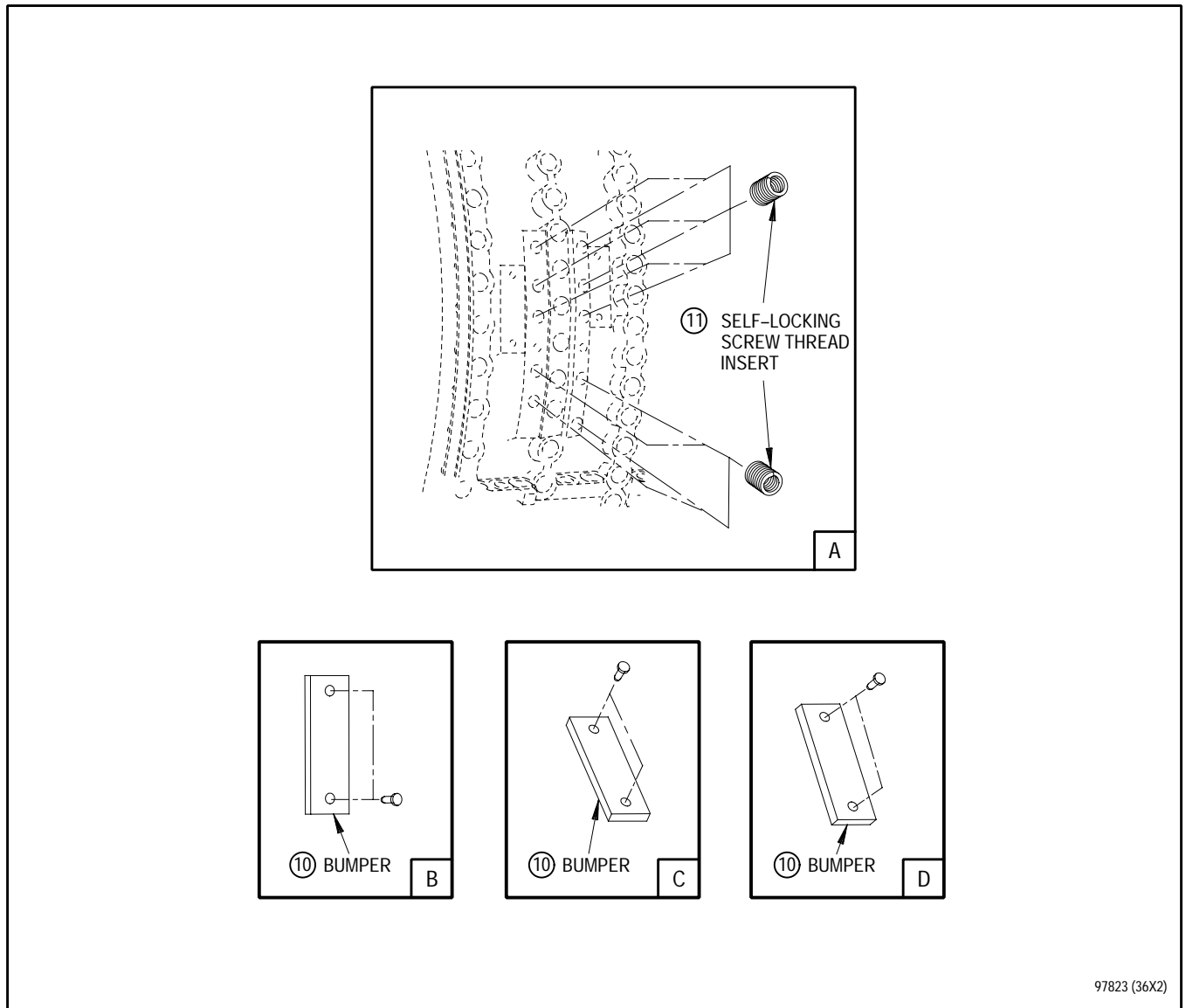


Figure 1. Fourth Through Ninth Stage Compressor Case Set - Inspection (Sheet 3 of 3)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Bleed valve strap seal -			
Broken	Not serviceable	Not reparable	Replace compressor case set.
Contact surface	0.005 inch depth	Not reparable	Replace compressor case set.
2. RCVV bearing holes -			
Wear	Per WP 801 00, Reference 2978 and 2980.	Not reparable	Replace compressor case set.
	Hole diameter at ID 0.545 to 0.548 inch.	Not reparable	Replace compressor case set.
	Hole diameter at OD 0.545 to 0.547 inch.		
3. Flanges -			
Cracks	Not serviceable	Not reparable	Replace compressor case set.
4. Rear snap diameter -			
	24.922 inch diameter	Not reparable	Replace compressor case set.
5. Front snap diameter -			
	28.208 inch diameter maximum, front snap.	Not reparable	Replace compressor case set.
6. Outer skin -			
Dents	Not serviceable	Not reparable	Replace compressor case set.
Nicks, pits, scratches	0.020 inch depth 0.100 inch width 0.500 inch length	Not reparable	Replace compressor case set.
Corrosion	Not serviceable	See corrective action.	Clean case assembly per WP 201 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
7. W Seal land - Wear	0.005 inch	0.010 inch	Strip and recoat copper-nickel coating per WP 451 00.
8. Case ID, vane/ bushing area - Dents	Not serviceable	Not reparable	Replace compressor case set.
Nicks, pits, scratches	0.002 inch maximum depth. Individual areas not to exceed 0.25 square inch. Sum of all damaged areas not to exceed 5.0 square inches.	0.010 inch maximum blend depth. Individual areas not to exceed 0.25 square inch. Sum of all damaged areas not to exceed 5.0 square inches.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Corrosion	Not serviceable	Any amount	Clean case assembly per WP 201 00.
9. 6th stage forward retaining lip - Toolmark	0.075 inch maximum depth toolmark resulting from through tap of RCVV pad boltholes. No sharp edges allowed.	Not reparable	Replace compressor case set.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
10. Bumper -			
Worn	Not serviceable	Not reparable	Replace bumper per WP 451 00.
Cracked or chipped	Not serviceable	Not reparable	Replace bumper per WP 451 00.
Loose	Not serviceable	Not reparable	Replace bumper per WP 451 00.
11. Self-locking screw thread insert -			
Missing	Not serviceable	Not reparable	Replace insert per WP 451 00.
Stripped or damaged	Not serviceable	Not reparable	Replace insert per WP 451 00.

WORK PACKAGE**TECHNICAL PROCEDURES****STATOR SEGMENT, COMPRESSOR,
TENTH THROUGH TWELFTH STAGE ASSEMBLY -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4A	29	6 - 8	29
2 - 3	25	4B Blank	4	9	25
4	4	5	4	10 Blank	4

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 10th through 12th stage compressor stator segment assembly.

2. TENTH THROUGH TWELFTH STAGE COMPRESSOR STATOR SEGMENT ASSEMBLY - INSPECTION.

(See Figure 1 and Tables 1 and 2.)

- a. Ensure 10th through 12th stage compressor stator segment assembly has been cleaned per WP 201 00.
- b. Visually inspect 10th through 12th stage compressor stator segment assembly per figure 1.

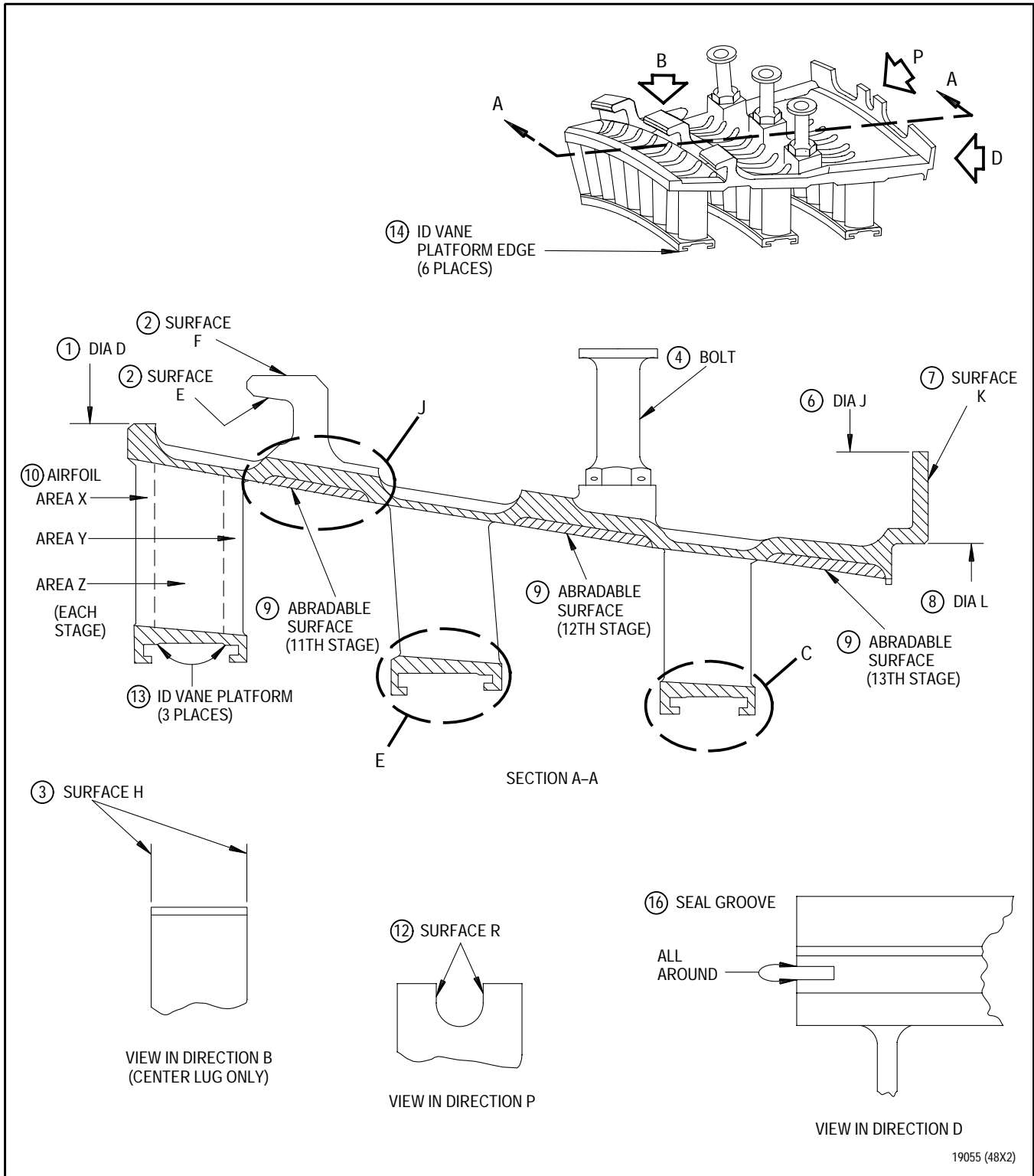


Figure 1. Tenth Through Twelfth Stage Compressor Stator Segment Assembly - Inspection (Sheet 1 of 2)

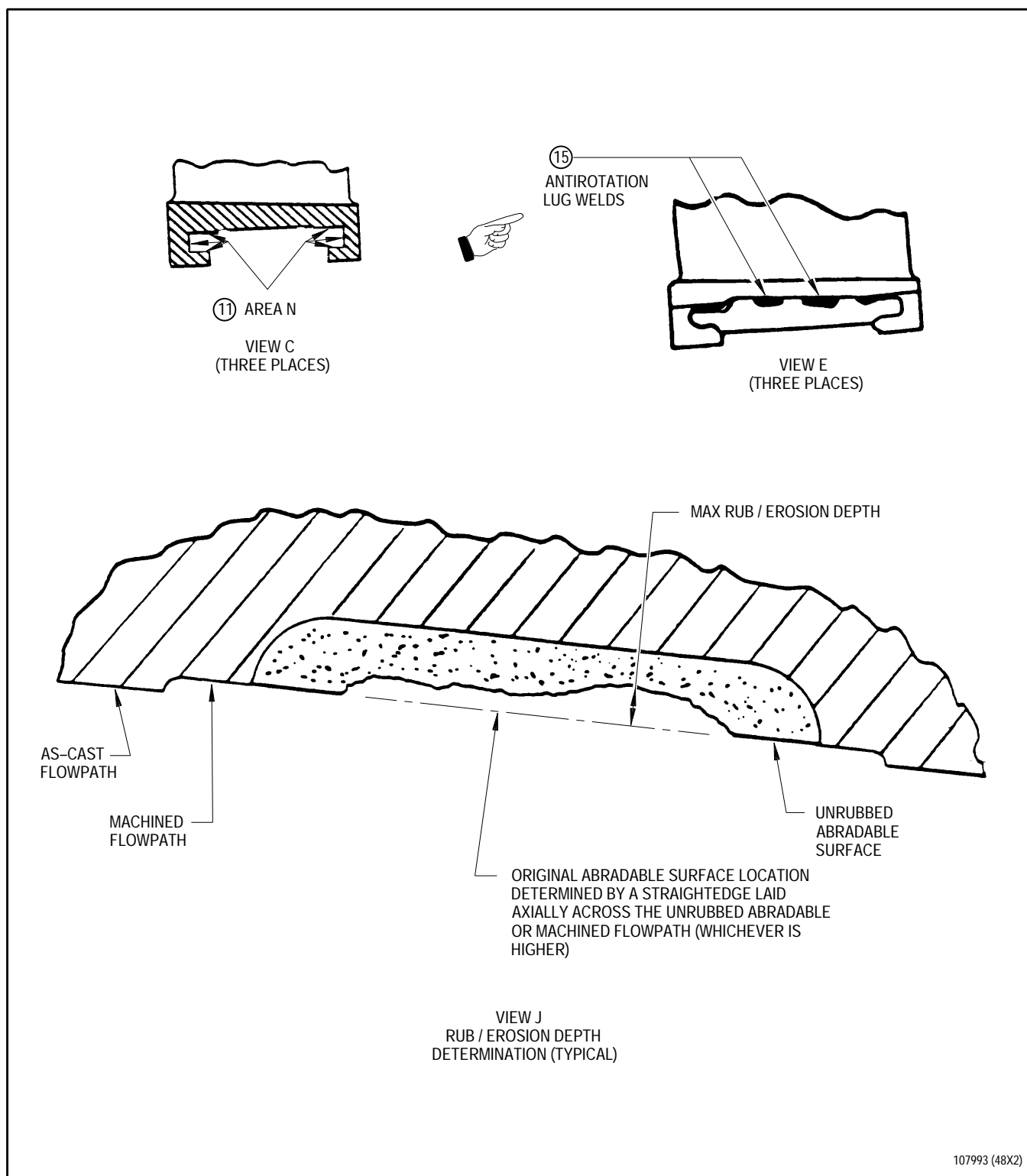


Figure 1. Tenth Through Twelfth Stage Compressor Stator Segment Assembly - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1.	Dia D - Fretting	0.003 inch depth	Not reparable	Replace assembly.
2.	Surface E and F - Fretting	0.003 inch depth	Not reparable	Replace assembly.
3.	Surface H - Fretting	0.002 inch depth	Not reparable	Replace assembly.
4.	Bolt - Damaged	Not serviceable	Not reparable	Replace assembly.
5.	Deleted			
6.	Dia J - Fretting	0.003 inch depth	Not reparable	Replace assembly.
7.	Surface K - Fretting	0.002 inch depth	Not reparable	Replace assembly.
8.	Dia L - Fretting	0.003 inch depth	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Abradable surface -	<p style="text-align: center;">NOTE</p> <p>Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub/erosion inspection.</p>		
Abrasion rub/erosion	See table 1. Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub/erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Replace abradable per WP 452 00.
Scratches	0.0625 inch width	Any amount	Replace abradable per WP 452 00.
Nicks, dents, gouges, abradable missing	Following are acceptable: a. The sum of all damaged areas on each land of each segment is not to exceed 0.150 square inch. Any condition with maximum dimension less than 0.0625 inch is not to be considered in 0.150 square-inch limit.	Any amount	Replace abradable per WP 452 00.

Legend for figure 1 (continued)

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
9.	Abradable surface (continued) -	b. Missing abradable up to 0.125 inch width along front and rear edges and sides (split lines) is not to be included in 0.150 square inch limit	Any amount	Replace abradable per WP 452 00.
	Voids, pits, cracks (PWA 284 abradable only)	Individual areas 0.250 inch long by 0.015 inch wide by 0.020 inch deep, one location per segment	Any amount	Replace abradable per WP 452 00.
NOTE				
Table 2 shows maximum number of airfoils per stage that may be blended.				
10. Airfoil -				
Nicks, dents, cracks				
	Area X (0.020 inch from vane leading edge)	Not serviceable	Blend depth not to exceed 0.020 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
	Area Y (0.040 inch from vane trailing edge)	Not serviceable	Blend depth not to exceed 0.040 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
	Area Z (mid chord area)	Not serviceable	May blend away up to 20% of airfoil thickness. Maximum blend diameter is 0.125 inch, two blends per airfoil allowed.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
11. Area N - Fretting	0.005 inch depth	Not reparable	Replace assembly.
12. Surface R - Fretting	0.005 inch depth	Not reparable	Replace assembly.
13. ID Vane Platform - Fretting	0.005 inch local depth, but must be 0.003 inch or less for 3.5 inches of total segment arc	Not reparable	Replace assembly.
14. ID Vane Platform Edge - Fretting	0.020 inch depth	Not reparable	Replace assembly.
15. Antirotation Lug - Welds cracked, lugs missing or bent	Not serviceable	Not reparable	Replace lug per WP 452 00.
Fretting, edge of lug	0.005 inch depth	Not reparable	Replace lug per WP 452 00.
16. Seal Groove - Fretting/Wear	0.013 inch depth	Not reparable	Replace assembly.

- c. Locally fluorescent penetrant inspect all airfoil blend repairs. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Fluorescent penetrant inspect 10th through 12th stage compressor stator segment assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

Table 1. Allowable Abradable Seal Rub/Erosion Limits

Stage	A (inch)	B (inch)
11	.010	.005
12	.010	.005
13	.010	.005

**Table 2. Maximum Number Of Airfoils Per Stage That May Be Blended
(Tenth Through Twelfth Stage Compressor Stator Segment Assembly)**

Stage	Maximum Number of Blendable Airfoils
10	10
11	11
12	12

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

STATOR SEGMENT, COMPRESSOR, TENTH THROUGH TWELFTH STAGE ASSEMBLY -

INSPECTION AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	5	29	7 - 9	29
2 - 3	25	6	8	10	25
4	8				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of 10th through 12th stage compressor stator segment assembly after volcanic ash ingestion.

**2. TENTH THROUGH TWELFTH STAGE
COMPRESSOR STATOR SEGMENT ASSEMBLY -
INSPECTION.**

(See Figure 1 and Tables 1 through 3.)

- a. Ensure 10th through 12th stage compressor stator segment assembly has been cleaned per WP 201 00.
- b. Visually inspect 10th through 12th stage compressor stator segment assembly per figure 1.
- c. Locally fluorescent penetrant inspect all airfoil blend repairs. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Fluorescent penetrant inspect 10th through 12th stage compressor stator segment assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

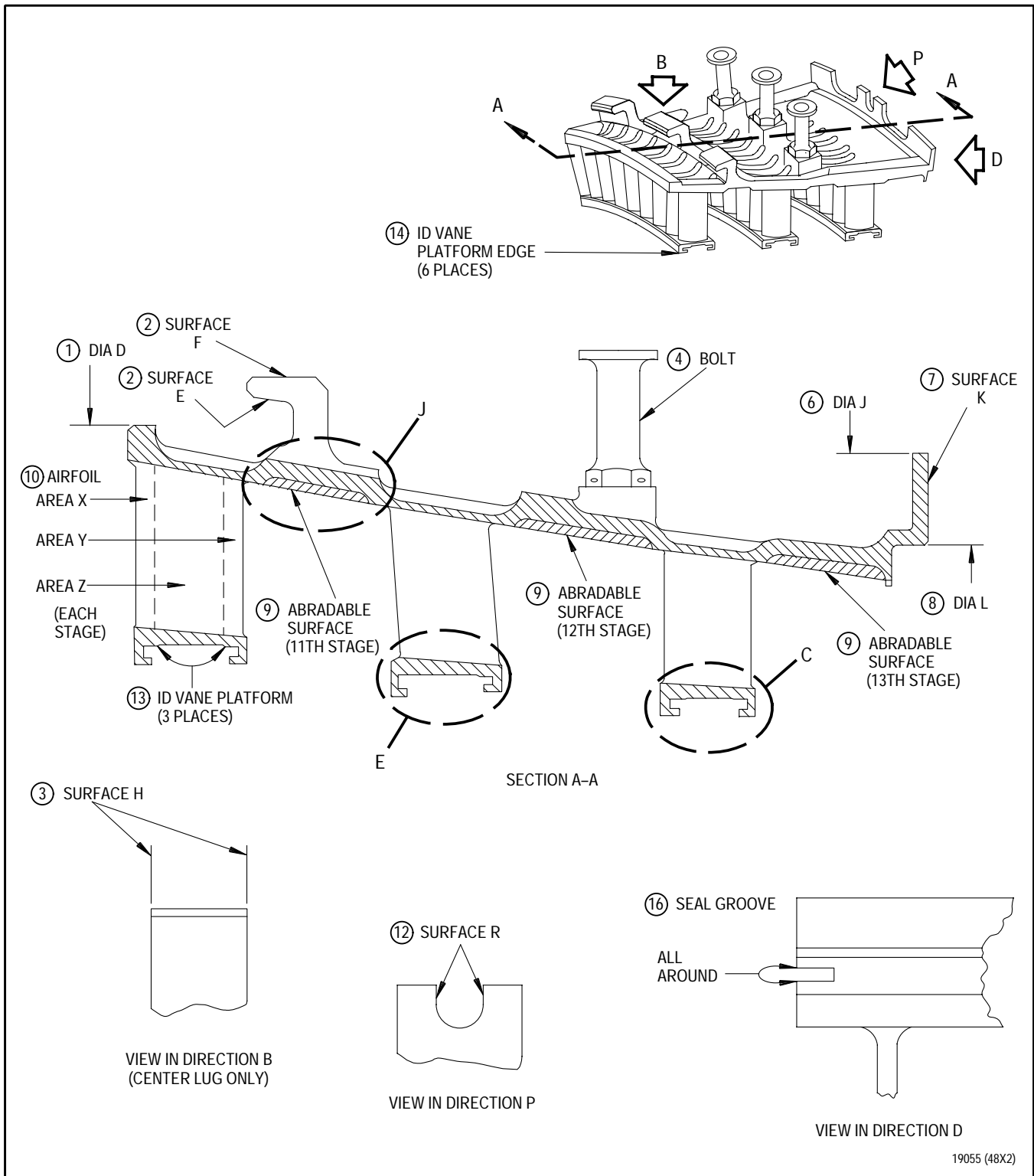


Figure 1. Tenth Through Twelfth Stage Compressor Stator Segment Assembly - Inspection (Sheet 1 of 2)

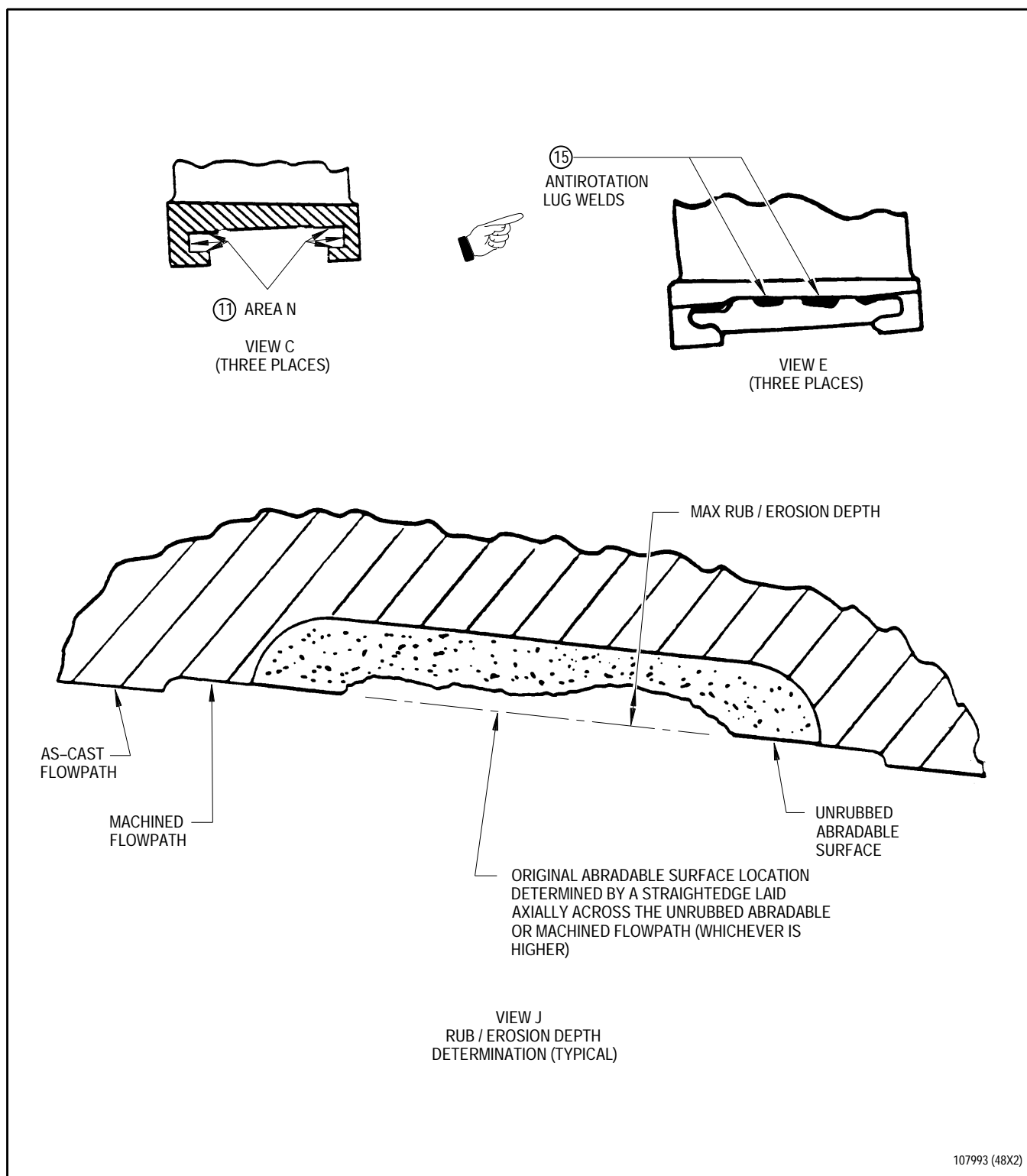


Figure 1. Tenth Through Twelfth Stage Compressor Stator Segment Assembly - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Dia D - Fretting	0.005 inch depth	Not reparable	Replace assembly.
2. Surface E and F - Fretting	0.005 inch depth	Not reparable	Replace assembly.
3. Surface H - Fretting	0.005 inch depth	Not reparable	Replace assembly.
4. Bolt - Damaged	Not serviceable	Not reparable	Replace assembly.
5. Deleted			
6. Dia J - Fretting	0.005 inch depth	Not reparable	Replace assembly.
7. Surface K - Fretting	0.005 inch depth	Not reparable	Replace assembly.
8. Dia L - Fretting	0.005 inch depth	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Abradable surface -	<p style="text-align: center;">NOTE</p> <p>Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.</p>		
Abrasion rub/erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub/erosion limits from table 1 if blade tips are uncoated (uncoated blades are used in PWA 279 cores). Use table 3 if blade tips exhibit 100% tip coating loss. Limit from Column B applies to all 6 locations specified above. One of 6 locations may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Replace abradable per WP 452 00.
Scratches	0.0625 inch width	Any amount	Replace abradable per WP 452 00.
Nicks, dents, gouges, abradable missing	Following are acceptable: a. The sum of all damaged areas on each land of each segment is not to exceed 0.150 square inch. Any condition with maximum dimension less than 0.0625 inch is not to be considered in 0.150 square-inch limit.	Any amount	Replace abradable per WP 452 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Abradable surface (continued) -	b. Missing abradable up to 0.125 inch width along front and rear edges and sides (split lines). Not to be included in 0.150 square inch limit.	Any amount	Replace abradable per WP 452 00.
NOTE			
Table 2 shows the maximum number of airfoils per stage that may be blended.			
10. Airfoil -			
Nicks, dents, cracks			
Area X (0.020 inch from vane leading edge)	0.005 inch round bottom dent	Blend depth not to exceed 0.020 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Y (0.040 inch from vane trailing edge)	0.005 inch round bottom dent	Blend depth not to exceed 0.040 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Z (mid chord area)	0.005 inch round bottom dent	May blend away up to 20% of airfoil thickness. Maximum blend diameter is 0.125 inch, 2 blends per airfoil allowed.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
11. Area N -			
Fretting	0.007 inch depth	Not reparable	Replace assembly.
12. Surface R -			
Fretting	0.008 inch depth	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
13. ID Vane Platform - Fretting	0.007 inch local depth, but must be 0.005 inch or less for 3.5 inches of total segment arc	Not reparable	Replace assembly.
14. ID Vane Platform Edge - Fretting	0.025 inch depth	Not reparable	Replace assembly.
15. Antirotation Lug - Welds cracked, lugs missing or bent	Not serviceable	Not reparable	Replace lug per WP 452 00.
Fretting, edge of lug	0.005 inch depth	Not reparable	Replace lug per WP 452 00.
16. Seal Groove - Fretting/Wear	0.015 inch depth	Not reparable	Replace assembly.

**Table 1. Allowable Abradable Seal Rub/Erosion Limits
(Uncoated Blades Used With PWA 279 Core)**

Stage	A (inch)	B (inch)
11	0.030	0.020
12	0.030	0.020
13	0.030	0.020

**Table 2. Maximum Number Of Airfoils Per Stage That May Be Blended
(Tenth Through Twelfth Stage Compressor Stator Segment Assembly)**

Stage	Maximum Number of Blendable Airfoils
10	10
11	11
12	12

**Table 3. Allowable Abradable Seal Rub/Erosion Limits
(100% Blade Tip Coating Loss)**

Stage	A (inch)	B (inch)
11	0.027	0.017
12	0.027	0.017
13	0.027	0.017

WORK PACKAGE**TECHNICAL PROCEDURES****TIP SHROUDS, COMPRESSOR BLADE,
FOURTH THROUGH THIRTEENTH STAGE****INSPECTION USING PWA 57832 INSPECTION GAGE****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	25	12	25	15	18
2 - 7	18	13	18	16 - 17	25
8 - 9	25	14	25	18	18
10 - 11	18				

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Inspection - - - - -	WP 352 00
Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Inspection After Volcanic Ash Ingestion - - -	SWP 352 01
Stator Segment Assemblies, Compressor, Seventh Through Ninth Stage - Inspection - - - - -	WP 355 00
Stator Segments, Compressor, Seventh Through Ninth Stage Assemblies - Inspection After Volcanic Ash Ingestion - -	SWP 355 01
Duct Segments - Compressor, Fourth, Fifth, Sixth and Seventh Stage - Inspection - - - - -	WP 388 00
Duct Segment, Compressor, Fourth, Fifth, Sixth and Seventh Stage - Inspection After Volcanic Ash Ingestion	SWP 388 01

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS**Nomenclature****Specification/Vendor Part Number**

COMPOUND, CORROSION PREVENTIVE,
SOLVENT CUTBACK, COLD-APPLICATION

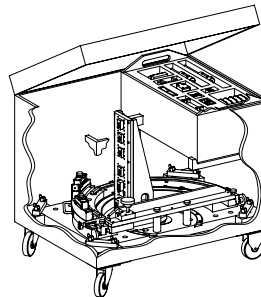
MIL-C-16173

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	PWA 57832 INSPECTION GAGE - PREPARATION FOR USE	
	INSPECTION GAGE - HIGH COMPRESSOR BLADE TIP SHROUD RADIAL CLEARANCE - - - - -	PWA 57832
3	FOURTH STAGE COMPRESSOR BLADE TIP SHROUD - RADIAL CLEARANCE MEASUREMENT	
	INSPECTION GAGE - HIGH COMPRESSOR BLADE TIP SHROUD RADIAL CLEARANCE - - - - -	PWA 57832
4	FIFTH THROUGH TENTH STAGE COMPRESSOR BLADE TIP SHROUD - RADIAL CLEARANCE MEASUREMENT	
	INSPECTION GAGE - HIGH COMPRESSOR BLADE TIP SHROUD RADIAL CLEARANCE - - - - -	PWA 57832
5	ELEVENTH THROUGH THIRTEENTH STAGE COMPRESSOR BLADE TIP SHROUD - RADIAL CLEARANCE MEASUREMENT	
	INSPECTION GAGE - HIGH COMPRESSOR BLADE TIP SHROUD RADIAL CLEARANCE - - - - -	PWA 57832

ILLUSTRATED SUPPORT EQUIPMENT

PWA 57832 -C

Figure T1. PWA 57832 INSPECTION GAGE

1. INTRODUCTION.

- a. This work package contains instructions for measuring 4th through 13th stage compressor blade tip shroud radial clearance using PWA 57832 inspection gage.

2. PWA 57832 INSPECTION GAGE - PREPARATION FOR USE.

(See Figures 1 and 2.)

- a. Open storage container and remove storage tray containing gage details.
- b. Remove PWA 57832 inspection gage base(8, figure 1) and riser(1) assembly from storage container as follows:



Overtightening knurled hand knob can cause damage to gage detail parts.

- (1) Secure riser to base using knurled hand knob(5) handtight.
- (2) Remove four plate clamps securing corners of base to bottom of storage container.



Lifting gage base and riser assembly from container using cutouts in riser supports(2) will result in gage damage.

- (3) Install four 5/8-11 lift eyes into lifting holes of base. Attach hoist to lift eyes and carefully lift base and riser assembly from container. Place on flat clean surface and remove lift eyes from base. Do not lift gage using cutouts in riser supports(2).
- c. Clean all gage surfaces.
- d. Inspect gage for damage.

NOTE

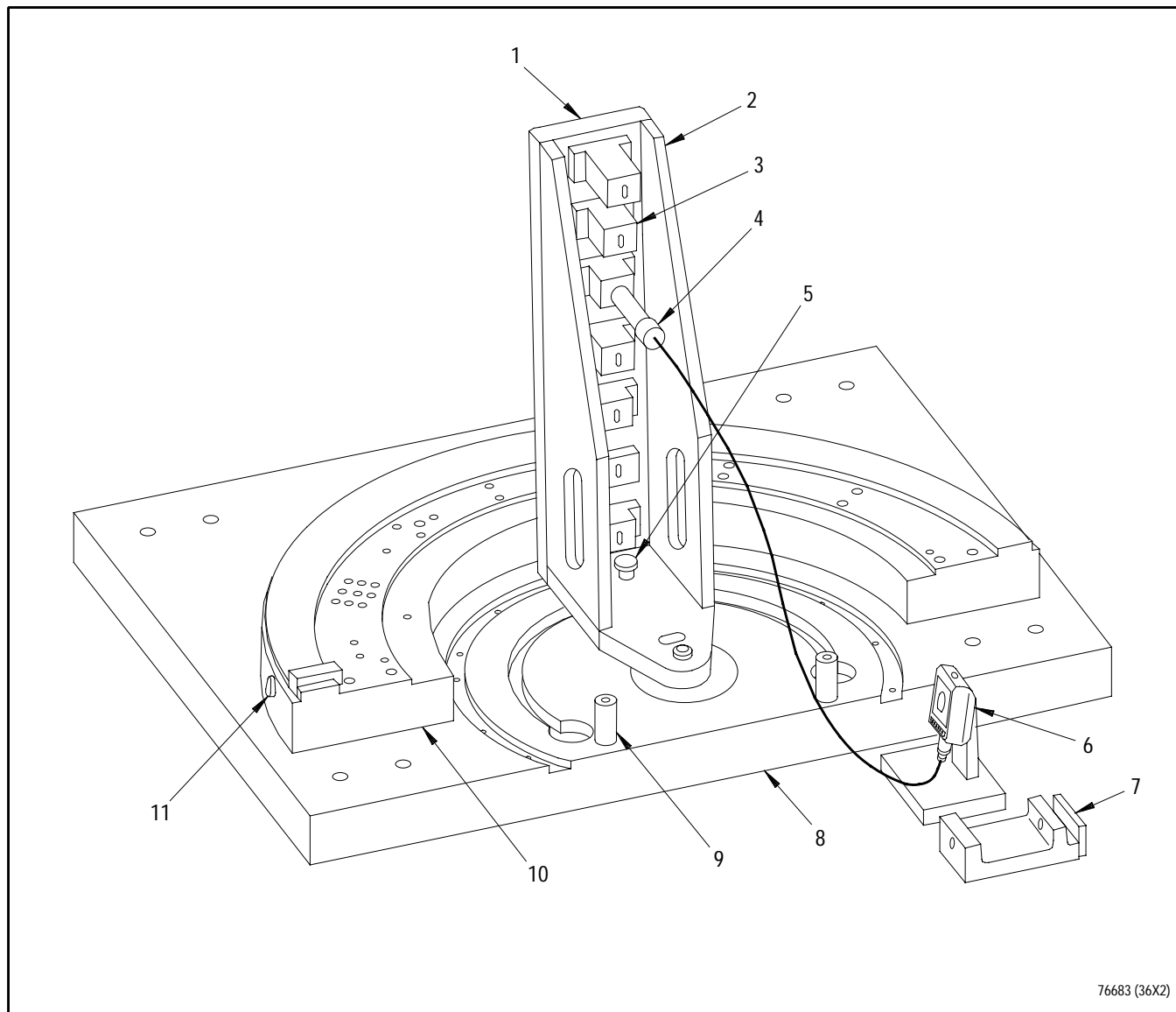
There are 10 gage blocks marked 4th through 13th and two master blocks marked A and B. Different gage blocks are installed on riser at different times during inspection sequence.

- e. Lubricate probe holes in 10 gage blocks(3) and two master blocks(7) with MIL-C-16173 corrosion preventive compound.
- f. Verify battery of indicator(6) is charged by checking for a + symbol visible on indicator screen. If necessary, replace with 3.4 volt lithium battery (Federal EBY-01011 or equivalent) or 4.5 volt alkaline battery (Eveready 523 or equivalent). Indicator will power down when not in use.

NOTE

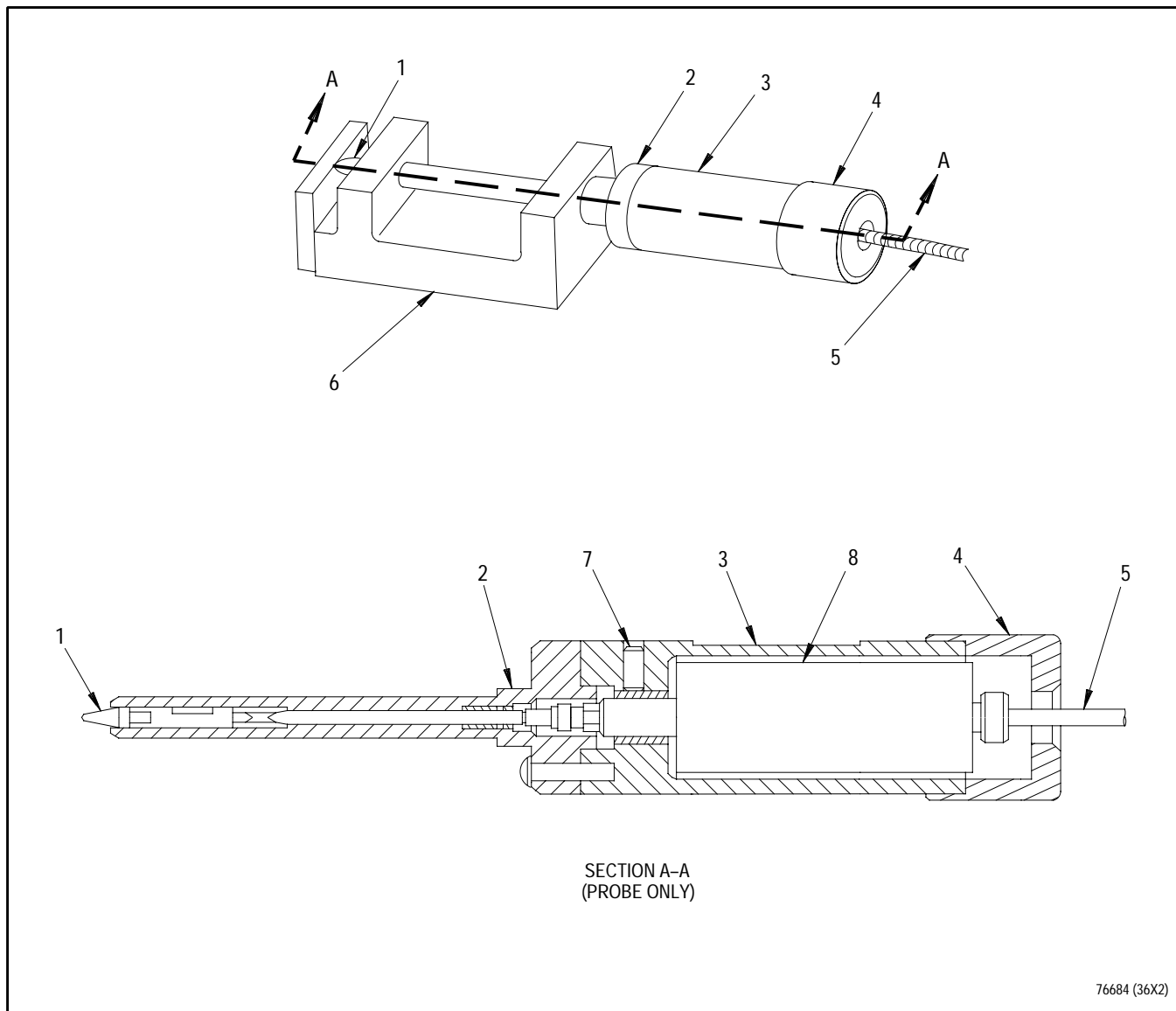
There are two probes(4) marked A and B which are used at different times during inspection sequence.

- g. Check probe presets as follows:
 - (1) Attach connector(5, figure 2) of probe A to indicator(6, figure 1).
 - (2) Insert probe A in master block A until probe body(2, figure 2) contacts block.
 - (3) Push zero button (far right) on indicator. Verify 0.000 inch reading on indicator.
 - (4) Slowly remove probe from master block while observing indicator. If readings range from 0.000 to at least 0.075 inch, probe is acceptable for use and does not need to be preset. If readings do not reach 0.075 inch, preset probe per step h.
 - (5) Repeat steps (1) through (4) using probe B and master block B.



1. Riser
2. Riser support
3. Gage block (typical)
4. Probe (A or B)
5. Knurled hand knob
6. Indicator
7. Master block (A or B)
8. Base
9. Post (two)
10. Locator ring
11. Hook clamp

Figure 1. PWA 57832 Inspection Gauge - Preparation For Use



1. Tip
2. Body
3. Housing
4. End cap
5. Connector
6. Master block
7. Setscrew
8. Transducer

Figure 2. PWA 57832 Inspection Gage - Probe Preset

h. If necessary, preset probes as follows:

- (1) Attach probe connector(5) to indicator.
- (2) Remove probe end cap(4) from probe housing(3).
- (3) Loosen setscrew(7) in probe housing to release transducer(8).



Do not use pencil to push true spindle position button. Graphite particles may affect electrical contacts.

- (4) Push true spindle position button (far left) on indicator using ball point pen or small metal probe.
- (5) Insert probe in appropriate master block until probe body(2) contacts block.
- (6) Adjust transducer in probe housing until indicator reads -0.035 to -0.045 inch.



Overtightening setscrew can damage probe transducer or housing.

- (7) Tighten setscrew fingertight in probe housing to secure transducer. Verify indicator still reads -0.035 to -0.045 inch.
- (8) While still holding probe body against master block, push zero button (far right) on indicator.
- (9) Slowly remove probe from master block while observing indicator. Verify readings range from 0.000 to at least 0.075 inch.
- (10) Screw probe end cap(4) on probe housing(3) handtight.

3. FOURTH STAGE COMPRESSOR BLADE TIP SHROUD - RADIAL CLEARANCE MEASUREMENT.

(See Figure 3.)

- a. Prepare PWA 57832 inspection gage probe A(7, figure 3) for use as follows:

- (1) Attach probe connector to indicator(5).
- (2) Insert probe into master block A until probe body contacts block.
- (3) Push zero button (far right) on indicator. Verify indicator reads 0.000 inch.
- (4) Remove probe from master block.

- b. Loosen knurled hand knob(3) and rotate riser(1) clockwise to stop against post(4).
- c. If necessary, remove 5th or 12th gage block(2) from inboard side of riser at second from bottom position.
- d. Install 4th gage block(6) on outboard side of riser in second from bottom position.
- e. Install 4th stage shroud fixture(11) on left side of locator ring(9) and locate using two L-pins(10). Secure fixture to locator ring using four captive screws.
- f. Loosen two knurled hand knobs(12) and retract two strap clamps(13).
- g. Carefully load 4th stage shroud(14) in fixture, forward edge down, with center of three shroud anti-rotation lugs located between two dowel pins on fixture. Secure shroud using two strap clamps(13) and two knurled hand knobs(12).

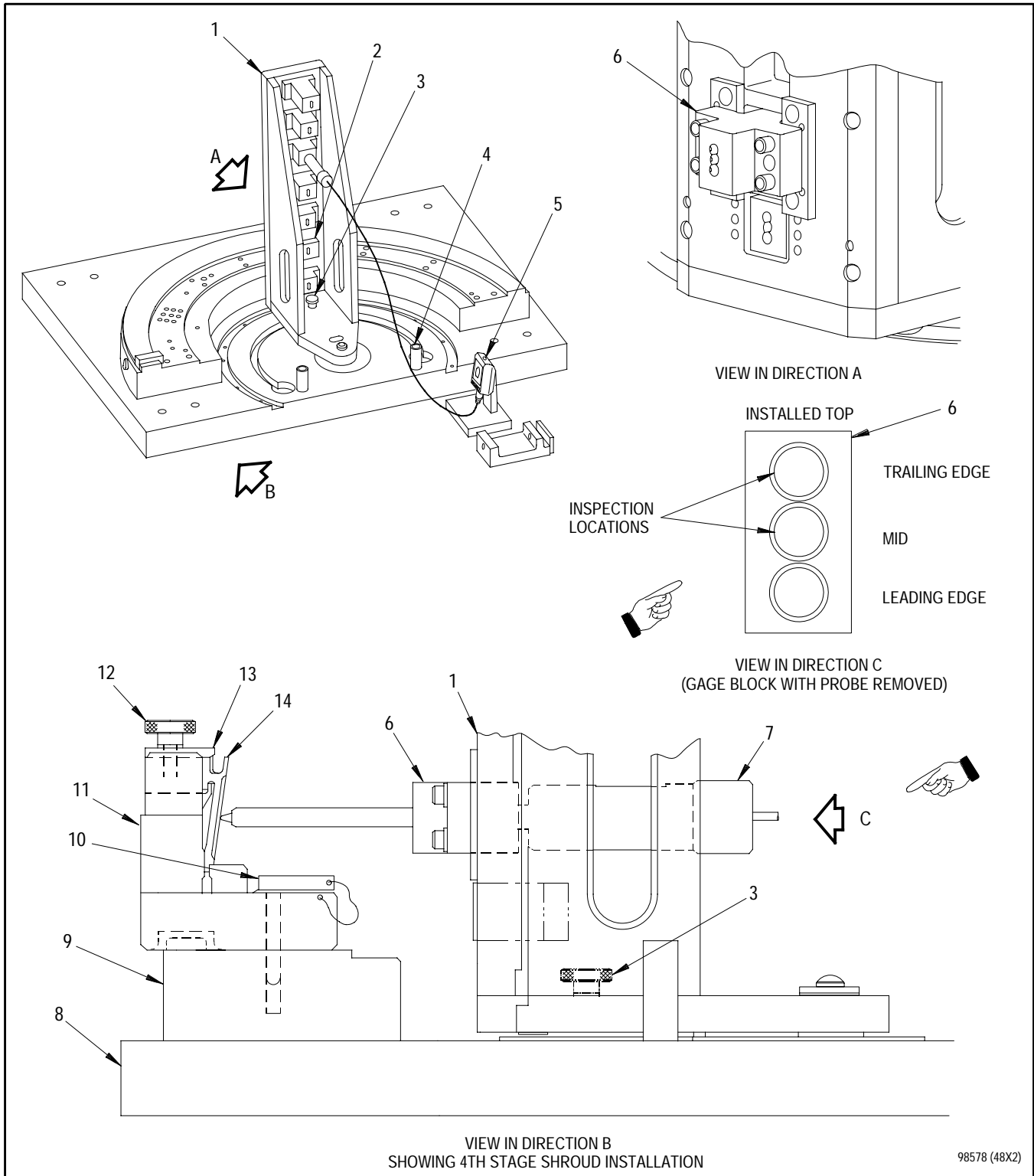


Figure 3. Fourth Stage Compressor Blade Tip Shroud - Radial Clearance Measurement

Legend for Figure 3

1. Riser
2. 5th or 12th gage block
3. Knurled hand knob
4. Post
5. Indicator
6. 4th gage block
7. Probe A
8. Base
9. Locator ring
10. L-pin
11. 4th stage shroud fixture
12. Knurled hand knob
13. Strap clamp
14. 4th stage shroud



Moving riser or 4th stage shroud while probe tip is in contact with shroud surface will damage shroud or probe.

NOTE

- There are three probe holes in 4th gage block which allows measurement in three axial planes.
 - Tip shroud radial clearance is affected by shroud surface abrasion or erosion. A 0.000 inch reading represents nominal new hardware clearances.
- h. Use top probe hole of 4th stage gage block for trailing edge (T.E.) measurement and center probe hole for mid measurement (see figure 3) at three equally spaced circumferential locations for total of six measurements

per segment. Insert probe A into 4th stage gage block until probe tip contacts shroud surface and probe body contacts gage block. Record radial clearance reading from indicator. Remove probe from gage block. Do not move riser while probe tip is in contact with shroud surface. Refer to WP 388 00 or SWP 388 01 for applicable shroud surface abrasion rub, erosion limits.

- i. Loosen two knurled hand knobs(12) and retract two strap clamps(13) on 4th stage shroud fixture. Carefully remove 4th stage shroud from fixture.
- j. Repeat steps f. through i. for remaining 4th stage shrouds.
- k. Remove 4th stage shroud fixture from locator ring and 4th gage block from riser.

**4. FIFTH THROUGH TENTH STAGE
COMPRESSOR BLADE TIP SHROUD - RADIAL
CLEARANCE MEASUREMENT.**

(See Figure 4.)

NOTE

Fifth through tenth stage shrouds are measured installed in fourth through ninth stage rear compressor case and stator assembly (split case).

- a. If necessary, install fifth through tenth stage shrouds in rear compressor split case per WP 621 00.
- b. Prepare PWA 57832 inspection gage probe A(4, figure 4) for use as follows:
 - (1) Attach probe connector to indicator(8).
 - (2) Insert probe into master block A until probe body contacts block.
 - (3) Push zero button (far right) on indicator. Verify indicator reads 0.000 inch.
 - (4) Remove probe from master block.
- c. Loosen knurled hand knob(9) and rotate riser(14) clockwise to stop against post(7).
- d. If necessary, remove 4th stage shroud fixture from locator ring(10) and 4th gage block from outboard side of riser.
- e. Install 5th through 10th gage blocks(5 and 3 typical) in order in second through seventh positions from bottom of riser. Thirteenth gage block(6) can remain installed in bottom position but is not used in this inspection sequence.

- f. Install either half of rear compressor split case and stator assembly(13) on locator ring as follows:

- (1) Loosen five hook clamps(12) on locator ring and rotate below locator ring top surface.
- (2) Ensure that locator ring and compressor split case forward flange surfaces are clean.
- (3) Carefully install compressor split case, forward flange down, on locator ring so that forward flange contacts OD of locator ring and radial locator stop(11) on left side of locator ring.
- (4) Secure case to locator ring using five hook clamps.

NOTE

Split case adapter holds rear flange of compressor split case to simulate engine installed position.

- g. Install split case adapter(1) on compressor split case rear flange(18) as follows:
 - (1) Rotate left and right case mount hand knobs(16) counterclockwise.
 - (2) Pull position indicator(22) upward until handle is out of slot and rotate handle 90 degrees.
 - (3) Rotate locating block hand knob(24) counterclockwise to retract locating block(19).
 - (4) Rotate right retaining hand knob(15) clockwise and left retaining hand knob(21) counterclockwise to disengage position.

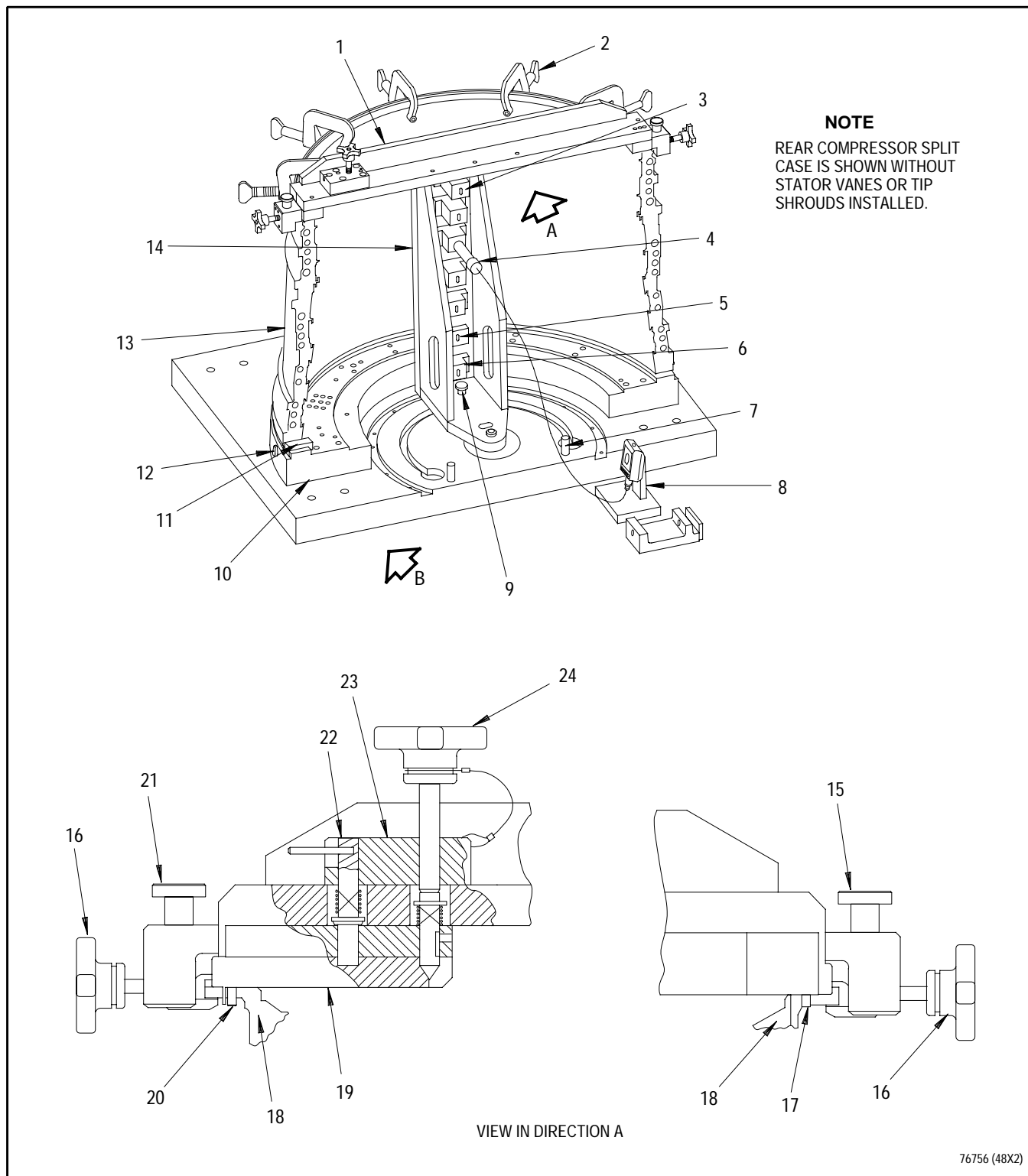


Figure 4. Fifth Through Tenth Stage Compressor Blade Tip Shroud - Radial Clearance Measurement (Sheet 1 of 2)

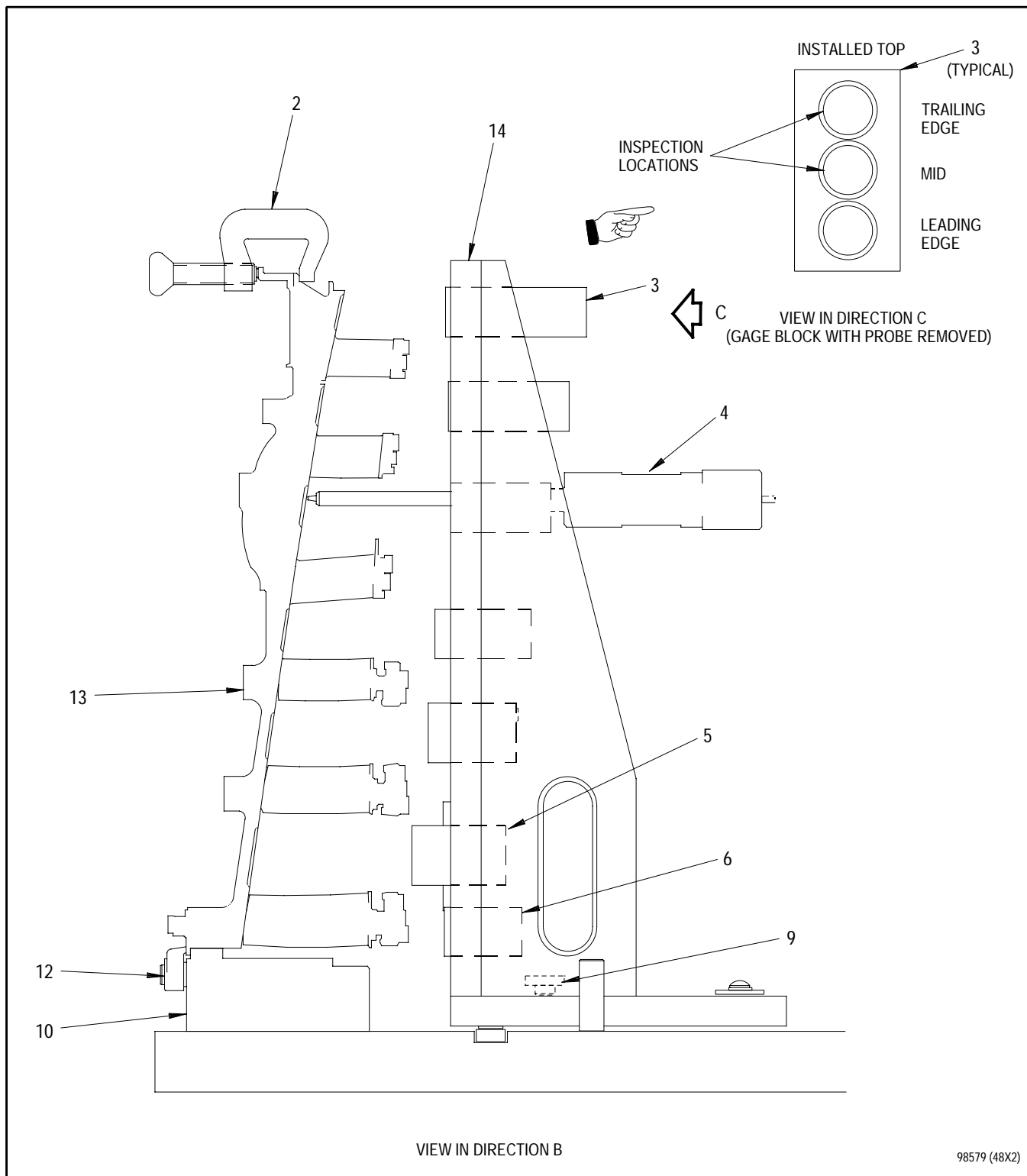


Figure 4. Fifth Through Tenth Stage Compressor Blade Tip Shroud - Radial Clearance Measurement (Sheet 2 of 2)

Legend for figure 4

1. Split case adapter
2. C-clamp
3. 10th gage block
4. Probe A
5. 5th gage block
6. 13th gage block
7. Post
8. Indicator
9. Knurled hand knob
10. Locator ring
11. Radial locator stop
12. Hook clamp
13. Compressor split case and stator assembly
14. Riser
15. Right retaining hand knob
16. Case mount hand knobs
17. Locating dowel pin
18. Compressor split case rear flange
19. Locating block
20. Flange dowel pin
21. Left retaining hand knob
22. Position indicator
23. Base block
24. Locating block hand knob

- (5) Position split case adapter on rear flange of split case so that left and right flange dowel pins(20) fit in case rear flange bolt holes and locating dowel pin(17) on right side is flush against case.
- (6) Rotate right retaining hand knob(15) counterclockwise and left retaining hand knob(21) clockwise to secure split case adapter to case rear flange.
- (7) Rotate position indicator(22) to align handle with slot in base block(23).
- (8) Rotate locating block hand knob(24) clockwise until position indicator drops into place in locating block(19). Top of indicator will be flush with top of base block within 0.005 inch when indicator is fully engaged in locating block.
- (9) Rotate left and right case mount hand knobs(16) clockwise until split case rear flange is flush with split case adapter.
- h. Secure 10th stage shrouds to split case rear flange using five C-clamps(2) as shown.



Moving riser or split case while probe tip is in contact with shroud surfaces will damage shrouds or probe.

NOTE

- There are three probe holes in each gage block which allows measurement in three axial planes for each shroud.
 - Tip shroud radial clearance is affected by shroud surface abrasion or erosion. A 0.000 inch reading represents nominal new hardware clearances.
- i. Use top probe hole of the 5th through 10th stage gage blocks for trailing edge (T.E.) measurement and center probe hole for mid measurement (see figure 4, sheet 2) at three equally spaced circumferential locations for total of six measurements per segment. Insert probe A into 5th, 6th, 7th, 8th, 9th or 10th stage gage block until probe tip contacts shroud surface and probe body contacts gage block. Record radial clearance reading from indicator. Remove probe from gage block. Do not move riser while probe tip is in contact with shroud surface. Refer to WP 388 00 or SWP 388 01 for applicable 5th, 6th, 7th stage shroud surface abrasion rub, erosion limits. Refer to WP 355 00 or SWP 355 01 for applicable 8th, 9th and 10th stage shroud surface abrasion rub, erosion limits.

- j. Rotate riser clockwise to stop against post.
- k. Remove five C-clamps securing 10th stage shrouds to split case rear flange.
- l. Remove split case adapter as follows:
 - (1) Rotate left and right case mount hand knobs(16) counterclockwise.
 - (2) Pull position indicator(22) upward until handle is out of slot and rotate handle 90 degrees. Rotate locating block hand knob(24) counterclockwise to retract locating block(19).
 - (3) Rotate right retaining hand knob(15) clockwise and left retaining hand knob(21) counterclockwise to disengage from case flange.
 - (4) Lift split case adapter from case flange.
- m. Loosen five hook clamps(12) and rotate below locator ring top surface.
- n. Carefully remove compressor split case from locator ring.
- o. Repeat steps f. through n. for other half of compressor split case.

5. ELEVENTH THROUGH THIRTEENTH STAGE COMPRESSOR BLADE TIP SHROUD - RADIAL CLEARANCE MEASUREMENT.

(See Figure 5.)

NOTE

Eleventh through thirteenth stage tip shrouds are contained in tenth through twelfth stage compressor stator segment assemblies.

- a. Prepare PWA 57832 inspection gage probe B(5, figure 5) for use as follows:
 - (1) Attach probe connector to indicator(9).
 - (2) Insert probe into master block B until probe body contacts block.
 - (3) Push zero button (far right) on indicator. Verify indicator reads 0.000 inch.
 - (4) Remove probe from master block.
- b. Loosen knurled hand knob(7) and rotate riser(2) clockwise to stop against post(8).
- c. If necessary, remove 4th gage block from outboard side of riser and 5th and 6th gage blocks from inboard side of riser at second and third positions from bottom.
- d. Install 11th and 12th gage blocks(3 and 4) in third and second positions from bottom on inboard side of riser. If necessary, install 13th gage block(6) in bottom position on inboard side of riser.
- e. Install 11th through 13th stage segment locator(1) on left side of locator ring(10) using four captive screws.
- f. Lift segment locator handle(16) up. Carefully position 10th through 12th stator segment assembly(17), rear flange down, on locator ring(10) and under segment locator.
- g. Locate stator segment assembly on locator ring by positioning captive screw(12) of flange clamp(11) in center slot of segment rear flange. Hold OD of stator segment flange against locator ring snap diameter and secure segment flange to locator ring using captive screw(12).
- h. Check stator segment flange position by attempting to insert 0.001 to 0.002 inch shim stock between OD of segment flange and locator ring snap diameter. If shim stock can be inserted, loosen captive screw(12) and reposition flange per step g.
- i. Rotate segment locator handle(16) down to lock forward flange of stator segment into position.

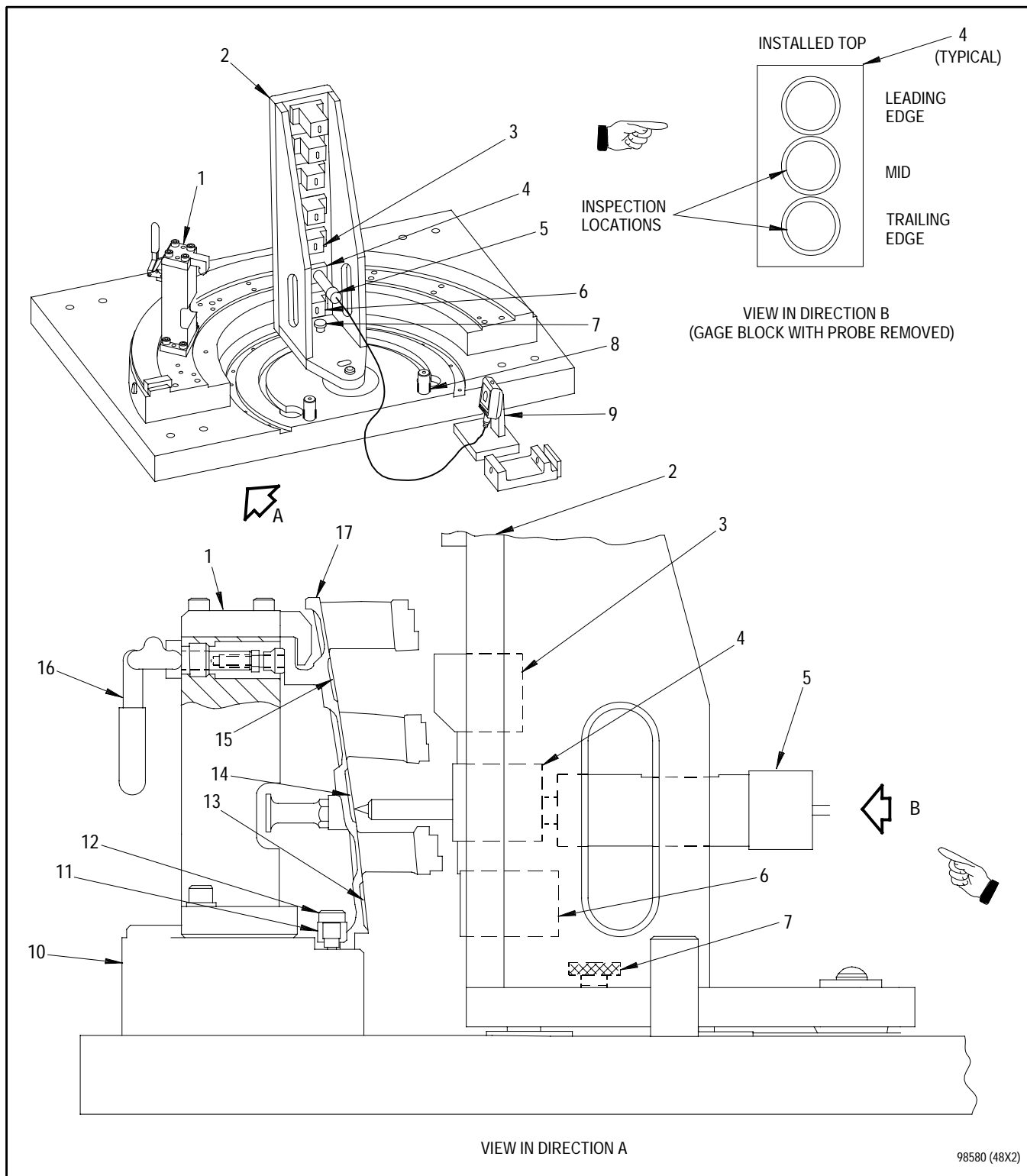


Figure 5. Eleventh Through Thirteenth Stage Compressor Blade Tip Shroud - Radial Clearance Measurement

Legend for figure 5

1. 11th through 13th segment locator
2. Riser
3. 11th gage block
4. 12th gage block
5. Probe B
6. 13th gage block
7. Knurled hand knob
8. Post
9. Indicator
10. Locator ring
11. Flange clamp
12. Captive screw
13. 13th stage shroud
14. 12th stage shroud
15. 11th stage shroud
16. Handle
17. 10th through 12th stator segment assembly



Moving riser or stator segment assembly while probe tip is in contact with shroud surfaces will damage shrouds or probe.

NOTE

- There are three probe holes in each gage block which allows measurement in three axial planes for each of three shrouds.
 - Tip shroud radial clearance is affected by shroud surface abrasion or erosion. A 0.000 inch reading represents nominal new hardware clearances.
- j. Use the bottom probe hole of the 11th through 13th stage gage blocks for trailing edge (T.E.) measurement and center probe hole for mid measurement (see figure 5) at three equally spaced circumferential locations for total of six measurements per segment. Insert probe B into 11th, 12th, or 13th stage gage block until probe tip contacts shroud surface and probe body contacts gage block. Record radial clearance reading from indicator. Remove probe from gage block. Do not move riser while probe tip is in contact with shroud surface. Refer to WP 352 00 or SWP 352 01 for applicable shroud surface abrasion rub, erosion limits.
- k. Rotate segment locator handle(16) up. Loosen captive screw(12) and remove flange clamp(11).
- l. Carefully remove stator segment assembly from segment locator.
- m. Repeat steps f. through l. for remaining stator segment assemblies.
- n. Remove 11th through 13th segment locator(1) from locator ring.

6. PWA 57832 INSPECTION GAGE - STORAGE

(See figures 1, 3, and 4)

- a. Install 4th stage shroud fixture(11, figure 3) on left side of locator ring(9) and locate using two L-pins(10). Secure fixture to locator ring with four captive screws.
- b. Install split case adapter assembly(1, figure 4) on two posts(7) using two container thumbscrew details.
- c. Verify all other gage details are either attached to gage base or riser or are in container storage tray.
- d. Install gage in storage container as follows:



Overtightening knurled hand knob can cause damage to gage detail parts.

- (1) Rotate riser(1, figure 1) to a position that will not interfere with container storage tray when installed in container. Secure riser to base(8) using knurled hand knob(5) handtight.



Lifting gage base and riser assembly using cutouts in riser supports(2) will result in gage damage.

- (2) Install four 5/8-11 lift eyes into lifting holes of base. Attach hoist to lift eyes and carefully lower base and riser assembly into storage container. Do not lift gage using cutouts in riser supports. Remove lift eyes from base.
- (3) Secure corners of base to bottom of storage container using four plate clamps and wing nuts.
- (4) Place storage tray inside container, ensuring tray does not touch riser.

WORK PACKAGE

TECHNICAL PROCEDURES

**SHROUD, COMPRESSOR STATOR,
SEVENTH THROUGH TWELFTH STAGE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3 - 5	29	6 Blank	0
2	0				

T.O. 2J-F100-53-7

WP 354 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 7th through 12th stage compressor stator shrouds.

2. SEVENTH THROUGH TWELFTH STAGE COMPRESSOR STATOR SHROUDS - INSPECTION.

(See Figure 1.)

- a. Visually inspect 7th through 12th stage compressor stator shrouds per figure 1.

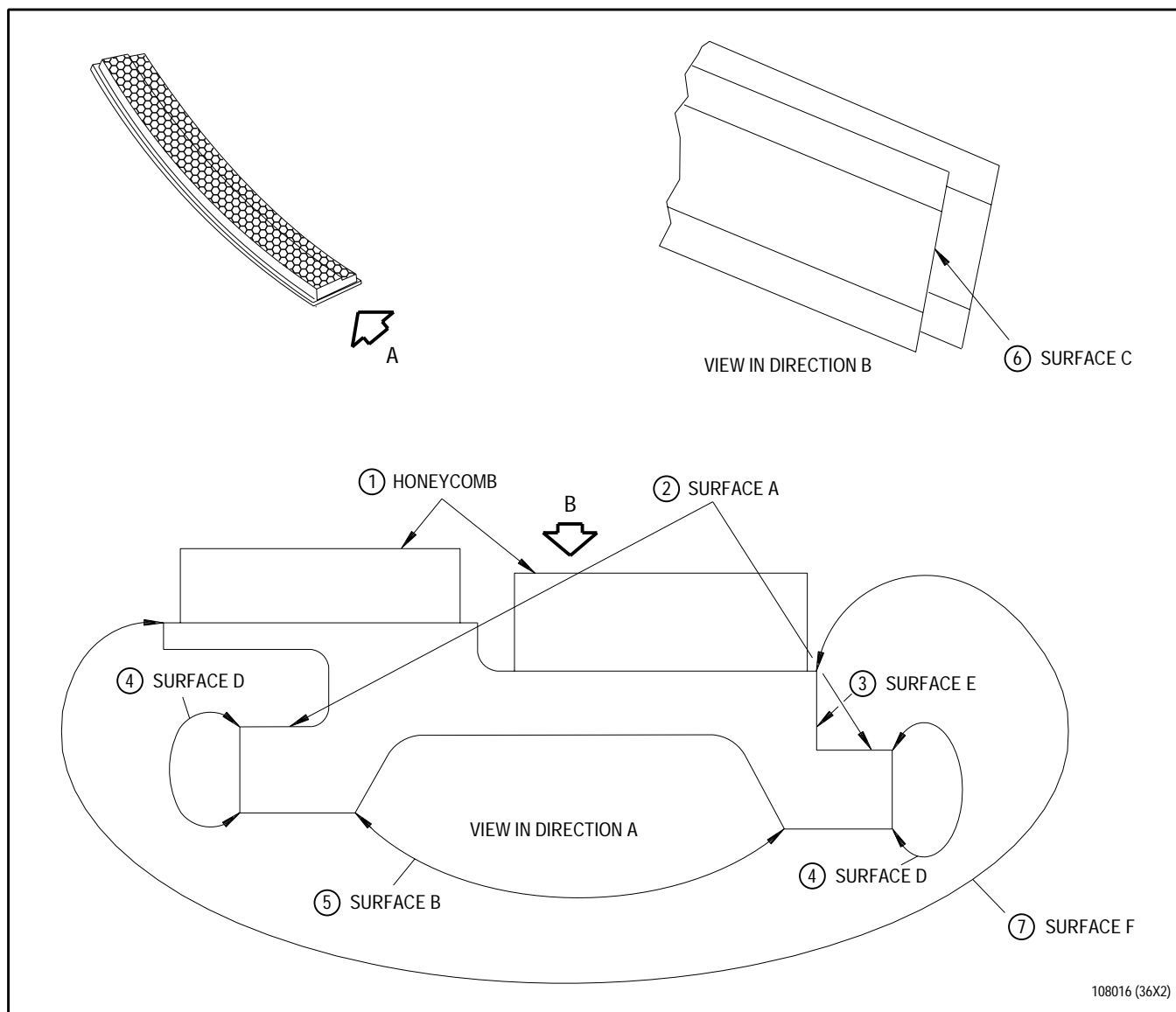


Figure 1. Seventh Through Twelfth Stage Compressor Stator Shroud (Typical) - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Honeycomb -			
Abrasion rub, grooves	Stages 7-9: 0.031 inch depth x full segment length	Stages 7-9: Any amount	Replace honeycomb per WP 454 00.
	Stages 10-12: 0.015 inch depth x full segment length	Stages 10-12: Not reparable	Replace shroud.
Nicks, gouges, dents, honeycomb missing, crushed cells	a. Damage along edges up to 3 cells wide x full feature length. Honeycomb must be fully bonded.	Stages 7-9: Any amount	Replace honeycomb per WP 454 00.
		Stages 10-12: No blending allowed	Replace shroud.
	b. Damage up to full depth separated from existing knife-edge seal rub groove.	Stages 7-9: Any amount	Replace honeycomb per WP 454 00.
		Stages 10-12: Not reparable	Replace shroud.
	c. Damage overlapping existing rub groove up to 0.062 inch depth. Total accepted arc length of rub groove must be 0.375 inch or less per land. Damage along edge not included in 0.375 inch limit.	Stages 7-9: Any amount	Replace honeycomb per WP 454 00.
		Stages 10-12: Not reparable	Replace shroud.

Legend for figure 1 (continued)

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2.	Surface A - Fretting	0.010 inch depth	Not reparable	Replace shroud.
3.	Surface E - Fretting	0.003 inch depth	Not reparable	Replace shroud.
4.	Surface D - Fretting	0.005 inch depth	Not reparable	Replace shroud.
5.	Surface B - Fretting	0.003 inch depth	Not reparable	Replace shroud.
	Cracks	Not serviceable	Not reparable	Replace shroud.
6.	Surface C - Fretting	0.003 inch depth	Not reparable	Replace shroud.
7.	Surface F - Nicks and scratches	0.003 inch depth	See corrective action.	Blend repair per WP 454 00.

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR SEGMENT, COMPRESSOR, SEVENTH THROUGH NINTH STAGE ASSEMBLY -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4A Added	4	5 - 6	29
2 - 3	25	4B Blank Added	4	7	5
4	29			8	29

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 7th through 9th stage compressor stator segment assemblies.

2. SEVENTH THROUGH NINTH STAGE COMPRESSOR STATOR SEGMENT ASSEMBLIES - INSPECTION.

(See Figure 1 and Tables 1 and 2.)

- a. Ensure 7th through 9th stage compressor stator segment assemblies have been cleaned per WP 201 00.
- b. Visually inspect 7th through 9th stage compressor stator segment assemblies per figure 1.
- c. Fluorescent penetrant inspect 7th through 9th stage compressor stator segment assemblies for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

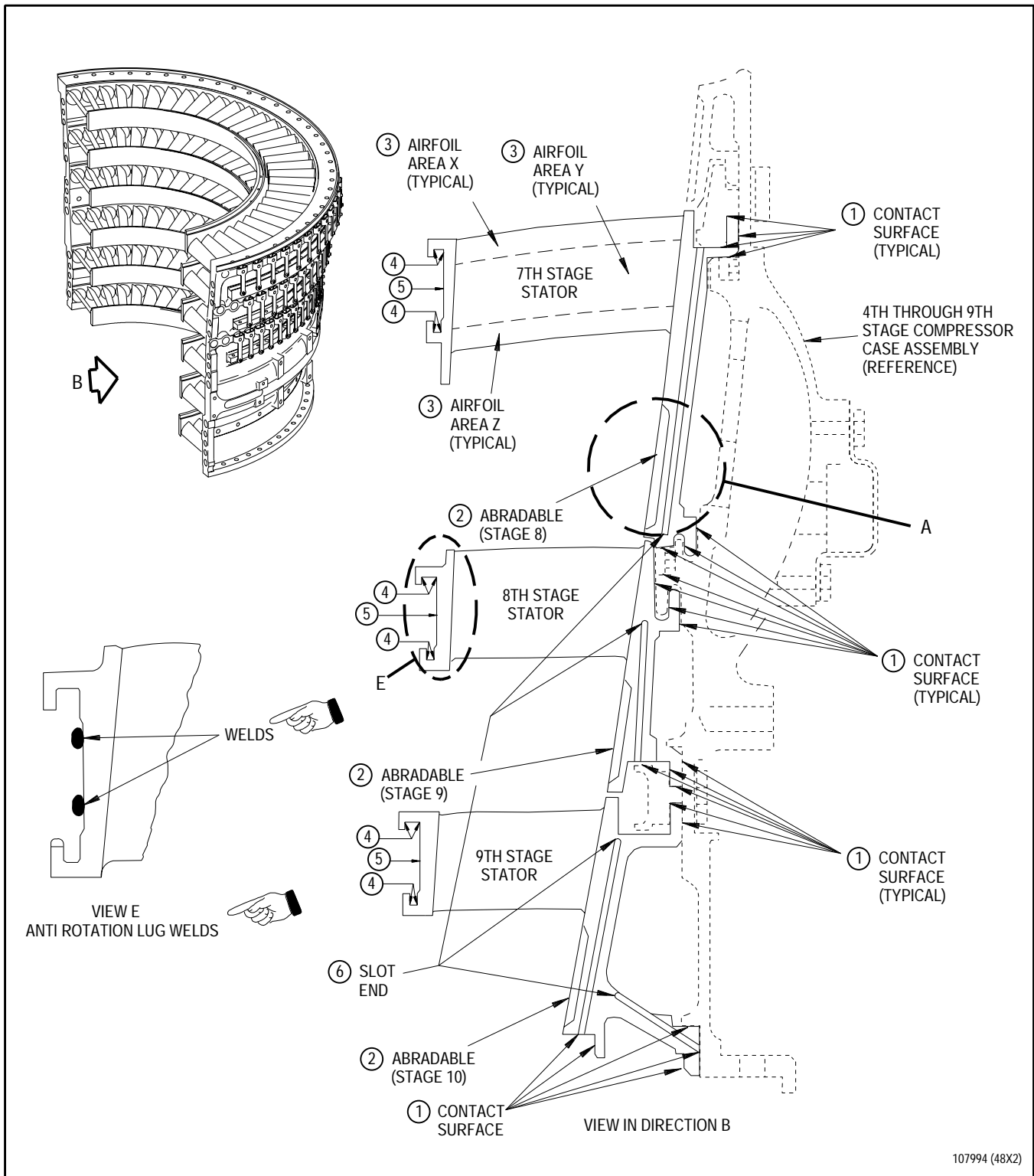


Figure 1. Seventh Through Ninth Stage Compressor Stator Segment Assemblies - Inspection (Sheet 1 of 2)

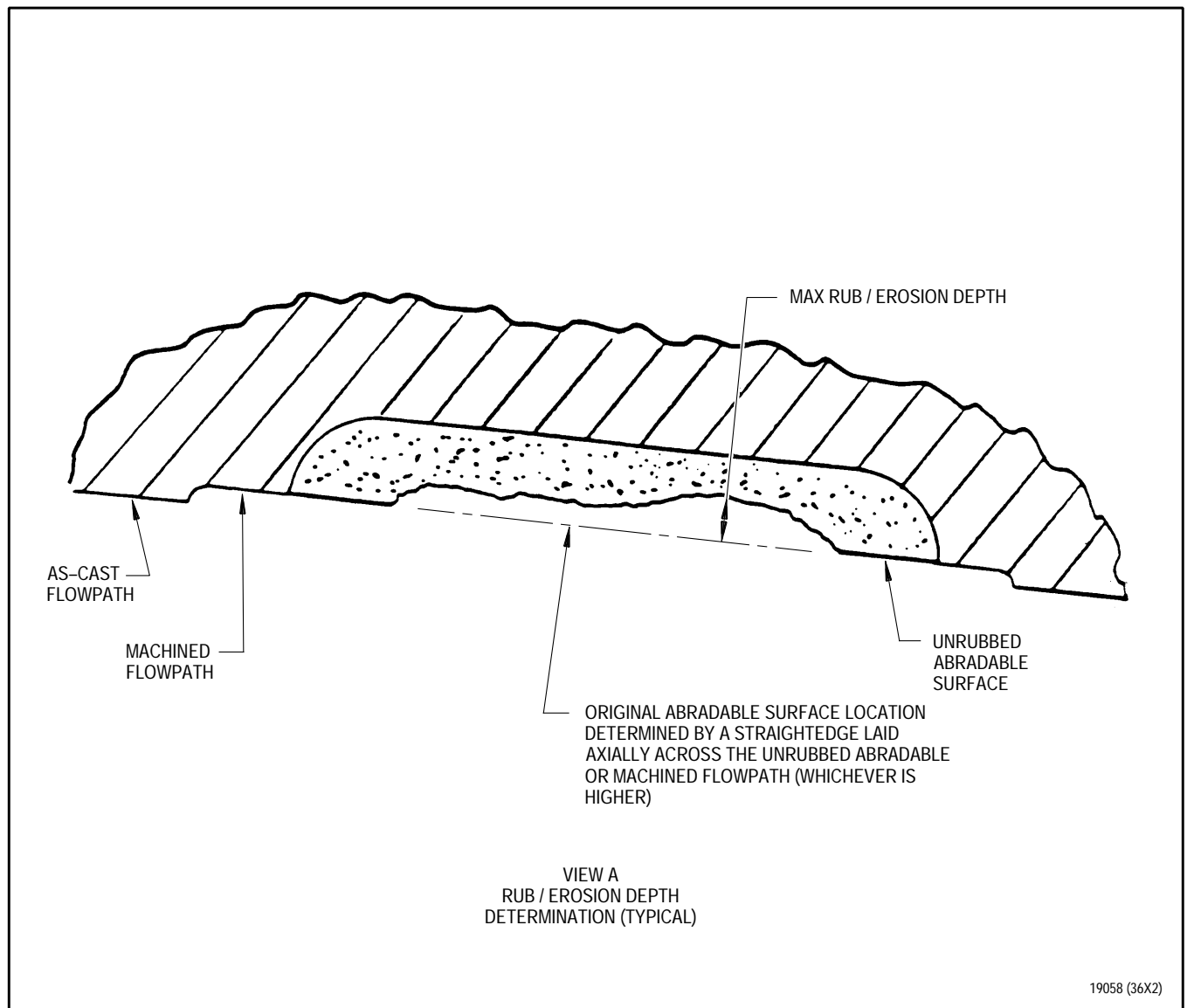


Figure 1. Seventh through Ninth Stage Compressor Stator Segment Assemblies - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Contact surface -			
Fretting	0.005 inch depth	Not reparable	Replace assembly.
2. Abradable -			

NOTE

Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.

Abrasion rub/erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub/erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Replace abradable per WP 455 00.
Scratches	0.0625 inch width	Any amount	Replace abradable per WP 455 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Abradable (continued) -			
Nicks, dents, gouges, abradable missing	<p>Following are acceptable:</p> <p>a. The sum of all damaged areas per segment not to exceed 0.200 square inch. Any condition with maximum dimension less than 0.0625 square inch is not to be considered in 0.200 square inch limit.</p> <p>b. Missing abradable up to 0.125 inch width along stator segment edge is not to be included in 0.200 square inch limit.</p> <p>c. Missing abradable up to 0.0625 inch width along front and rear edges is not to be included in 0.200 square inch limit.</p>	Any amount	Replace abradable per WP 455 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
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NOTE

Table 2 shows the maximum number of airfoils per stage that may be blended.

3. Airfoil -

Nicks, dents,
cracks

Area X (0.020 inch from vane leading edge)	Not serviceable	Blend depth not to exceed 0.020 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Y (0.040 inch from vane trailing edge)	Not serviceable	Blend depth not to exceed 0.040 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Z (mid chord area)	Not serviceable	May blend away up to 20% of airfoil thickness. Maximum blend diameter is 0.125 inch, 2 blends per airfoil allowed.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.

After all airfoil blend repairs have been made, locally fluorescent penetrant inspect all airfoil blend repairs. Refer to T.O. 2J-F100-9. No cracks allowed.

4. I.D. shroud contact surface -

Fretting	0.005 inch depth	Not repairable	Replace assembly.
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Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. ID shroud spring contact surface -			
Wear	0.005 inch depth for up to 20% of individual vane platform contact area.	Not reparable	Replace assembly.
Antirotation lug welds cracked, lug missing or bent	Not serviceable	Not reparable	Replace lug per WP 455 00.
Fretting, edge of lug	0.005 inch depth	Not reparable	Replace lug per WP 455 00.
6. Slot end -			
Wear	0.010 inch depth	Not reparable	Replace assembly.

Table 1. Allowable Abradable Seal Rub/Erosion Limits

Stage	A (inch)	B (inch)
8	.007	.003
9	.007	.003
10	.010	.005

**Table 2. Maximum Number Of Airfoils Per Stage That May Be Blended
(Seventh Through Ninth Stage Compressor Stator Segment Assembly)**

Stage	Maximum Number of Blendable Airfoils
7	9
8	9
9	10

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

STATOR SEGMENTS, COMPRESSOR, SEVENTH THROUGH NINTH STAGE ASSEMBLY -

INSPECTION AFTER VOLCANIC ASH INGESTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	5	8	9	25
2 - 3	25	6 - 8	29	10 Blank	8
4	29				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of 7th through 9th stage compressor stator segment assemblies after volcanic ash ingestion.

**2. SEVENTH THROUGH NINTH STAGE
COMPRESSOR STATOR SEGMENT
ASSEMBLIES - INSPECTION.**

(See Figure 1 and Tables 1 through 3.)

- a. Ensure 7th through 9th stage compressor stator segment assemblies have been cleaned per WP 201 00.
- b. Visually inspect 7th through 9th stage compressor stator segment assemblies per figure 1.
- c. Locally fluorescent penetrant inspect all airfoil blend repairs. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Fluorescent penetrant inspect 7th through 9th stage compressor stator segment assemblies for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

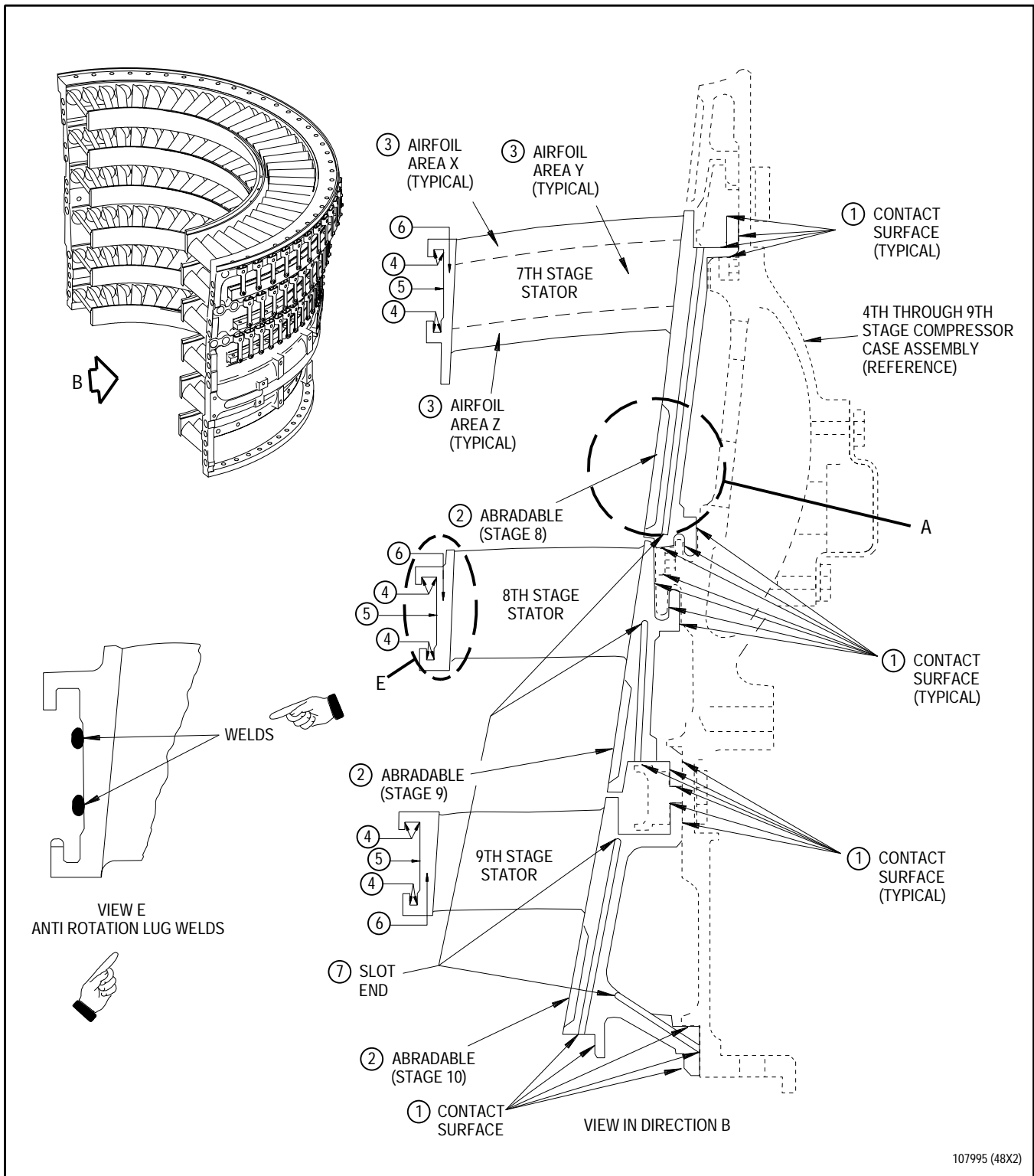


Figure 1. Seventh Through Ninth Stage Compressor Stator Segment Assemblies - Inspection (Sheet 1 of 2)

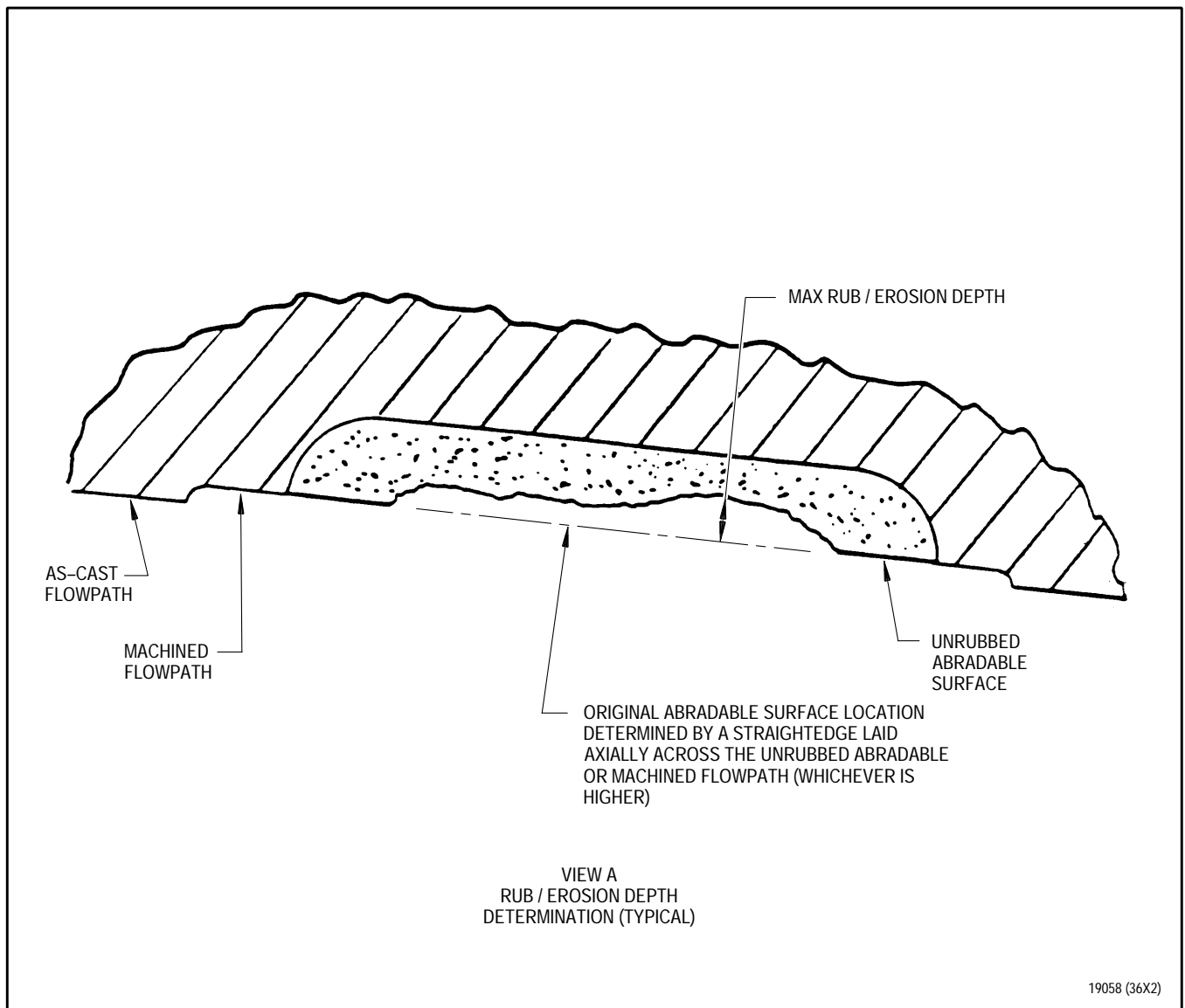


Figure 1. Seventh through Ninth Stage Compressor Stator Segment Assemblies - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Contact surface -			
Fretting	0.007 inch depth	Not reparable	Replace assembly.
2. Abradable -			

NOTE

Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.

Abrasion rub/erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub/erosion limits from table 1 if blade tips are uncoated (uncoated blades are used in PWA 279 cores). Use table 3 if blade tips exhibit 100% tip coating loss. Limit from Column B applies to all 6 locations specified above. One of 6 locations may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Replace abradable per WP 455 00.
Scratches	0.0625 inch width	Any amount	Replace abradable per WP 455 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Abradable (continued) -			
Nicks, dents, gouges, abradable missing	<p>a. The sum of all damaged areas per segment not to exceed 0.200 square inch. Any condition with maximum dimension less than 0.0625 square inch is not to be considered in 0.200 square inch limit.</p> <p>b. Missing abradable up to 0.125 inch width along stator segment edge is not to be included in 0.200 square inch limit.</p> <p>c. Missing abradable up to 0.0625 inch width along front and rear edges is not to be included in 0.200 square inch limit.</p>	Any amount	Replace abradable per WP 455 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
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NOTE

Table 2 shows maximum number of airfoils per stage that may be blended.

3. Airfoil -

Nicks, dents, cracks

Area X (0.020 inch from vane leading edge)	0.005 inch round bottom dent	Blend depth not to exceed 0.020 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Y (0.040 inch from vane trailing edge)	0.005 inch round bottom dent	Blend depth not to exceed 0.040 inch. Blends allowed up to full length of area.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Area Z (mid chord area)	0.005 inch round bottom dent	May blend away up to 20% of airfoil thickness. Maximum blend diameter is 0.125 inch, 2 blends per airfoil allowed.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.

4. I.D. shroud contact surface -

Fretting	0.007 inch depth	Not reparable	Replace assembly.
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5. ID shroud spring, contact surface -

Wear	0.007 inch depth for up to 20% of individual vane platform contact area.	Not reparable	Replace assembly.
Antirotation lug welds cracked, lug missing or bent	Not serviceable	Not reparable	Replace lug per WP 455 00.
Fretting, edge of lug	0.005 inch depth	Not reparable	Replace lug per WP 455 00.

6. ID vane platform edge -

Fretting	0.020 inch depth	Not reparable	Replace assembly.
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7. Slot end -

Wear	0.010 inch depth	Not reparable	Replace assembly.
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**Table 1. Allowable Abradable Seal Rub/Erosion Limits
(Uncoated Blades Used With PWA 279 Core)**

Stage	A (inch)	B (inch)
8	.018	.008
9	.022	.012
10	.030	.020

**Table 2. Maximum Number Of Airfoils Per Stage That May Be Blended
(Seventh Through Ninth Stage Compressor Stator Segment Assembly)**

Stage	Maximum Number of Blendable Airfoils
7	9
8	9
9	10

**Table 3. Allowable Abradable Seal Rub/Erosion Limits
(100% Blade Tip Coating Loss)**

Stage	A (inch)	B (inch)
8	.015	.005
9	.019	.009
10	.027	.017

WORK PACKAGE

TECHNICAL PROCEDURES

BEARINGS, REAR COMPRESSOR, VARIABLE INLET VANE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance Charts -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

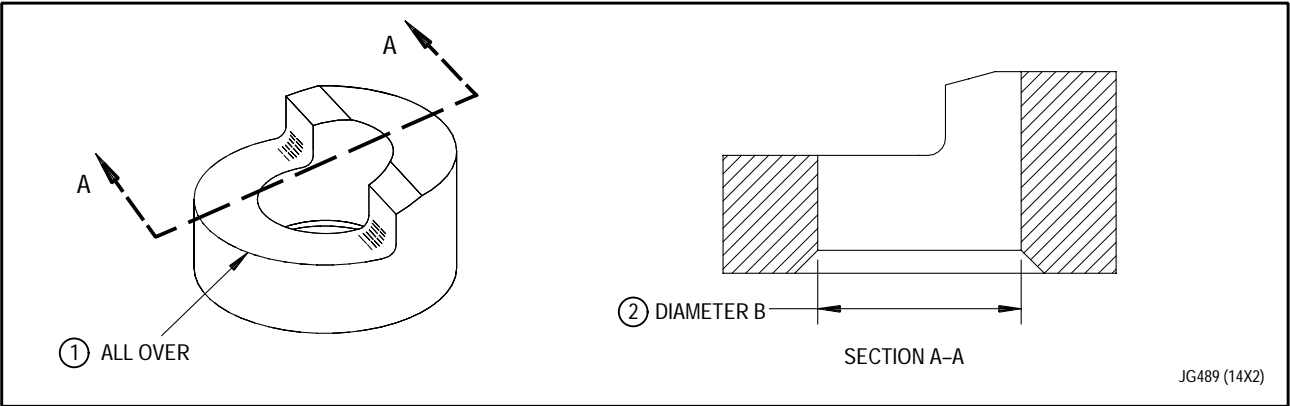
1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor variable inlet vane bearings.

2. REAR COMPRESSOR VARIABLE INLET
VANE BEARING - INSPECTION.

(See Figure 1.)

- a. Inspect rear compressor variable inlet vane bearing
(See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks and chipping	Not serviceable	Not repairable	Replace bearing.
Nicks, dents, and scratches	0.010 inch depth	Not repairable	Replace bearing.
2. Diameter B -			
Wear	Per WP 801 00, Reference 3271.	Not repairable	Replace bearing.

Figure 1. Rear Compressor Variable Inlet Vane Bearing - Inspection

WORK PACKAGE**TECHNICAL PROCEDURES****VANES, REAR COMPRESSOR, VARIABLE INLET -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	0	4 - 7	29
2	6			8 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor variable inlet vanes.

2. REAR COMPRESSOR VARIABLE INLET VANES - INSPECTION.

(See Figure 1.)

- a. Ensure rear compressor variable inlet vanes have been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect vanes for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Inspect vanes per figure 1.

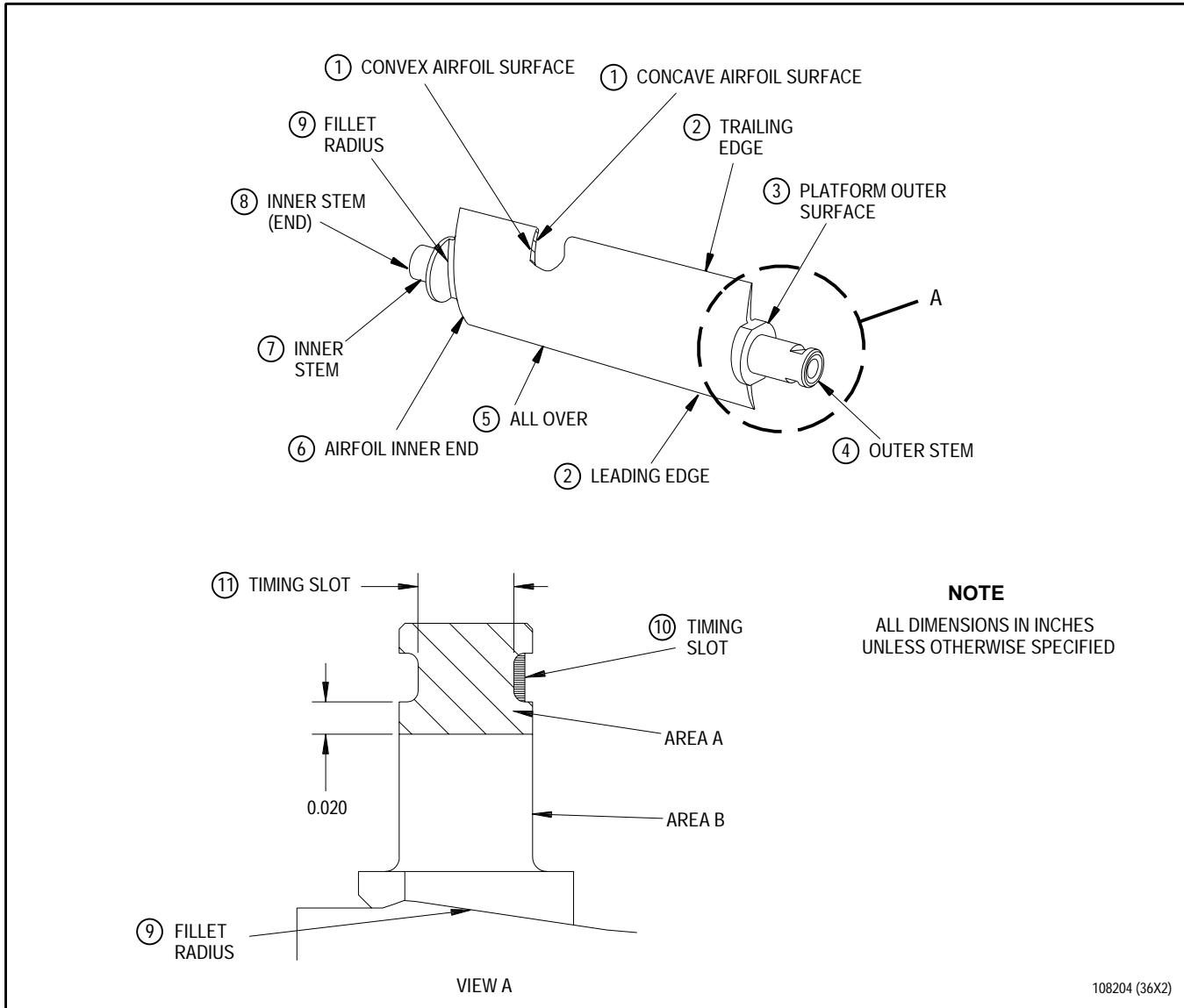


Figure 1. Rear Compressor Variable Inlet Vanes - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
1. Concave and convex surfaces -			
Nicks, dents, and scratches	Not serviceable	See corrective action.	Blend repair per WP 457 00.
Round-bottom dents	0.010 inch depth	Not reparable	Replace vane.
Pitting	0.001 inch	Not reparable	Replace vane.
Corrosion or salt buildup	Not serviceable	See corrective action.	Clean vane per WP 201 00.
2. Leading and trailing edges -			
Nicks and dents	Not serviceable	See corrective action.	Blend repair per WP 457 00.
3. Platform outer surface -			
Wear	0.005 inch depth	Not reparable	Replace vane.
4. Outer stem -			
Wear	0.394 inch minimum diameter	Not reparable	Replace vane.
Grooves, missing or chipped plating	Linear: 0.004 inch depth x 0.010 inch width x circumference Non-linear: 0.002 inch depth x 0.040 inch width x 0.060 inch length	Not reparable	Replace vane.
Flat spots	10% of journal cylindrical surface. Raised metal not serviceable	Not reparable	Replace vane.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
4. Outer stem - (continued)			
Rough or pitted journal surface	16 microinch finish	0.395 inch maximum diameter	Replace vane.
Plating chipped	Area A - Serviceable	None	None
	Area B - Not serviceable	Not reparable	Replace vane.
Plating peeling	Not serviceable	Not reparable	Replace vane.
Plating missing	Not serviceable	Not reparable	Replace vane.
5. All over -			
Cracks	Not serviceable	Not reparable	Replace vane.
6. Airfoil inner end -			
Edge notching	0.020 inch depth provided all sharp edges are deburred	Not reparable	Replace vane.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
7. Inner stem -			
Wear	0.350 inch minimum diameter	Not repairable	Replace vane.
Grooves	Linear: 0.004 inch depth x 0.010 inch width x circumference Non-linear: 0.002 inch depth x 0.040 inch width x 0.060 inch length	Not repairable	Replace vane.
Flat spots	10% of journal cylindrical surface. Raised metal not serviceable	Not repairable	Replace vane.
Rough or pitted journal surface	16 microinch finish	Not repairable	Replace vane.
Plating chipped	Not serviceable	Not repairable	Replace vane.
Plating missing	Not serviceable	Not repairable	Replace vane.
Plating peeling	Not serviceable	Not repairable	Replace vane.
8. Inner stem end -			
Wear	0.020 inch depth	Not repairable	Replace vane.
9. Fillet radius -			
Cracks	Not serviceable	Not repairable	Replace vane.
10. Timing slot -			
Plating chipped	Not serviceable	Not repairable	Replace vane.
Plating missing	Not serviceable	Not repairable	Replace vane.
Plating peeling	Not serviceable	Not repairable	Replace vane.
11. Timing slot -			
Width	0.278 inch minimum	Not repairable	Replace vane.

WORK PACKAGE**TECHNICAL PROCEDURES****CHAMBER ASSEMBLY, COMBUSTION -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	30	7 - 8	16	14 - 15	30
2 - 3	0	9 - 10	30	16	0
4	18	11	0	17	8
5	30	12 - 13	16	18 Blank	0
6	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of combustion chamber assembly.

2. PRELIMINARY INSTRUCTION.

- a. Clean combustion chamber assembly per WP 201 00.

**3. COMBUSTION CHAMBER ASSEMBLY -
INSPECTION.**

(See Figure 1.)

- a. Visually inspect combustion chamber assembly per figure 1.
- b. Fluorescent penetrant inspect combustion chamber assembly for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Dimensionally inspect combustion chamber assembly per figure 1.

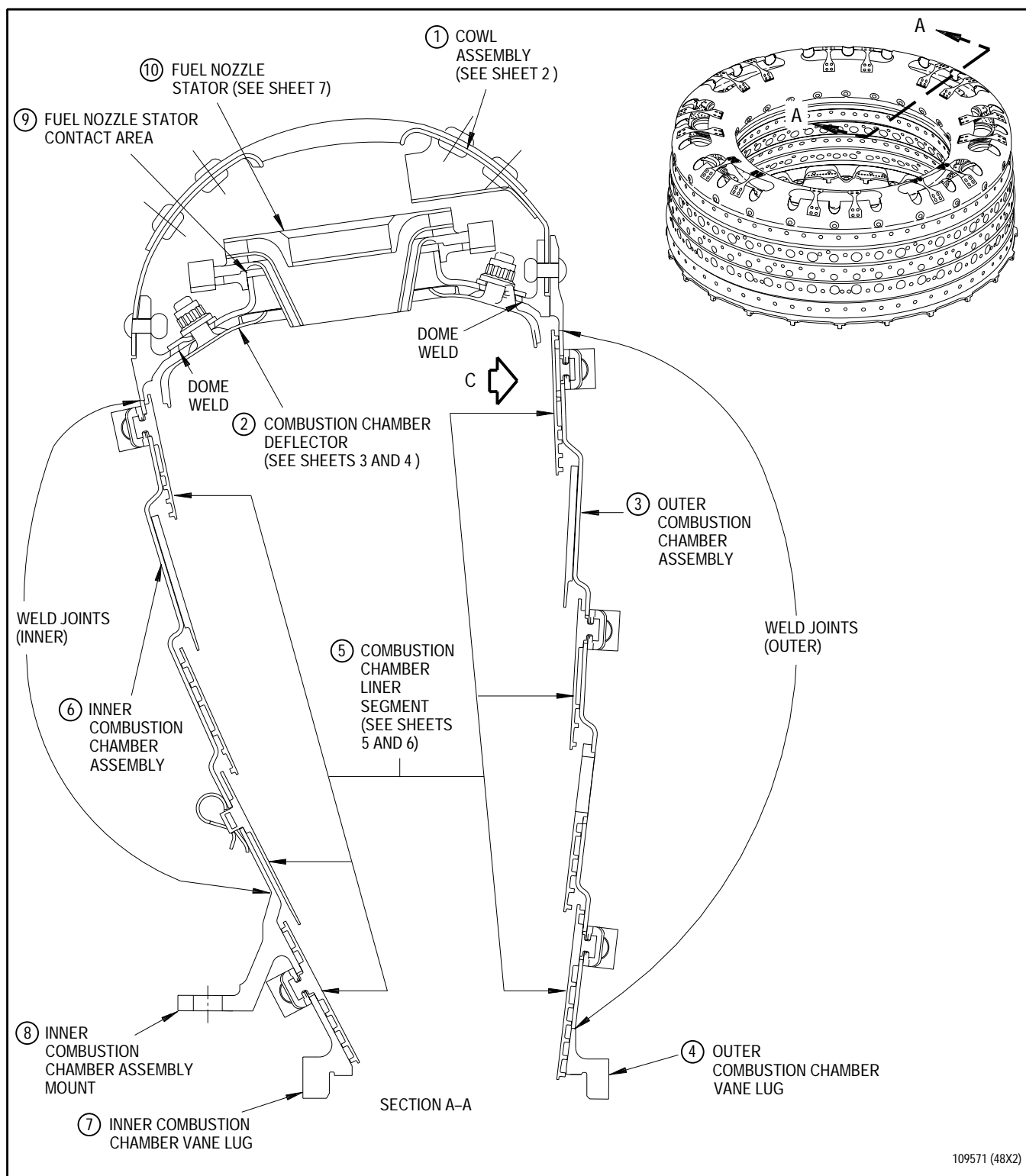


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 1 of 7)

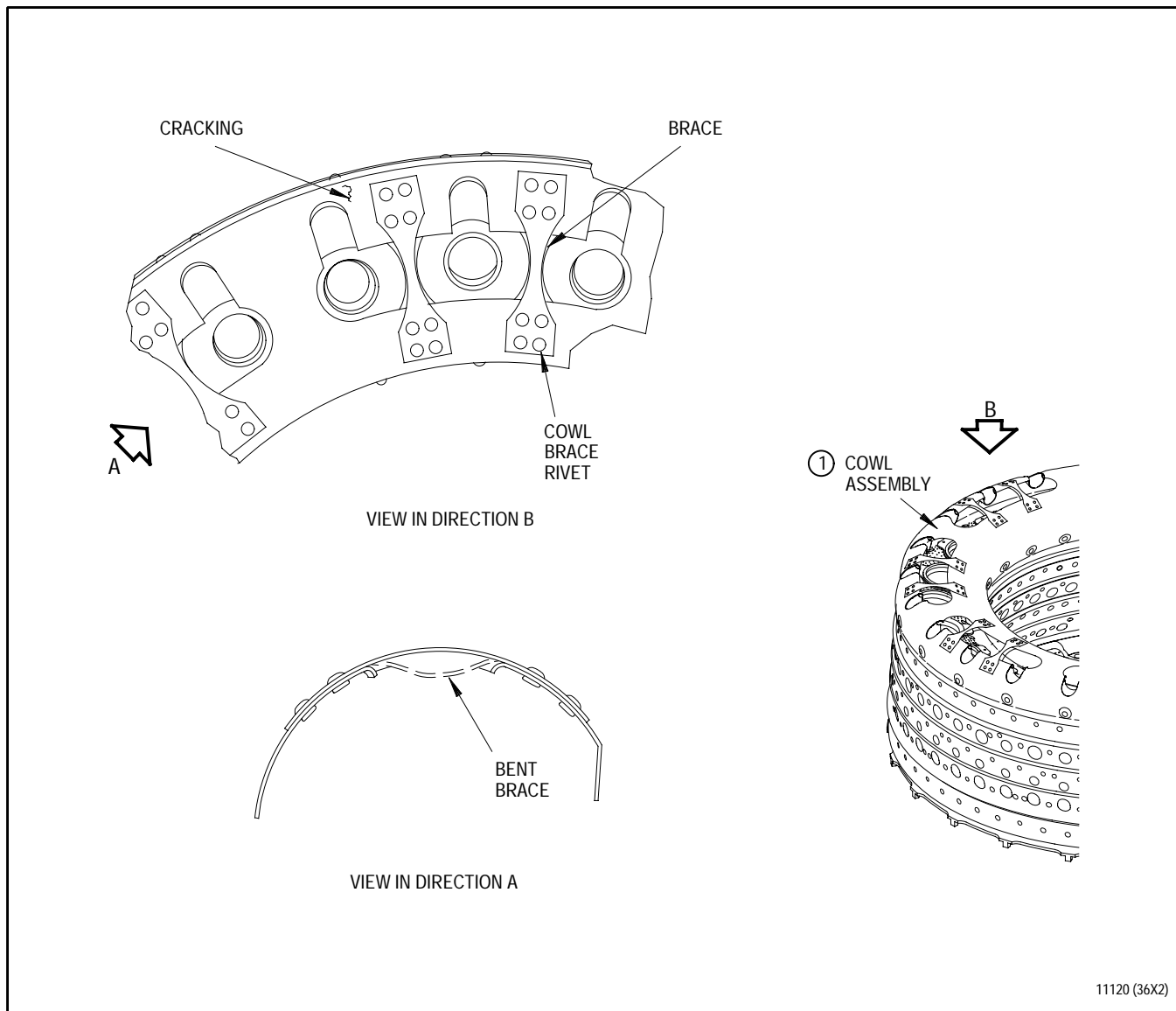
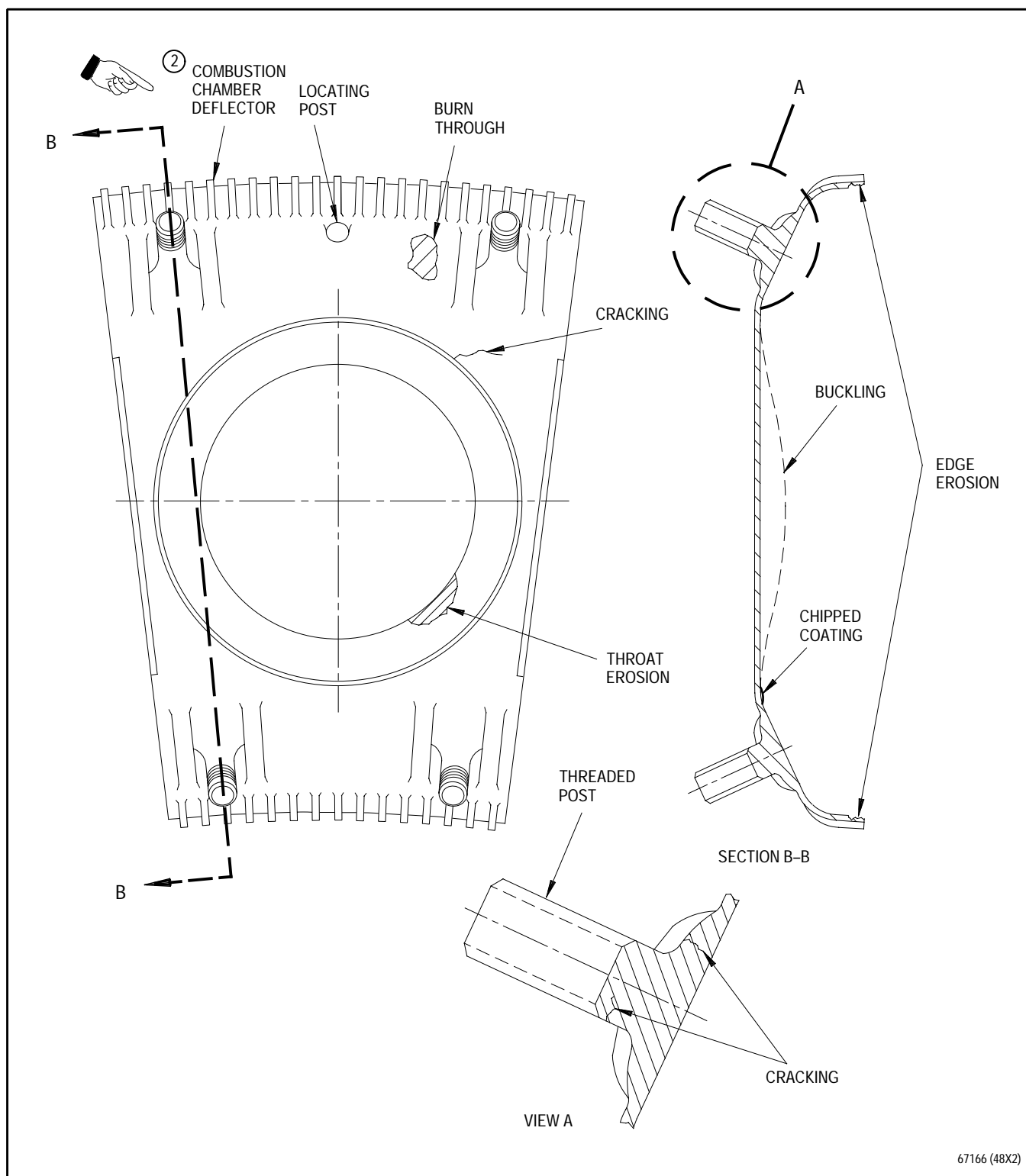


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 2 of 7)



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Figure 1. Combustion Chamber Assembly - Inspection (Sheet 3 of 7)

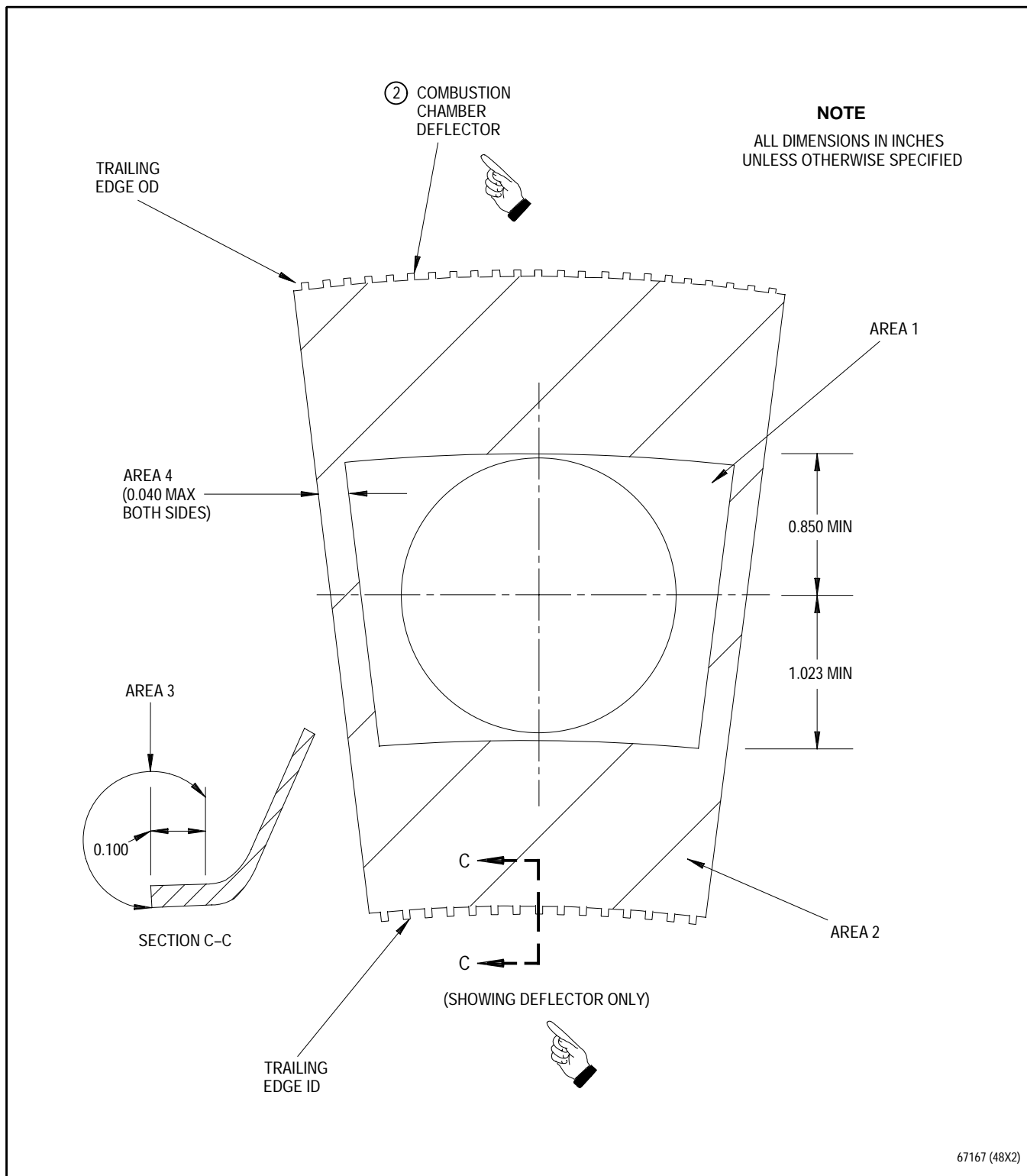


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 4 of 7)

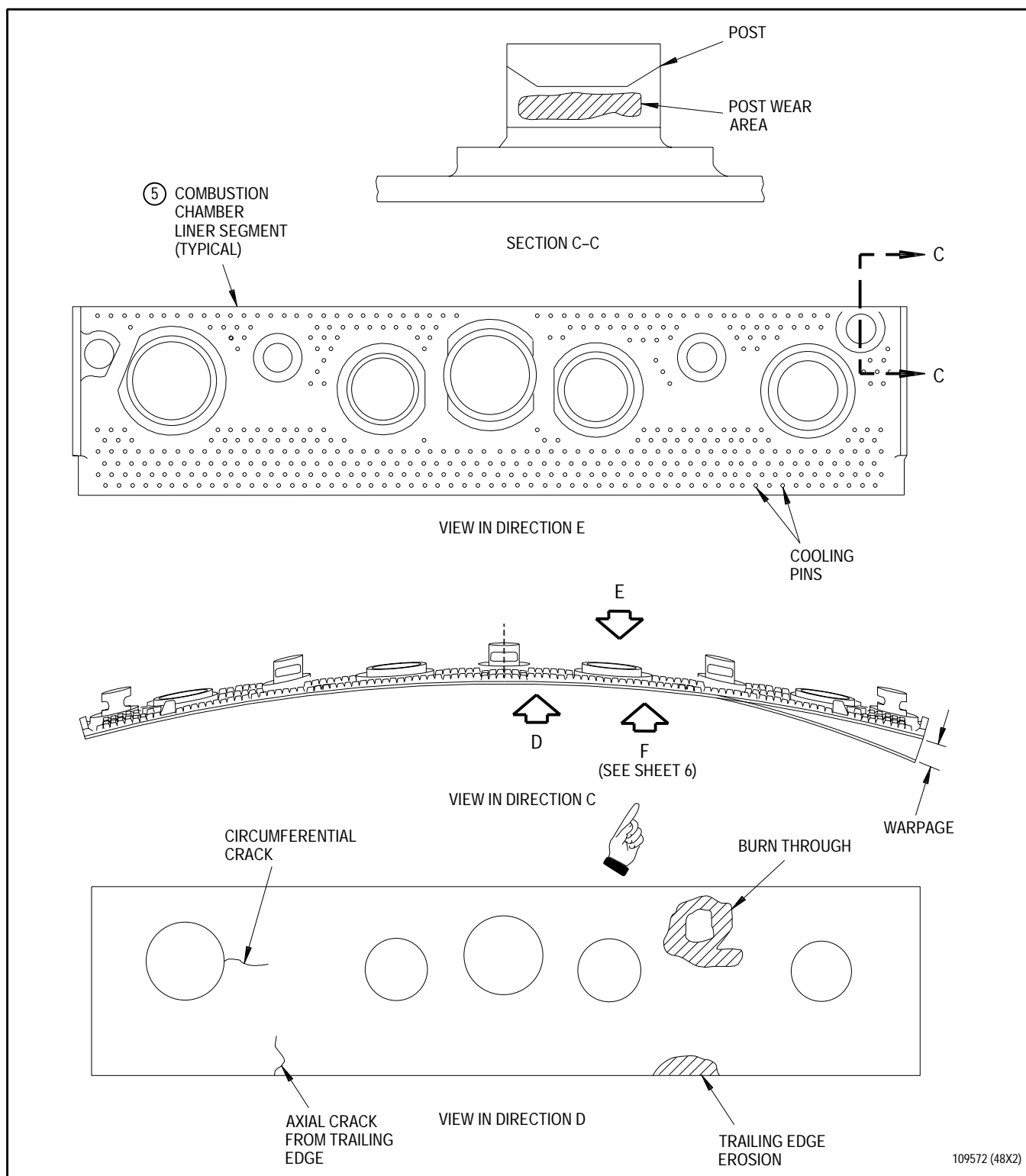


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 5 of 7)

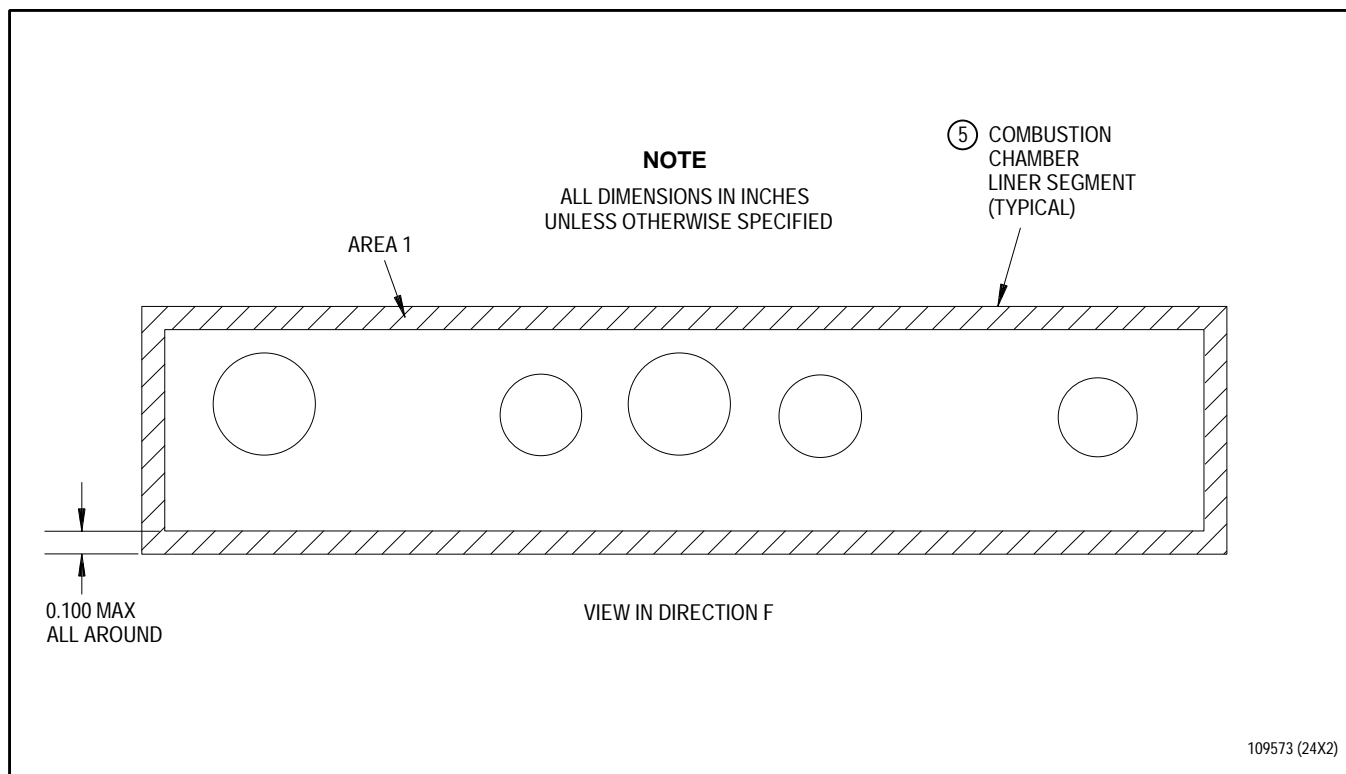


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 6 of 7)

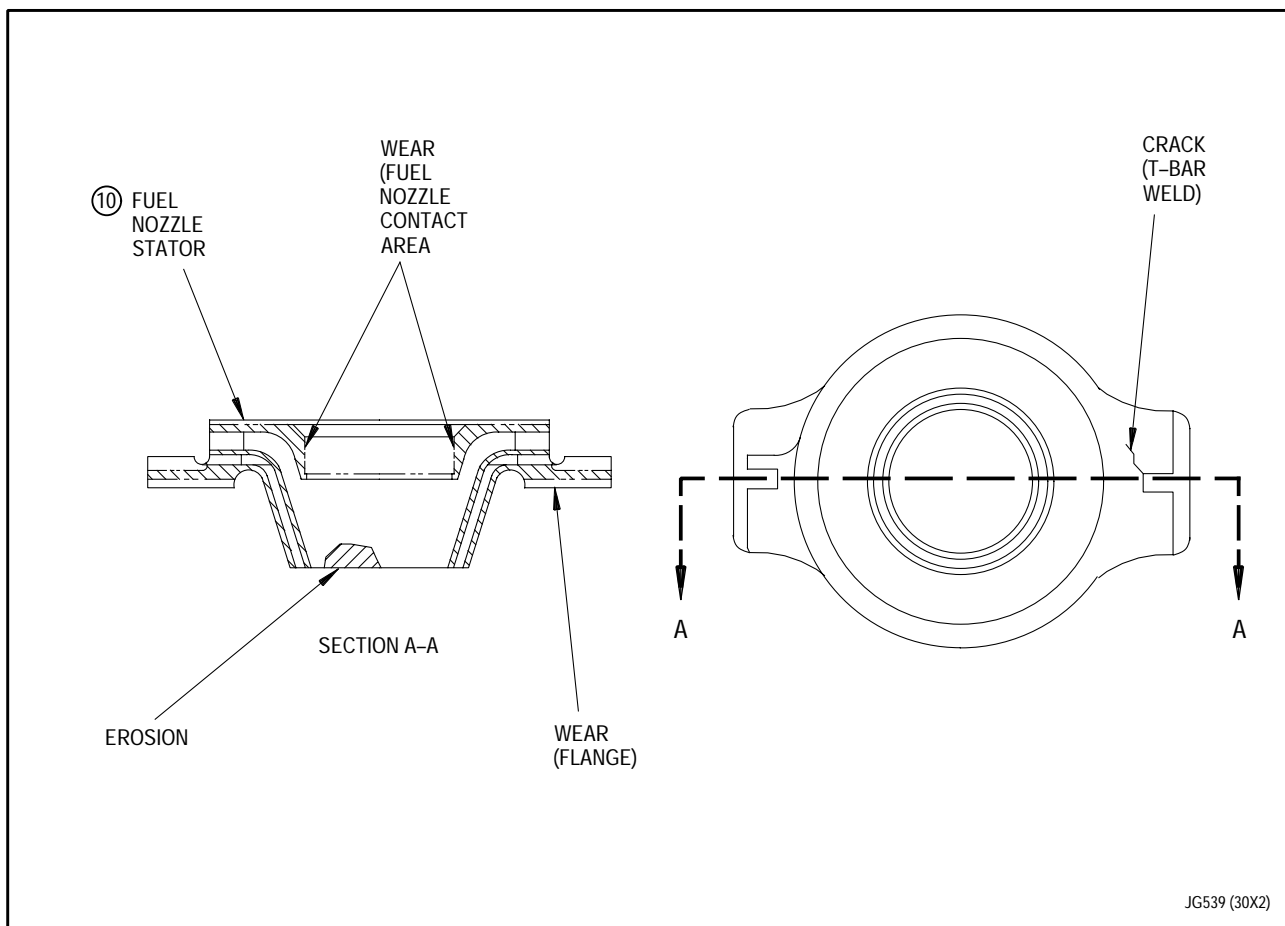


Figure 1. Combustion Chamber Assembly - Inspection (Sheet 7 of 7)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Cowl Assembly -			
Cracking	Not serviceable	See corrective action.	Replace assembly.
Bent brace	0.060 inch	See corrective action.	Replace assembly.
Loose brace rivet	Not serviceable	See corrective action.	Replace assembly.
2. Combustion chamber deflector -			
Cracks -			
Area 1	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 2	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 3	Any amount	None	None
Area 4	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Erosion, missing material -			
Area 1	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 2	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 3	Any amount	None	None
Area 4	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Combustion chamber heatshield (continued) -			
Coating, missing or chipped -			
Area 1	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 2	1.00 square inch	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Area 3	Any amount	None	None
Area 4	Any amount	None	None
Locating post -			
Wear	0.010 inch depth	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Broken/ missing	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Burn through (all over)	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Buckling (all over)	0.020 inch	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Thread damage (threaded post)	None allowed	Up to 4 deflectors, no more than 2 adjacent and no more than 3 in a group of 8.	Replace deflector per WP 458 00.
Nuts, loose or missing	None allowed	One missing or loose per deflector, replace nut. Two or more missing or loose per deflector, replace deflector.	Replace nut or deflector per WP 458 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective action
3. Outer combustion chamber assembly -			
Cracks (except weld joints)	0.125 inch length not to exceed 2 within 4.000 inch diameter.	Not reparable	Replace assembly.
Burn through	Not serviceable	Not reparable	Replace assembly.
Cracks (weld joints)	Not serviceable	Not reparable	Replace assembly.
4. Outer combustion chamber vane lug -			
Wear	0.003 inch depth	Not reparable	Replace assembly.
Bent	0.008 inch	Not reparable	Replace assembly.
5. Combustion chamber liner segment -			
Axial cracks from trailing edge	None allowed	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Circumferential cracks	None allowed	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Trailing edge erosion	Maximum one area per segment not to exceed 0.100 inch axially by 0.500 inch circumferen- tially	Not reparable	Replace liner segment per WP 033 00 and 619 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. Combustion chamber liner segment - (continued)			
Burn through	None allowed	See corrective action.	Replace liner segment per WP 033 00 and 619 00.
Wear (post)	0.002 inch depth	See corrective action.	Replace liner segment per WP 033 00 and 619 00.
Warpage	0.125 inch	See corrective action.	Replace liner segment per WP 033 00 and 619 00.
Twist	0.040 inch	See corrective action.	Replace liner segment per WP 033 00 and 619 00.
Missing cooling pins	Ten total. Not to exceed 3 within 1.000 inch diameter.	See corrective action.	Replace liner segment per WP 033 00 and 619 00.
Coating, missing or chipped in Area 1 (See sheet 6.)	0.100 inch maximum from segment edge, 0.085 square inch combined area	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Edge erosion	0.100 inch in from edges	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Cracks	None allowed	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Burn through	None allowed	Not reparable	Replace liner segment per WP 033 00 and 619 00.
Uncoated liner segment	Not serviceable	Not reparable	Replace liner segment per WP 033 00 and 619 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
6. Inner combustion chamber assembly -			
Cracking (except weld joints)	0.125 inch length. Not to exceed 2 within 4.000 inch diameter.	See corrective action.	Replace assembly.
Burn through	Not serviceable	See corrective action.	Replace assembly.
Cracks (weld joints)	Not serviceable	See corrective action.	Replace assembly.
7. Inner combustion chamber vane lug - (see sheet 5 of 7)			
Bent	0.008 inch	See corrective action.	Replace assembly.
Wear	0.003 inch	See corrective action.	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
8. Inner combustion chamber assembly mount - (See sheet 5 of 7)			
NOTE			
Combustion chamber assembly mount bolt hole allowed to be over maximum limit to 0.300 inch at 3 of 16 locations.			
Bent	0.005 inch	Not reparable	Replace assembly.
Wear	0.002 inch depth	Not reparable	Replace assembly.
9. Fuel nozzle stator contact area - (See sheet 5 of 7)			
Wear	0.004 inch depth	Not reparable	Replace assembly.
Flatness	Within 0.008 inch	Not reparable	Replace assembly.
10. Fuel nozzle stator-			
Erosion	None allowed	Not reparable	Replace assembly.
Wear (fuel nozzle contact area)	0.008 inch	Not reparable	Replace assembly.
Crack (t-bar)	Not serviceable	Not reparable	Replace assembly.
Wear (flange)	0.004 inch depth	Not reparable	Replace assembly.

WORK PACKAGE**TECHNICAL PROCEDURES****SUPPORT ASSEMBLY, FIRST STAGE TURBINE STATOR -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	6	23	11	29
2	0	7	29	12	18
3 - 4	23	8 - 10	0	13 - 14	0
5	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

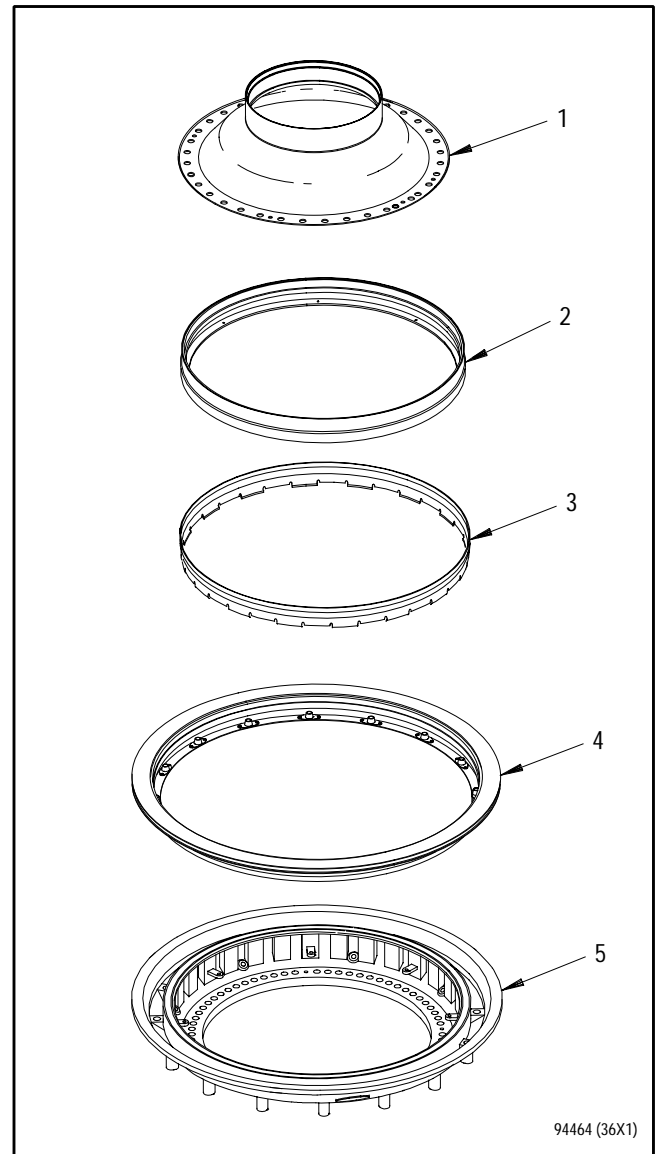
1. INTRODUCTION.

- a. This work package contains instructions for inspection of 1st stage turbine stator support assembly (TOBI duct).

2. FIRST STAGE TURBINE STATOR SUPPORT ASSEMBLY (TOBI DUCT) PARTS - GENERAL.

(See Figures 1 and 2.)

- a. Inspect assembly of 1st stage turbine outer air sealing ring(4, figure 1) and 1st stage turbine stator support(5) prior to disassembly. Maximum gap of 0.002 inch allowed between Surface K of metal seal ring(5, figure 2) and mating surface of 1st stage turbine stator support(5, figure 1). Reject outer air sealing ring if any tab on metal seal ring exceeds 0.002 inch gap limit. Outer air sealing ring is not reparable.



1. 1st stage turbine inner air sealing ring (bore seal)
2. 1st stage turbine air sealing ring
3. 1st stage turbine air sealing ring support
4. 1st stage turbine outer air sealing ring
5. 1st stage turbine stator support

Figure 1. First Stage Turbine Ring and Support Assembly (TOBI Duct) Parts - General

3. FIRST STAGE TURBINE OUTER AIR SEALING RING - INSPECTION.

(See Figure 2.)

- a. Visually inspect 1st stage turbine outer air sealing ring per figure 2. No cracks allowed.
- b. Use handlight or flashlight to visually inspect brazed joints to limits of figure 2. Use strong enough light to clearly view braze joint area.

NOTE

Fluorescent penetrant inspection (FPI) is not required on assemblies which have had honeycomb repairs. An FPI is accomplished following repair procedure.

- c. Fluorescent penetrant inspect air sealing ring assembly. Refer to T.O. 2J-F100-9. No cracks allowed.

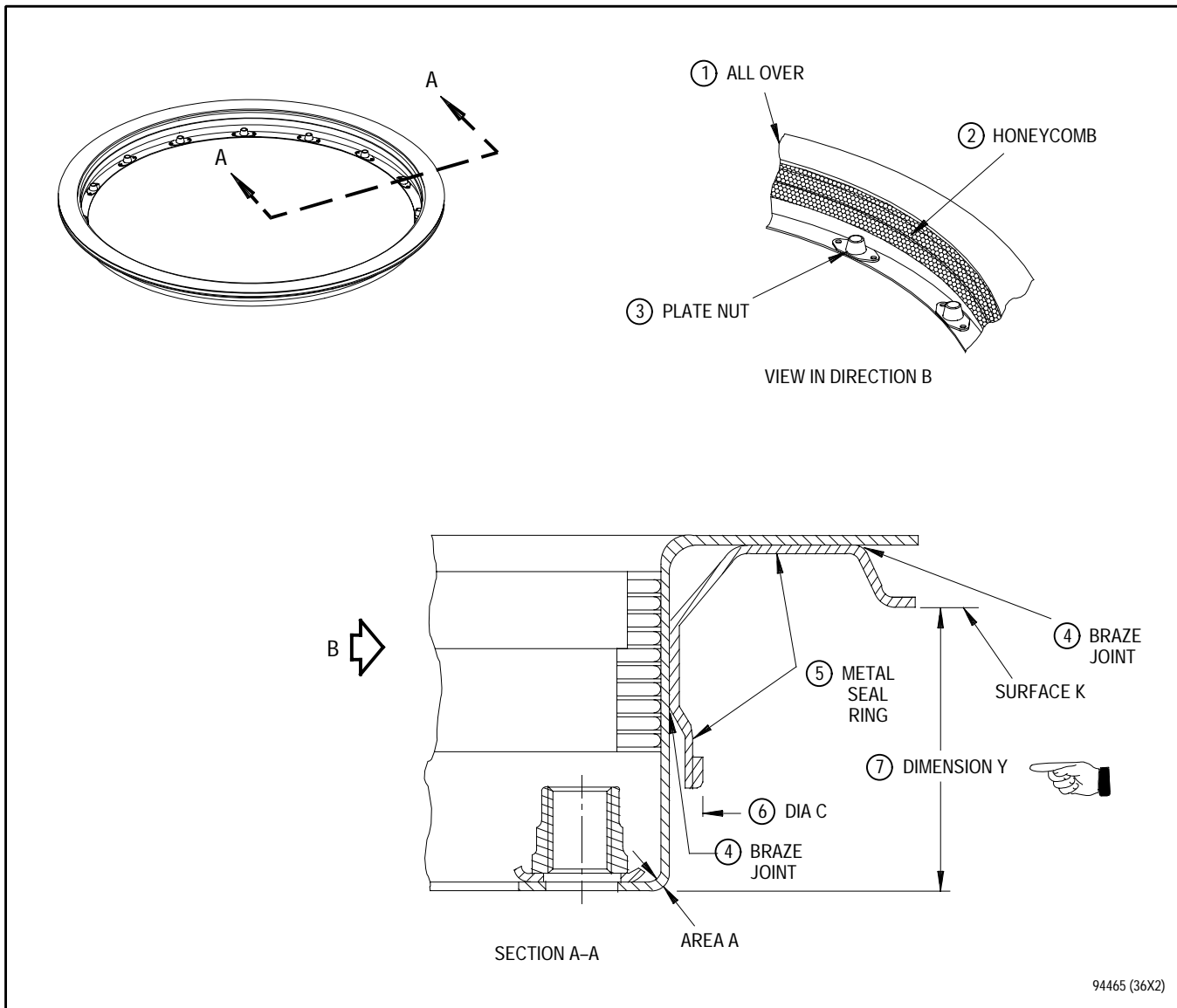


Figure 2. First Stage Turbine Outer Air Sealing Ring - Inspection

Legend for figure 2

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Up to 0.500 inch in length and 0.020 inch in width. Honeycomb braze area and Area A not reparable.	Stop drill ends of crack using 0.062 inch drill. (Cobalt drill recommended.)
Separation of details	Not serviceable	Not reparable	Replace ring assembly.
2. Honeycomb -			
Damaged or missing cells	0.375 inch maximum width and 0.750 inch maximum circumferential length. Not more than 2% of total honeycomb area may be affected.	Not reparable	Replace ring assembly.
Wear, grooving	Up to 0.008 inch depth for full circumference	Not reparable	Replace ring assembly.
3. Plate nut -			
Damaged or threads stripped	Not serviceable	Reparable	Replace nut assembly per WP 459 00.
4. Braze joints -			
Missingbraze	a. Shall show complete line or ring of brazing alloy between joined detail parts at braze fillets. b. Shall have 100% bonding around joint with no through voids.	Not reparable	Replace ring.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. Metal seal ring -			
Nicks and scratches	0.015 inch maximum depth	Not reparable	Replace ring.
Dents and local distortions	0.020 inch maximum depth on surface K	Not reparable	Replace ring.
	0.040 inch maximum depth not on surface K	Not reparable	Replace ring.
6. Dia C -			
Wear	18.102 inches diameter	Not reparable	Replace ring.
7. Dimension Y	1.065 inches	Not reparable	Replace ring.

4. FIRST STAGE TURBINE AIR SEALING RING - INSPECTION.

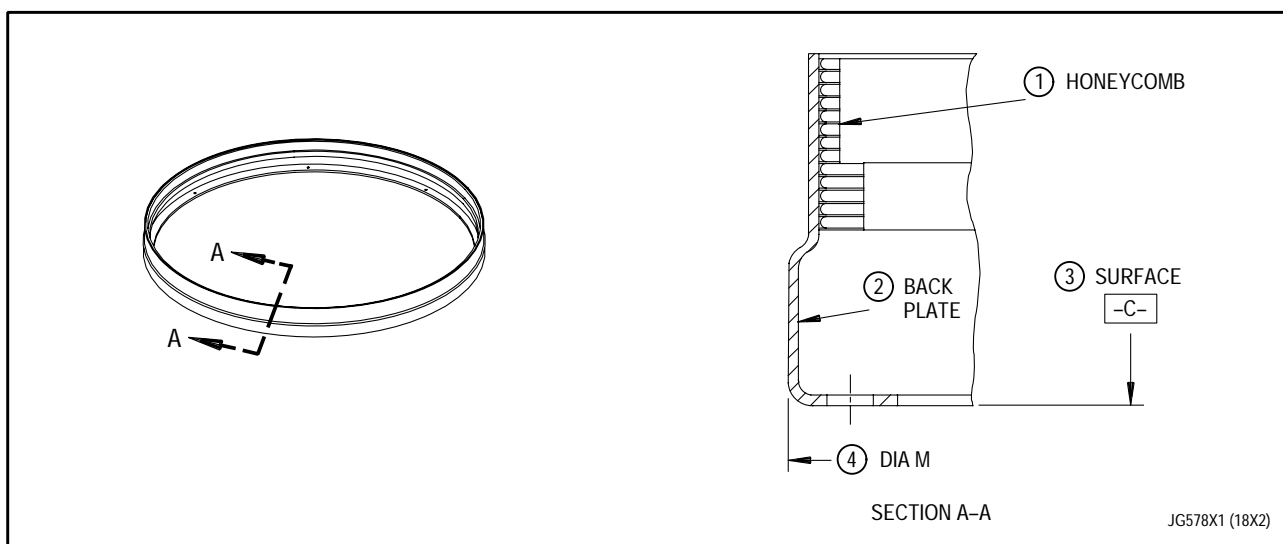
(See Figure 3.)

- a. Visually inspect 1st stage turbine air sealing ring per figure 3. No cracks allowed.

NOTE

Fluorescent penetrant inspection (FPI) is not required on assemblies which have had honeycomb repairs. An FPI is accomplished following repair procedure.

- b. Fluorescent penetrant inspect air sealing ring assembly. Refer to T.O. 2J-F100-9. No cracks allowed.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Honeycomb -			
Grooving, wear	0.008 inch maximum depth for full circumference.	Any amount provided damage does not extend into back plate.	Replace honeycomb per WP 459 00.
Damage, missing cells	0.375 inch maximum width and 0.750 inch in circumferential length. Not more than one square inch of honeycomb area may be affected.	Any amount provided damage does not extend into back plate.	Replace honeycomb per WP 459 00.

Figure 3. First Stage Turbine Air Sealing Ring - Inspection

Legend for figure 3

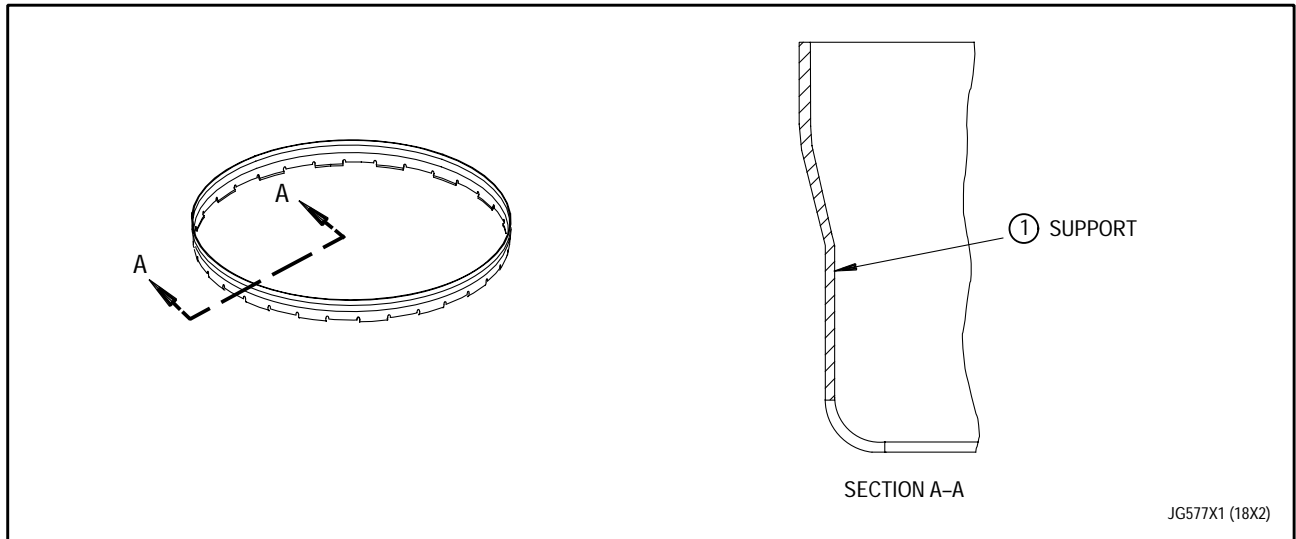
Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Back plate -			
Local distortions and dents	Up to 0.040 inch in depth	See corrective action.	Replace ring assembly.
Cracks	No cracks allowed.	See corrective action.	Replace ring assembly.
Nicks and scratches	Up to 0.015 inch in depth	See corrective action	Replace ring assembly.
3. Surface C -			
Local distortions, bends	0.040 inch displacement from surface C	See corrective action.	Replace ring assembly.
Cracks	No cracks allowed.	See corrective action.	Replace ring assembly.
4. Dia M -			
Wear	15.357 inch diameter	See corrective action.	Replace ring assembly.

5. FIRST STAGE TURBINE AIR SEALING RING SUPPORT - INSPECTION.

(See Figure 4.)

- a. Visually inspect first stage turbine air sealing ring support. (See figure 4.)

- b. Fluorescent penetrant inspect air sealing ring support. Refer to T.O. 2J-F100-9. No cracks allowed.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Support -			
Local distortions and dents	0.040 inch maximum depth	See corrective action.	Replace support.
Cracks	No cracks allowed	See corrective action.	Replace support.
Nicks and scratches	0.015 inch maximum depth	See corrective action.	Replace support.

Figure 4. First Stage Turbine Air Sealing Ring Support - Inspection

6. FIRST STAGE TURBINE INNER AIR SEALING RING - INSPECTION.

(See Figure 5.)

- a. Visually inspect first stage turbine inner air sealing ring.
(See figure 5.)

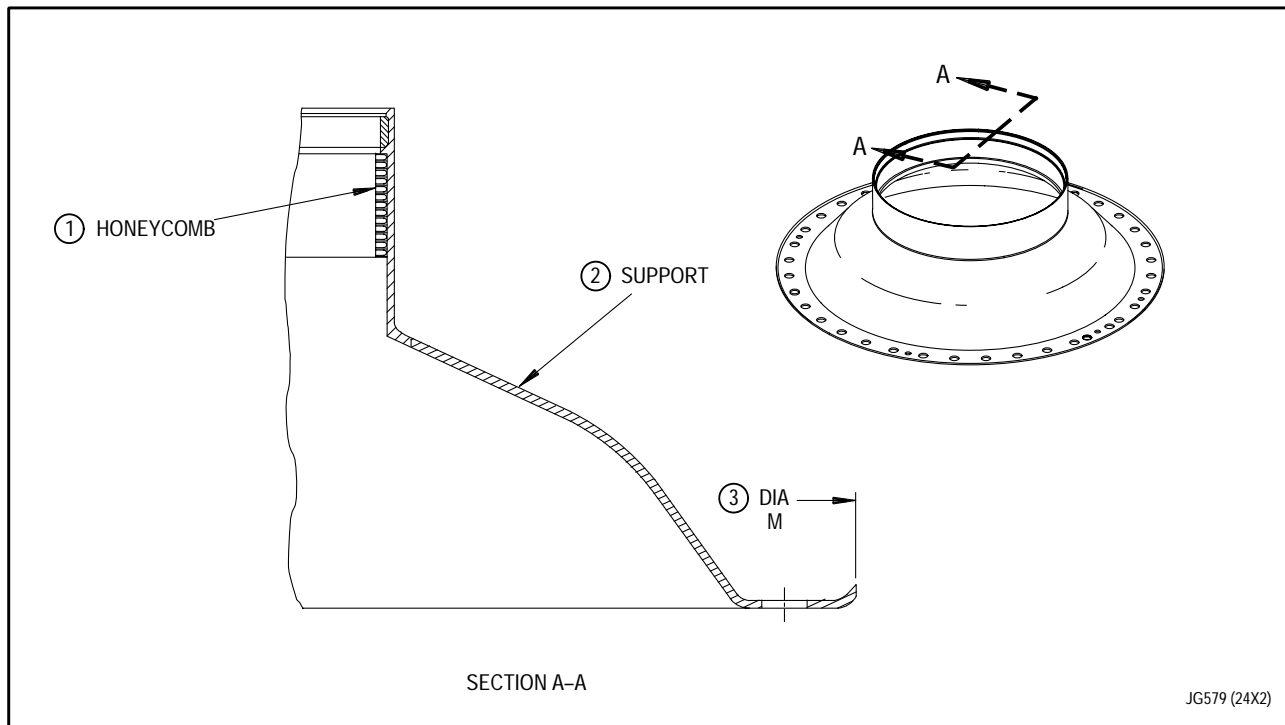


Figure 5. First Stage Turbine Inner Air Sealing Ring - Inspection

Legend for figure 5

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Honeycomb -			
Damage, missing cells	0.375 inch maximum width and 0.750 inch in circumferential length. Not more than 2% of total honeycomb area may be affected.	Any amount provided damage does not extend into support.	Replace honeycomb per WP 459 00.
Grooving, wear	0.008 inch maximum depth for full circumference.	Any amount provided damage does not extend into support.	Replace honeycomb per WP 459 00.
2. Support -			
Nicks and dents	0.040 inch maximum depth any location	Not reparable	Replace ring assembly.
Cracks	Not serviceable	Not reparable	Replace ring assembly.
3. Diameter M -	14.311 inch diameter	Not reparable	Replace ring assembly.

7. FIRST STAGE TURBINE STATOR SUPPORT - INSPECTION.

(See Figure 6.)

- a. Ensure first stage turbine stator support has been cleaned per WP 201 00.
- b. Visually inspect stator support per figure 6.

- c. Fluorescent penetrant inspect stator support for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

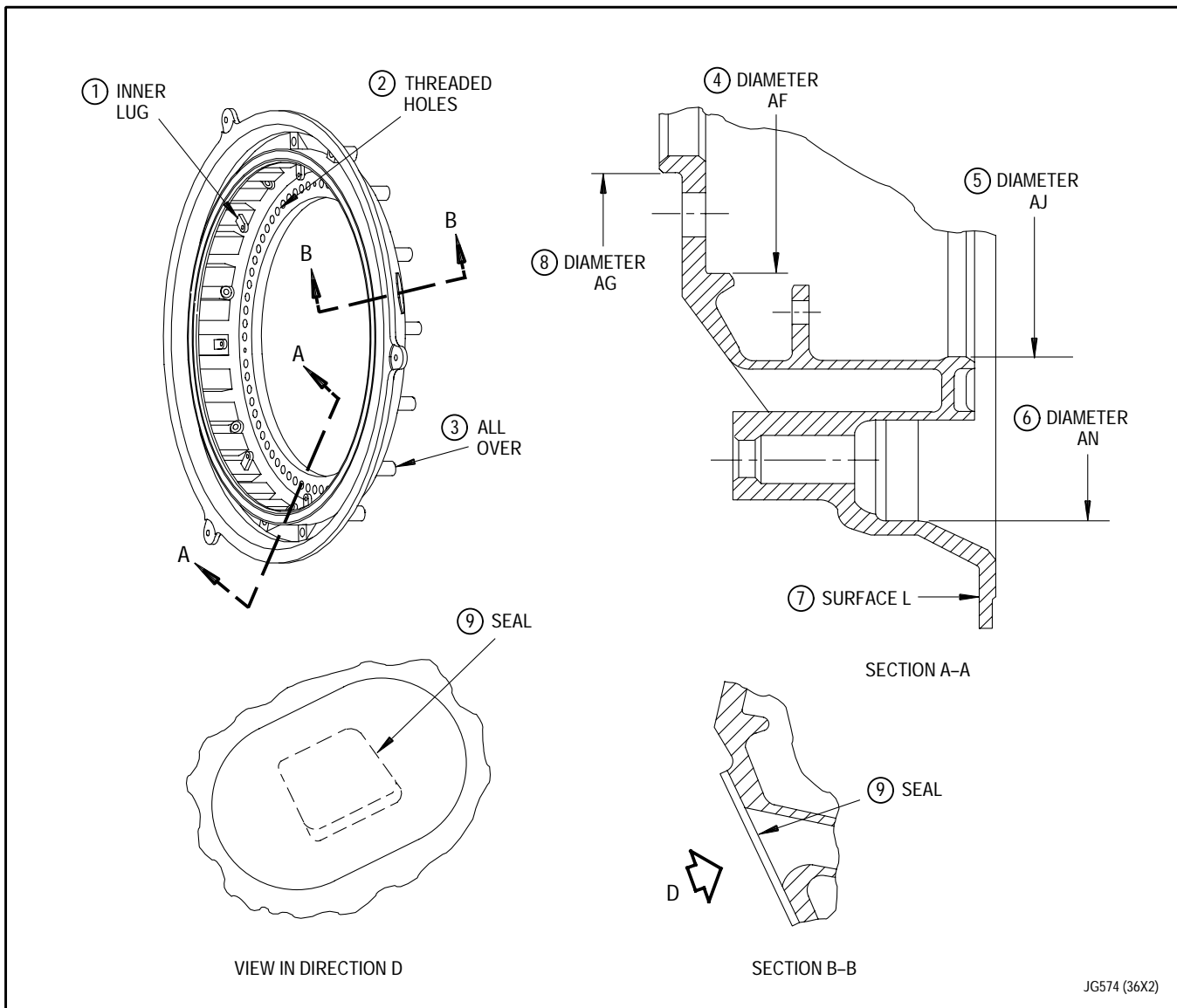


Figure 6. First Stage Turbine Stator Support - Inspection

Legend for figure 6

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Inner lugs -			
Nicks and dents	0.005 inch depth	Reparable	Remove raised metal and pick up using fine stone. Refer to T.O. 2-1-111.
Cracks	Not serviceable	Not reparable	Replace support assembly.
Missing lugs	One may be missing	Not reparable	Replace support assembly.
2. Threaded holes -			
Stripped threads	Not serviceable	Not reparable	Replace support assembly.
3. All over (except lugs) -			
Dents,nicks, andscratches	0.010 inch depth	0.031 inch depth	Remove raised metal and pick up using fine stone. Refer to T.O. 2-1-111.
Chipping	0.015 inch depth	Reparable	Remove raised metal and pick up using fine stone. Refer to T.O. 2-1-111.
Cracks	Not serviceable	Not reparable	Replace support assembly.

Legend for figure 6 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
4. Diameter AF - Wear or chipped coating	Per WP 801 00, Reference 3281	See corrective action.	Replace support assembly.
5. Diameter AJ - Wear or chipped coating	Per WP 801 00, Reference 3241	See corrective action.	Replace support assembly.
6. Diameter AN - Wear or chipped coating	Per WP 801 00, Reference 3240	See corrective action.	Replace support assembly.
7. Surface L - Wear	0.010 inch depth	See corrective action.	Replace support assembly.
8. Diameter AG - Wear or chipped coating	Per WP 801 00, Reference 3232	See corrective action.	Replace support assembly.
9. Seal or seal rivets - Loose or missing	80% contact with Surface J and 0.003 inch maximum gap.	See corrective action.	Replace support assembly.

WORK PACKAGE

TECHNICAL PROCEDURES

VANE ASSEMBLIES, TURBINE STATOR, FIRST STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	4	18	5 - 10	0
2 - 3	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 1st stage turbine stator vane assemblies.

**2. FIRST STAGE TURBINE STATOR VANE
ASSEMBLIES - INSPECTION.**

(See Figures 1.)

- a. Ensure 1st stage turbine stator vane assemblies have been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect vane assemblies for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect vane assemblies per figure 1.
- d. Hold all serviceable and reparable vane assemblies for future coating repair.

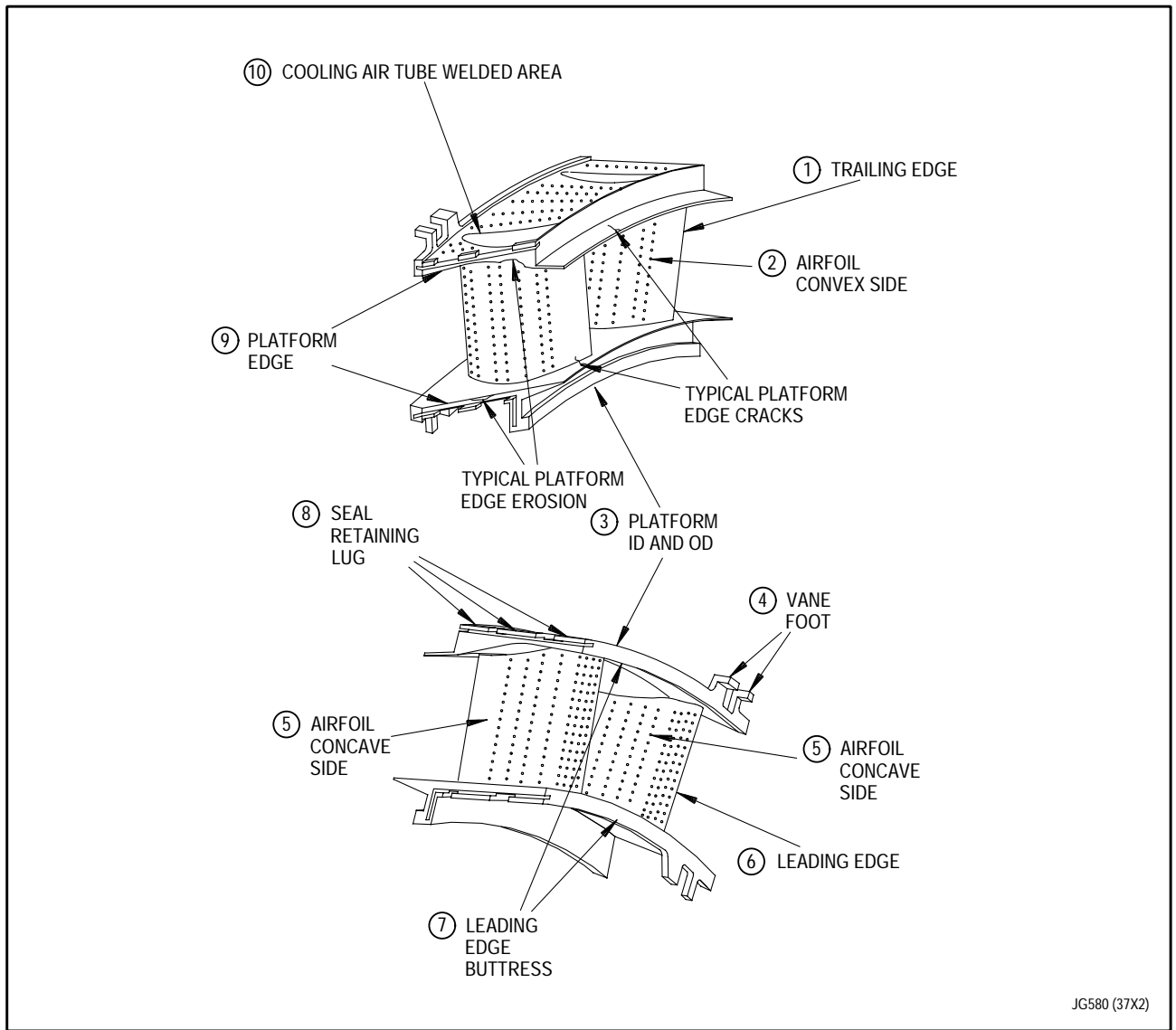


Figure 1. First Stage Turbine Stator Vane Assemblies - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
1. Trailing edge - Nicks and dents	a. Any amount less than 0.015 inch depth and 0.015 inch diameter b. One location of 0.020 inch depth, 0.125 inch diameter c. Five locations of 0.015 inch depth, 0.100 inch diameter separated by 3/8 inch minimum d. No cracks extending from nicks or dents are permitted.	See corrective action.	Replace vane assembly.
2. Airfoils convex side - Cracks	Not serviceable except for: a. Cracks that are within limits of platform edge cracks b. Cracks that are not greater than 0.010 inch wide and are not within 0.250 inch of trailing edge	See corrective action.	Replace vane assembly.
Erosion	Not serviceable	See corrective action.	Replace vane assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
2. Airfoils convex side - (continued)			
Nicks, and dents	a. Any amount of condition less than 0.015 inch depth and 0.015 inch diameter b. 0.010 inch depth, 0.125 inch diameter, one condition per airfoil c. 0.015 inch depth, 0.100 inch diameter, five locations per airfoil separated by 3/8 inch minimum d. No cracks extending from nicks or dents are permitted.	See corrective action.	Replace vane assembly.
Foreign material splatter	Not serviceable	See corrective action.	Replace vane assembly.
3. Platform ID and OD -			
Cracks	0.500 inch length, 0.030 inch width. Any number provided they will not result in loss of piece of material.	See corrective action.	Replace vane assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
4. Vane foot -			
Wear, cracks or missing	0.002 inch maximum depth on both ID surfaces. Each surface shall be uniform within 0.002 inch. No cracks or missing vane feet permitted.	See corrective action.	Replace vane assembly.
5. Airfoil concave side -			
Cracks	Per airfoil: a. Two cracks, 0.050 inch width, up to 1.000 inch length b. Two cracks, 0.030 inch width, up to 0.500 inch long c. Any amount of 0.020 inch wide cracks any length d. Cracks within 0.250 inch of the trailing edge 0.020 inch maximum width.	See corrective action.	Replace vane assembly.
Erosion	0.010 inch depth	See corrective action.	Replace vane assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action.
5. Airfoils concave side - (continued)			
Nicks, and dents	a. Any amount of condition less than 0.015 inch depth and 0.015 inch diameter. b. 0.010 inch depth, 0.125 inch diameter, one condition per airfoil. c. 0.015 inch depth, 0.100 inch diameter, five locations per airfoil separated by 3/8 inch minimum. d. No cracks extending from nicks or dents are permitted.	See corrective action.	Replace vane assembly.
Foreign material splatter	Not serviceable	See corrective action.	Replace vane assembly.
6. Leading edge - Erosion	0.010 inch depth	See corrective action.	Replace vane assembly.
Nicks and dents	a. Any amount of condition less than 0.015 inch depth and 0.015 inch diameter. b. Two locations of 0.015 inch depth, 0.100 inch diameter. c. No cracks extending from nicks or dents are permitted.	See corrective action.	Replace vane assembly.
Foreign material splatter	Not serviceable	See corrective action.	Replace vane assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
7. Leading edge buttress - Wear from seal contact ID and OD	a. Up to 0.005 inch depth, any length b. No wear allowed across full width of buttress face.	See corrective action.	Replace vane assembly.
8. Seal retaining lug - Missing	Not serviceable	See corrective action.	Replace vane assembly.
Wear	0.005 inch maximum depth.	See corrective action.	Replace vane assembly.
Cracks	(See platform, cracks.)	See corrective action.	Replace vane assembly.
9. Platform edge - Erosion with or without cracks	a. Half of local thickness. b. If erosion is less than 0.015 inch deep, cracks may extend completely through platform edge provided they are not greater than 0.015 inch wide.	See corrective action.	Replace vane assembly.
Cracks	Any number provided none are greater than 0.015 inch wide or extend more than 0.150 into airfoil radius or buttress.	See corrective action.	Replace vane assembly.
10. Cooling air tube welded area - Cracks	Any number of cracks. Any length provided no cracks extend greater than 0.050 inch into vane casting parent material.	See corrective action.	Replace vane assembly.

WORK PACKAGE**TECHNICAL PROCEDURES****DISK-DRUM ROTOR ASSEMBLY, REAR COMPRESSOR
(SEVENTH THROUGH THIRTEENTH STAGE) -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	6A - 6B	22	12	29
2	0	7 - 10	29	12A - 12B	22
3	20	11	22	13	29
4 - 6	29			14 Blank	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Disk - Drum Rotor, Rear Compressor, Rear Assy (Seventh Through Thirteenth Stages) - Repair - - - - -	WP 461 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

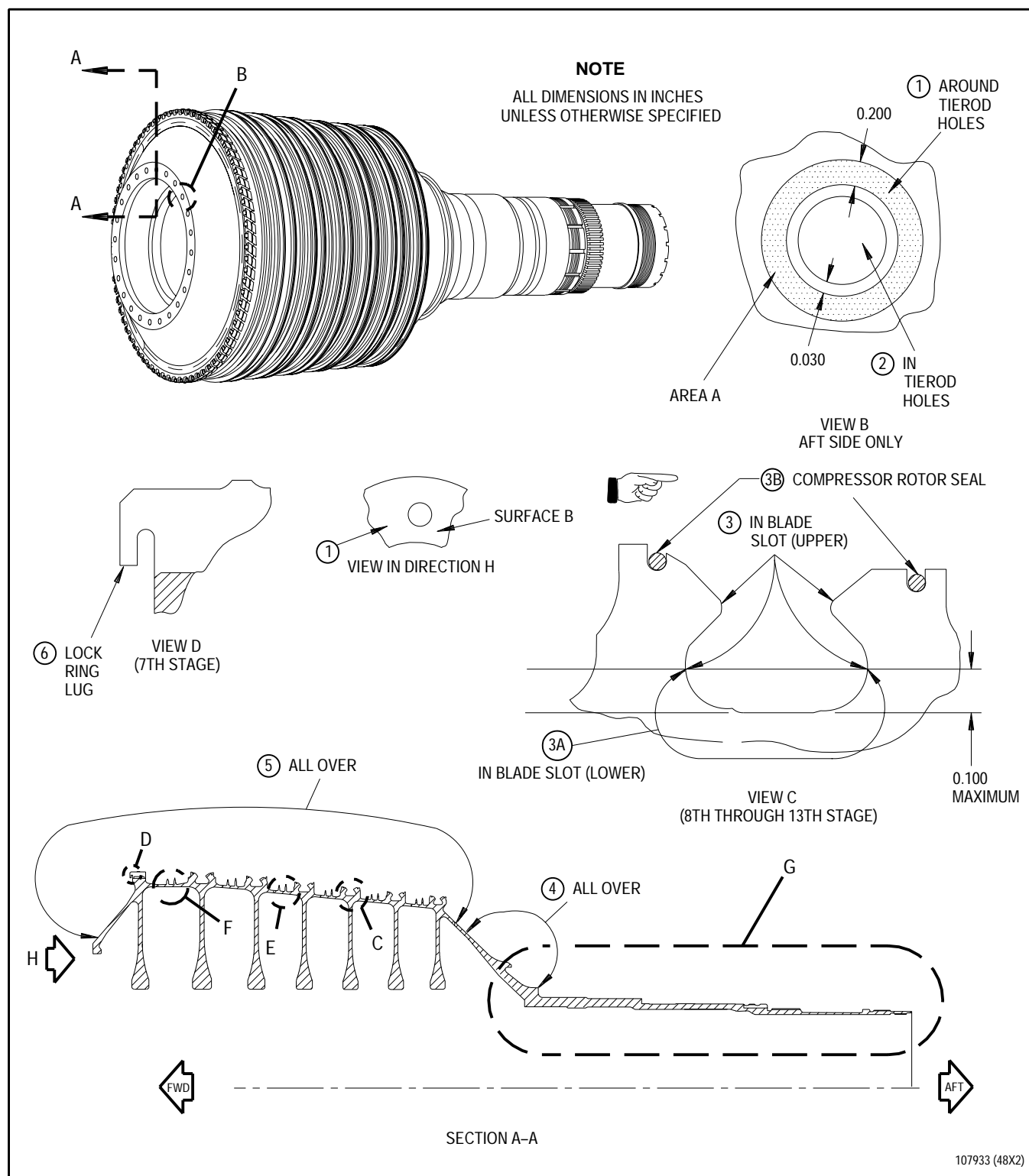
- a. This work package contains instructions for inspection of 7th through 13th stage rear compressor disk-drum rotor assembly.
- b. If disk-drum rotor assembly is installed in transportation stand, remove from stand per WP 622 00 if necessary for inspection. Install rotor assembly in transportation stand per WP 035 00 after inspection.

**2. SEVENTH THROUGH THIRTEENTH STAGE
REAR COMPRESSOR DISK - DRUM ROTOR
ASSEMBLY - INSPECTION.**

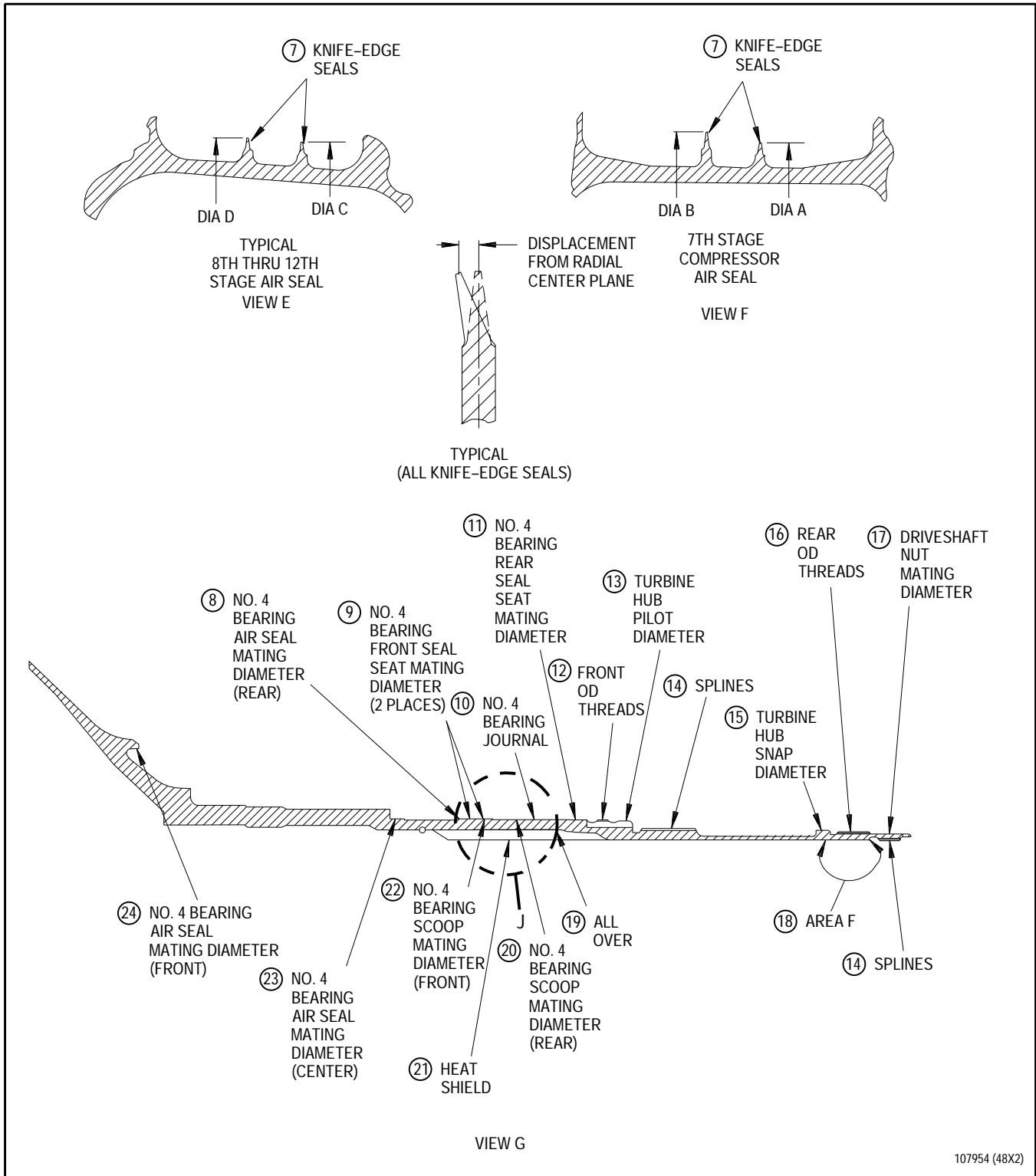
(See Figures 1, 1A, and 3.)

- a. Ensure 7th through 13th stage rear compressor disk-drum rotor assembly has been cleaned per WP 201 00.
- b. Visually inspect disk-drum rotor assembly per figure 1.
- c. Dimensionally inspect disk-drum rotor assembly per figure 1.
- d. Fluorescent penetrant inspect disk-drum rotor assembly for cracks on a system with capability defined in figure 1A. Refer to T.O. 2J-F100-9. No cracks allowed. All crack indications observed are cause for rejection and require Material Review Board (MRB) evaluation.

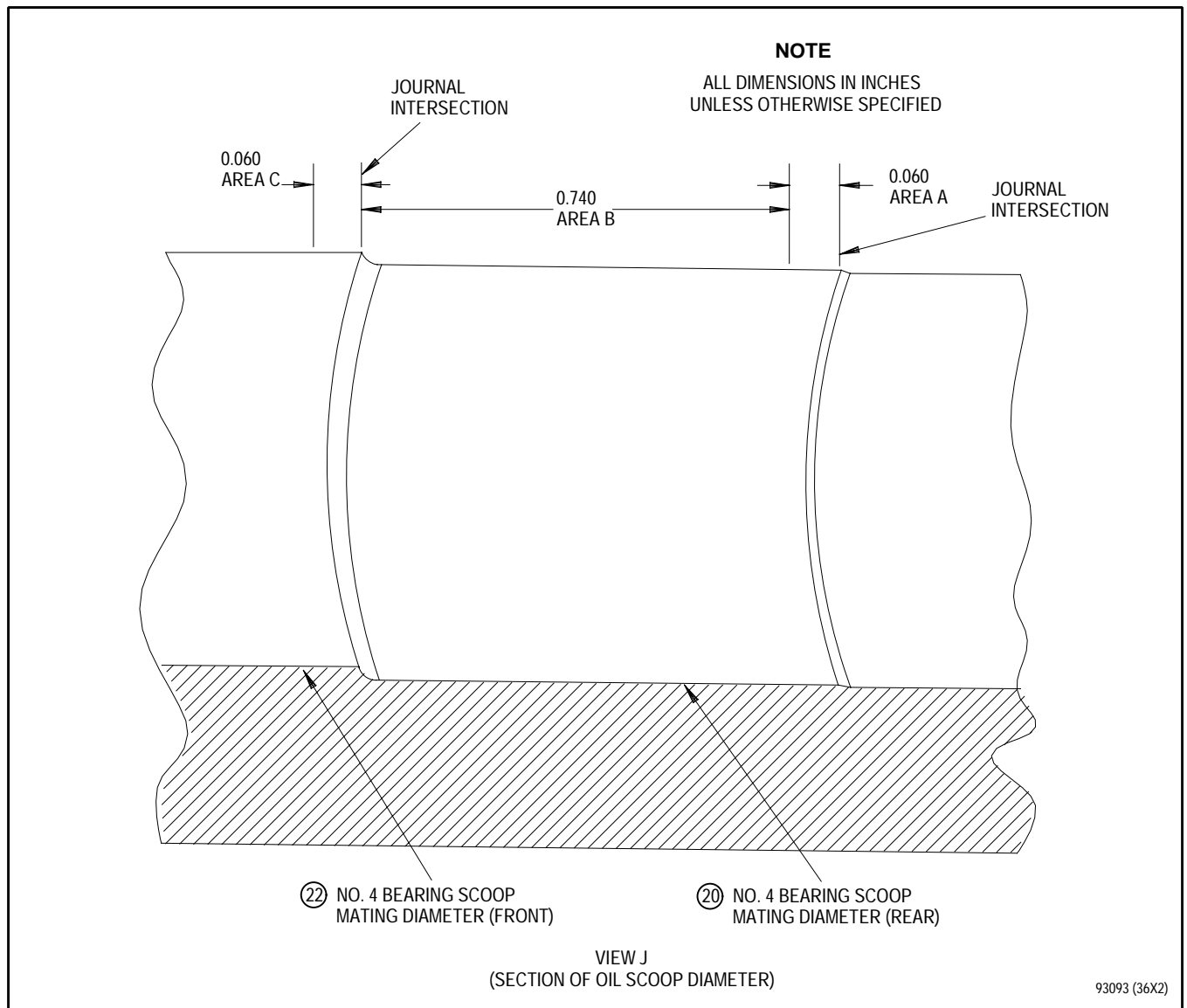
3. Deleted.



**Figure 1. Seventh Through Thirteenth Stage Rear Compressor
Disk-Drum Rotor Assembly - Inspection (Sheet 1 of 3)**



**Figure 1. Seventh Through Thirteenth Stage Rear Compressor
Disk-Drum Rotor Assembly - Inspection (Sheet 2 of 3)**



**Figure 1. Seventh Through Thirteenth Stage Rear Compressor,
Disk - Drum Rotor Assembly - Inspection (Sheet 3 of 3)**

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Around tierod holes -			
Aft side, View B, pits, nicks, dents (Area A)	Minor machining imperfections from original manufacturer. Refer to T.O. 2-1-111, PWA 362. 0.002 inch maximum depth circumferential scratches in Area A only.	0.003 inch depth	Blend repair per WP 461 00.
Aft side, View B, scratches, (Area A)	Not serviceable	0.0005 inch depth	Blend repair per WP 461 00.
Forward side, View H, pits, nicks, dents (Surface B)	Minor machining imperfections from original manufacturer. Refer to T.O. 2-1-111, PWA 362. 0.010 inch maximum depth circumferential scratches in Surface B only.	0.010 inch depth	Blend repair per WP 461 00.
2. In tierod holes -			
Pits, nicks, dents, scratches	Minor machining imperfections from original manufacturer. Refer to T.O. 2-1-111, PWA 362.	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. In blade slots (upper) -			
Pits, nicks, scratches, and dents	0.0005 inch depth	Not reparable	Replace assembly.
3A. In blade slots (lower) loading and locking slot corners -			
Pits, nicks, scratches, and dents	0.0005 inch depth	0.010 inch depth after blending	Blend repair per WP 461 00.
3B. Compressor rotor seal (8th through 13th stage) -			
Wear	Not serviceable	Not reparable	Replace seal.
4. All over -			
Nicks, dents, and pits	0.003 inch depth, 0.005 inch width, and 0.500 inch length with minimum separation of two inches	0.003 inch depth after blending	Blend repair per WP 461 00.
Scratches	0.500 inch length by 0.005 inch width by 0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 461 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. All over (except in and around tierod holes and in blade slots and knife-edge seals) -			
Pits, nicks, and dents	0.001 inch depth	0.003 inch depth after blending	Blend repair per WP 461 00.
Scratches	1.000 inch length by 0.003 inch width by 0.0005 inch depth	0.003 inch depth after blending	Blend repair per WP 461 00.
6. Lock ring lugs -			
Cracked, bent, or damaged	Not serviceable	Not reparable	Replace assembly.
Dents, or scratches	0.001 inch depth	0.003 inch depth after blending resulting in wall thickness of 0.055 inch minimum.	Blend repair per WP 461 00.
7. Knife-edge seals -			
Small upsets and bends	Acceptable up to 0.050 inch displacement from radial center plane. 0.500 inch in length per knife-edge.	Reparable if final blend meets blend limits per WP 461 00.	Blend repair per WP 461 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
7. Knife-edge seals (continued)-			
NOTE			
Imbedded honeycomb material appears as smooth, shiny, often raised surface in discrete and/or continuous length. Material is usually confined to knife-edge tip and adjacent corners, and is not separated from adjacent coating by defined lines of demarcation. See figure 3.			
Imbedded honeycomb material	Any amount	None	None
Chipped or missing coating	Visible as lost top coating separated from bond coat layer by defined lines of demarcation. See figure 3. a. Eight places per knife-edge up to 0.500 inch long separated by two times length of longer chipped area b. Any amount per knife-edge up to 0.100 inch long each separated by two times length of longer chipped area	Any amount	Strip and recoat per WP 461 00.
Nicks and dents	0.500 inch length by 0.005 inch width by 0.003 inch depth	Reparable if final blend meets blend limits per WP 461 00.	Blend repair per WP 461 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
7. Knife-edge seals (continued)-			
Cracks	Not serviceable	Not reparable	Replace assembly.
Wear	Average minimum serviceable diameters:	Average minimum reparable diameters:	Strip and recoat per WP 461 00.
	<u>Stage</u> <u>Diameter</u>	<u>Stage</u> <u>Diameter</u>	
	7th	7th	
	Dia A 18.147 inches	Dia A 18.131 inches	
	Dia B 18.280 inches	Dia B 18.264 inches	
	8th	8th	
	Dia C 17.926 inches	Dia C 17.910 inches	
	Dia D 18.019 inches	Dia D 18.003 inches	
	9th	9th	
	Dia C 17.449 inches	Dia C 17.433 inches	
	Dia D 17.568 inches	Dia D 17.552 inches	
	10th	10th	
	Dia C 17.004 inches	Dia C 16.988 inches	
	Dia D 17.104 inches	Dia D 17.088 inches	
	11th	11th	
	Dia C 16.568 inches	Dia C 16.552 inches	
	Dia D 16.648 inches	Dia D 16.632 inches	
	12th	12th	
	Dia C 16.150 inches	Dia C 16.134 inches	
	Dia D 16.238 inches	Dia D 16.222 inches	
8. No. 4 bearing air seal mating diameter (rear) -			
Wear	Per WP 801 00, Reference 3006	Not reparable	Replace assembly.
9. No. 4 bearing front seal seat mating diameter (2 places) -			
Wear	Per WP 801 00, Reference 3007	Not reparable	Replace assembly.
Circumferential or axial grooves	0.003 inch deep	Not reparable	Replace assembly.
Pitting	0.003 inch deep up to a maximum of 20% of journal circumference	Not reparable	Replace assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
10. No. 4 bearing journal -			
Circumferential and axial grooves, scoring and wear step			
(Unscheduled inspection)	Any amount that cannot be felt by a 0.120 inch stylus	0.010 inch depth	Repair per WP 461 00.
(Scheduled inspection)	Not serviceable	0.010 inch depth	Repair per WP 461 00.
Circumferential and axial witness marks	Any amount	Not applicable	Not applicable
(Scheduled inspection)			
Pitting			
(Unscheduled inspection)	0.005 inch deep up to a maximum of 20% of journal circumference	0.010 inch depth	Repair per WP 461 00.
(Scheduled inspection)	Not serviceable	0.010 inch depth	Repair per WP 461 00.
Wear, reduced diameter	Per WP 801 00, Reference 3009	0.010 inch depth	Repair per WP 461 00.
(Scheduled inspection)			
11. No. 4 bearing rear seal seat mating diameter -			
Wear	Per WP 801 00, Reference 3011	Not reparable	Replace assembly.
Circumferential or axial grooves	0.003 inch deep	Not reparable	Replace assembly.
Pitting	0.003 inch deep up to a maximum of 20% of journal circumference	Not reparable	Replace assembly.
12. Front OD threads -			
Thread damage	Pickup and raised metal not serviceable	See corrective action.	Remove pickup and raised metal with fine stone.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
13. Turbine hub pilot diameter -			
Metal shear	a. 0.001 inch depth b. Raised metal not serviceable c. Per WP 801 00, Reference 3325	See corrective action.	Plasma spray repair per WP 461 00.
14. Splines -			
Pits, nicks, and dents	Pickup and raised metal not serviceable	See corrective action.	Remove pickup and raised metal with fine stone.
15. Turbine hub snap diameter -			
Wear	Per WP 801 00, Reference 3321	Not reparable	Replace assembly.
16. Rear OD threads -			
Thread damage	Pickup and raised metal not serviceable	See corrective action.	Remove pickup and raised metal with fine stone.
17. Driveshaft nut mating diameter -			
Wear	Per WP 801 00, Reference 3055	Not reparable	Replace assembly.
18. Area F -			
Pits, nicks, dents, and wear	Raised metal not serviceable. Blend repair to remove any raised metal. Maximum depth after removal is 0.005 inch. Remaining damage must be round bottomed.	0.147 inch minimum wall thickness	Blend repair per WP 461 00.
19. All over -			
Cracks	Not serviceable	Not reparable	Replace assembly.
Pits, nicks, and dents	Raised metal not serviceable	0.003 inch depth after blending	Blend repair per WP 461 00.
Scratches	Raised metal not serviceable	0.003 inch depth after blending	Blend repair per WP 461 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
20. No. 4 bearing scoop mating diameter (rear) -			
Wear	Per WP 801 00, Reference 3229	Not reparable	Replace assembly.
Fretting, galling, circumferential or axial grooves (Area A)	0.003 inch deep for total of 25% of circumference and 0.001 inch deep for remainder	Not reparable	Replace assembly.
Fretting, galling, circumferential or axial grooves (Area B)	Any amount 0.003 inch deep	Not reparable	Replace assembly.
21. Heat shield -			
Nicks, pits, and dents	0.020 inch depth	Not reparable	Replace assembly.
22. No. 4 bearing scoop mating diameter (front) -			
Wear	Per WP 801 00, Reference 3008	Not reparable	Replace assembly.
Fretting, galling, circumferential or axial grooves (Area C)	0.003 inch deep for total of 25% of circumference and 0.001 inch deep for remainder	Not reparable	Replace assembly.
23. No. 4 bearing air seal mating diameter (center) -			
Wear	Per WP 801 00, Reference 3005	Not reparable	Replace assembly.
24. No. 4 bearing air seal mating diameter (front) -			
Wear	Per WP 801 00, Reference 3268	Not reparable	Replace assembly.

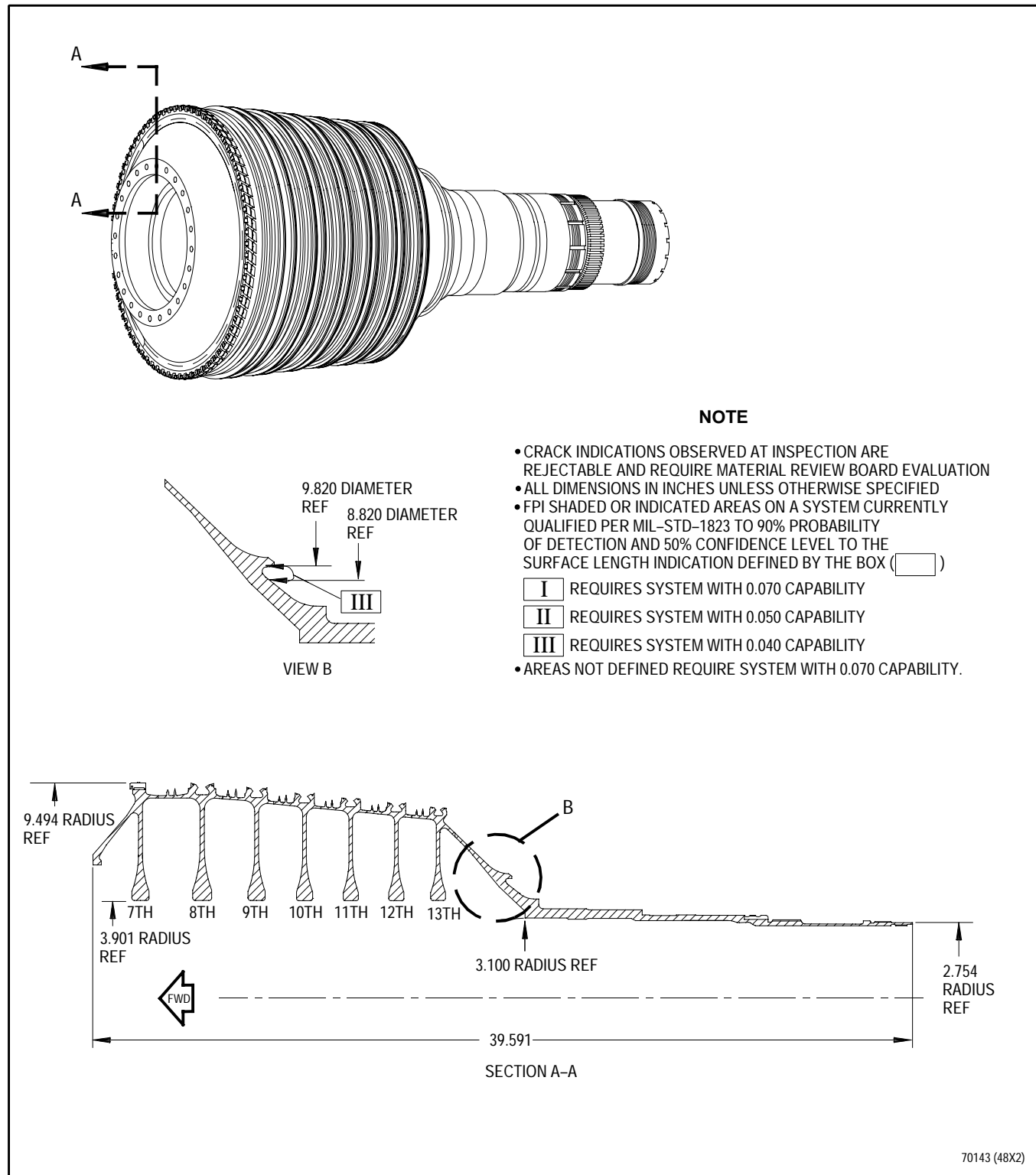


Figure 1A. Seventh Through Thirteenth Stage Rear Compressor Disk-Drum Rotor Assembly - Required Fluorescent Penetrant System Capability

Figure 2. Deleted.

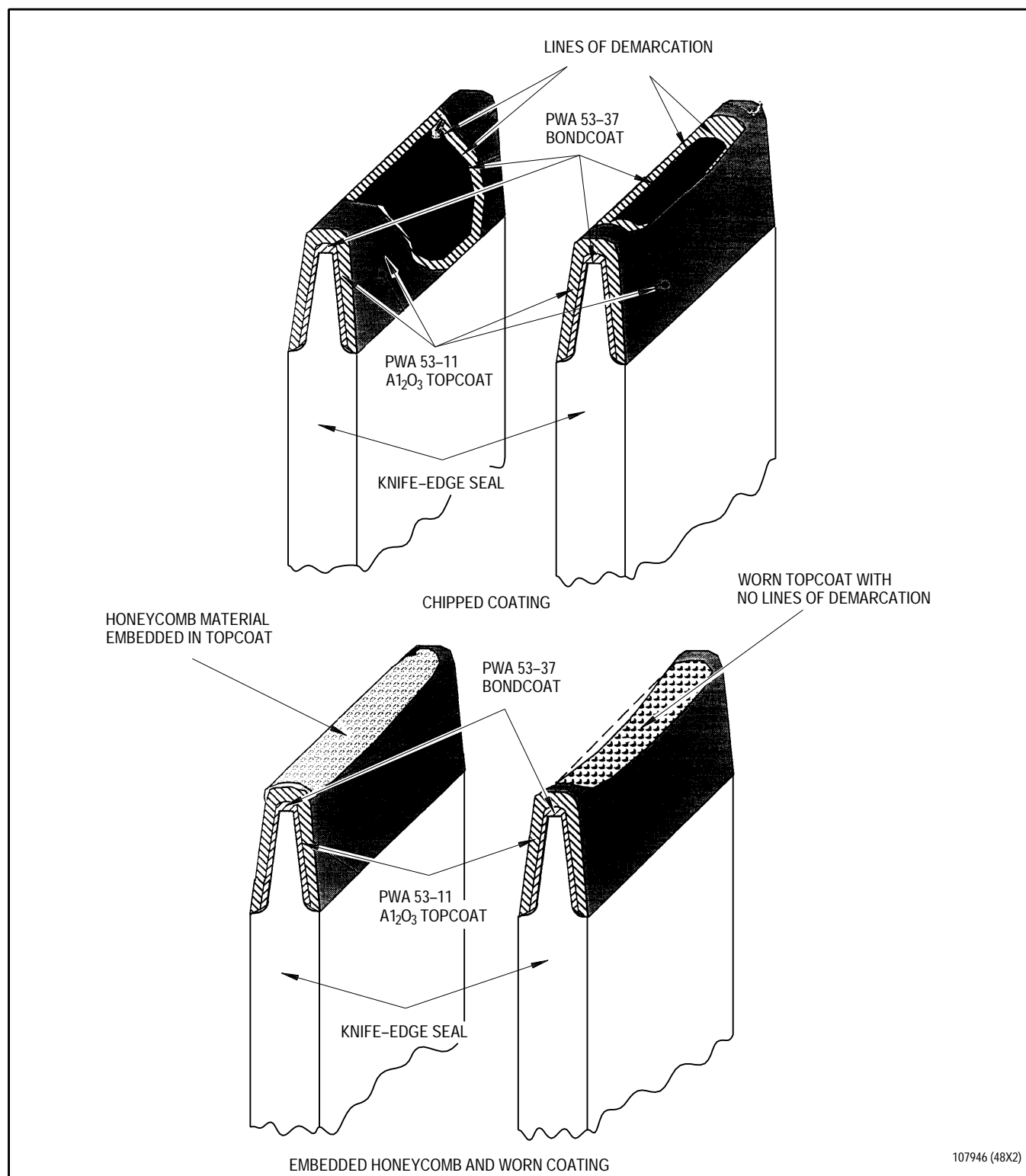


Figure 3. Seventh Through Thirteenth Stage Rear Compressor Disk-Drum Rotor Assembly - Chipped Coating, Embedded Honeycomb and Worn Coating

WORK PACKAGE

TECHNICAL PROCEDURES

SHIELD, NO. 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 3 bearing shield.

2. NO. 3 BEARING SHIELD - INSPECTION.

(See Figure 1.)

- a. Inspect No. 3 bearing shield.
(See figure 1.)

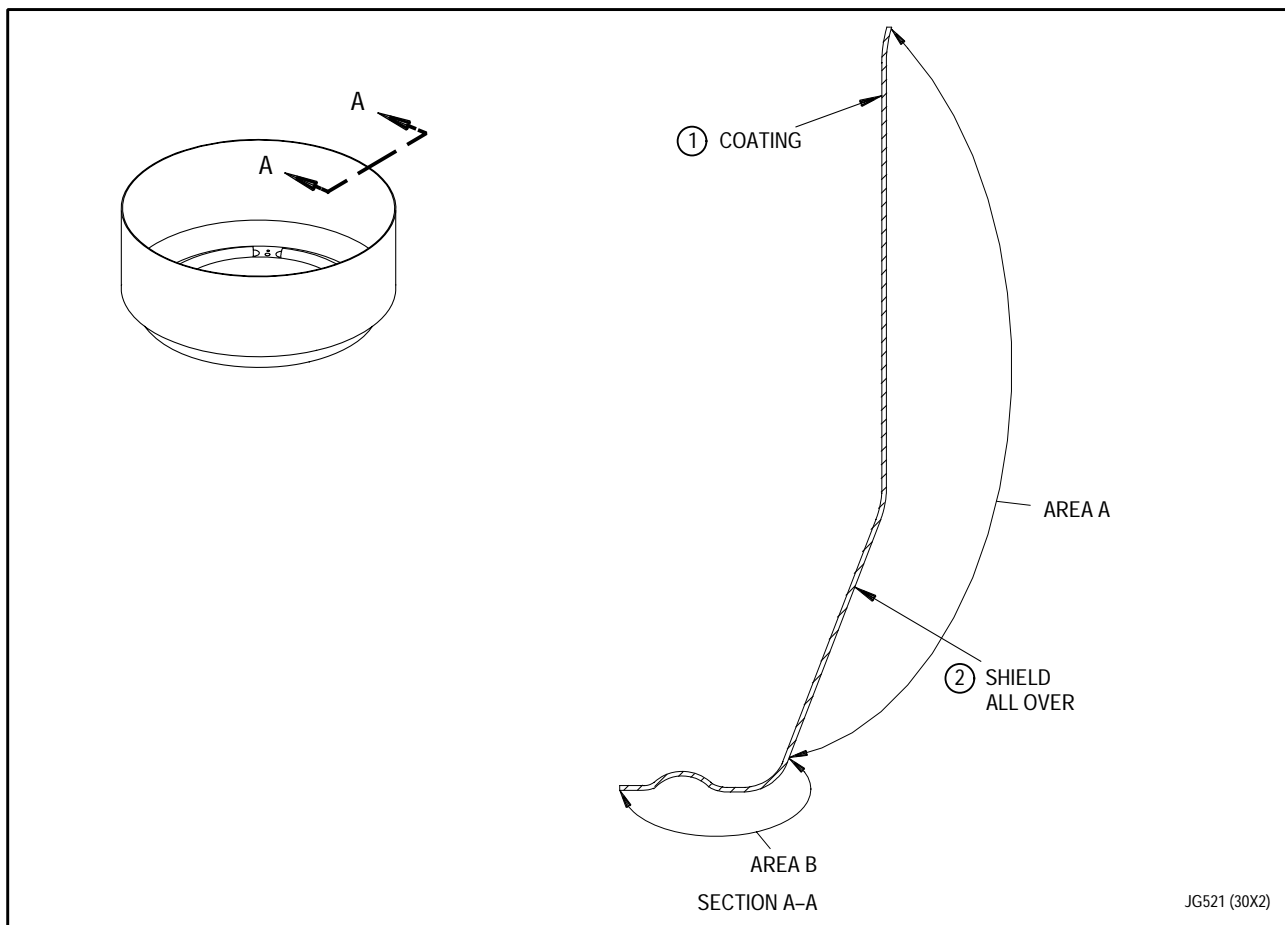


Figure 1. No. 3 Bearing Shield - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Coating -			
Wear	Not serviceable	See corrective action.	Replace shield.
2. Shield All Over -			
Stress, corrosion, fatigue, cracking	Not serviceable	See corrective action.	Replace shield.
Scratches	0.010 inch depth if polished out	See corrective action.	Replace shield.
Round bottom dents, area A	0.050 inch depth, no sharp radius allowed.	See corrective action.	Replace shield.
Round bottom dents, area B	0.010 inch depth, no sharp radius allowed.	See corrective action.	Replace shield.

WORK PACKAGE

TECHNICAL PROCEDURES

HEAT SHIELD AND HEAT SHIELD SEGMENTS, COMPRESSOR STATOR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	4	6
2	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of compressor stator heat shield and heat shield segments.

2. COMPRESSOR STATOR HEAT SHIELD AND HEAT SHIELD SEGMENTS - INSPECTION.

(See Figure 1.)

- a. Ensure compressor stator heat shield and heat shield segments have been cleaned per WP 201 00.

- b. Visually inspect heat shield and heat shield segments per figure 1.
- c. Fluorescent penetrant inspect heat shield and heat shield segments for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

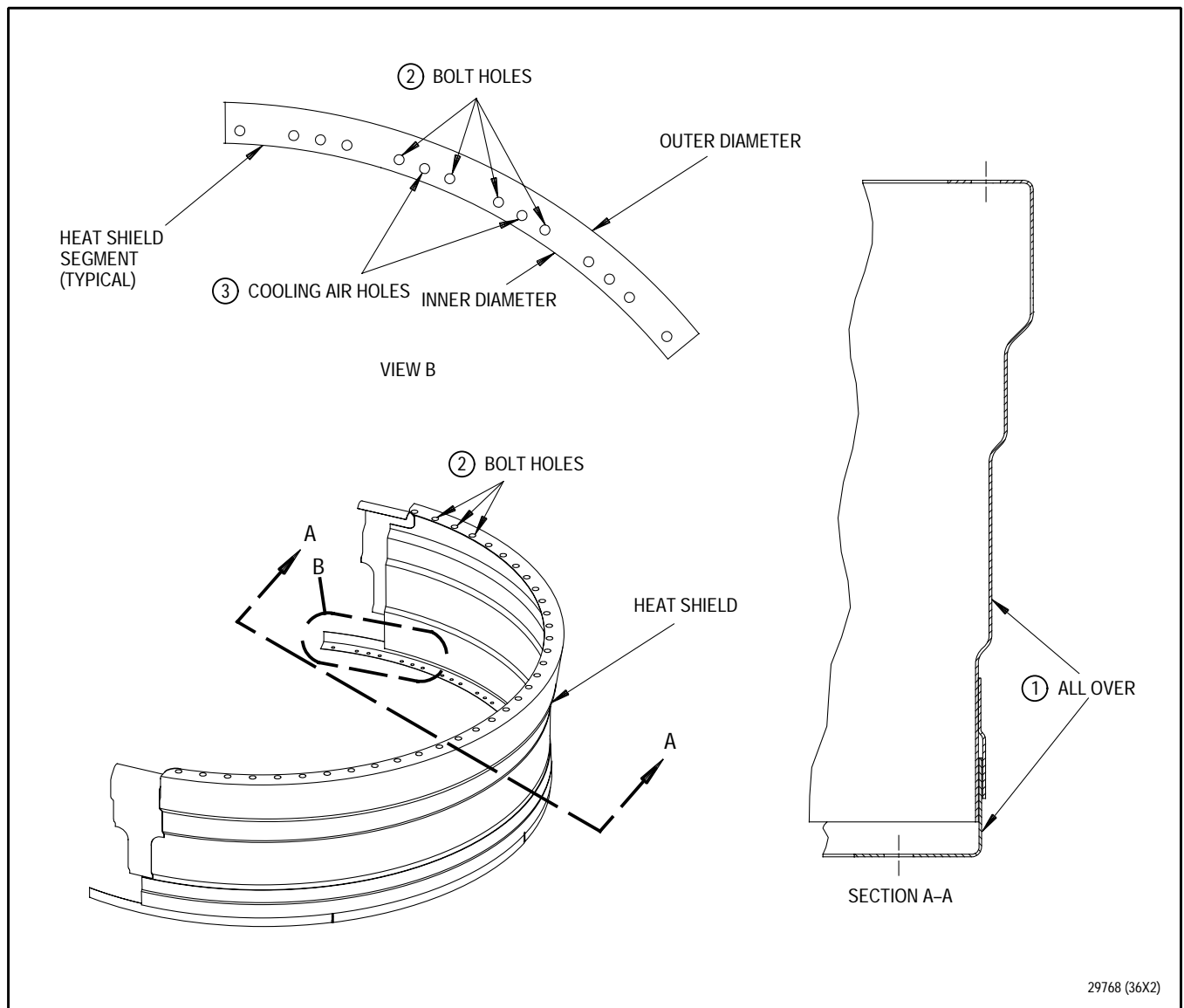


Figure 1. Compressor Stator Heat Shield and Heat Shield Segments - Inspection

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All Over -			
Cracks, tears	Not serviceable	See corrective action.	Replace heat shield.
Dents	0.100 inch depth maximum. Not to exceed a 10 to 1 width to depth ratio. No sharp edges.	See corrective action.	Replace heat shield.
Scratches	0.010 inch depth maximum, if polished out.	See corrective action.	Replace heat shield.
2. Bolt Holes -			
Circumferential scoring	Serviceable	Any amount	Not applicable.
Cracking out of hole ID or OD	Not serviceable	Not reparable.	Replace heat shield or segment.
3. Segment cooling air holes -			
Cracks to inner diameter	Serviceable	Any amount	Not applicable.
Crack to outer diameter	Not serviceable	Not reparable.	Replace heat shield segment.

WORK PACKAGE

TECHNICAL PROCEDURES

CASE ASSEMBLY, COMPRESSOR, FOURTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	25	3	0	4 - 6	25

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th stage compressor case assembly.

2. FOURTH STAGE COMPRESSOR CASE ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure 4th stage compressor case assembly has been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect case assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Inspect case assembly. See figure 1.

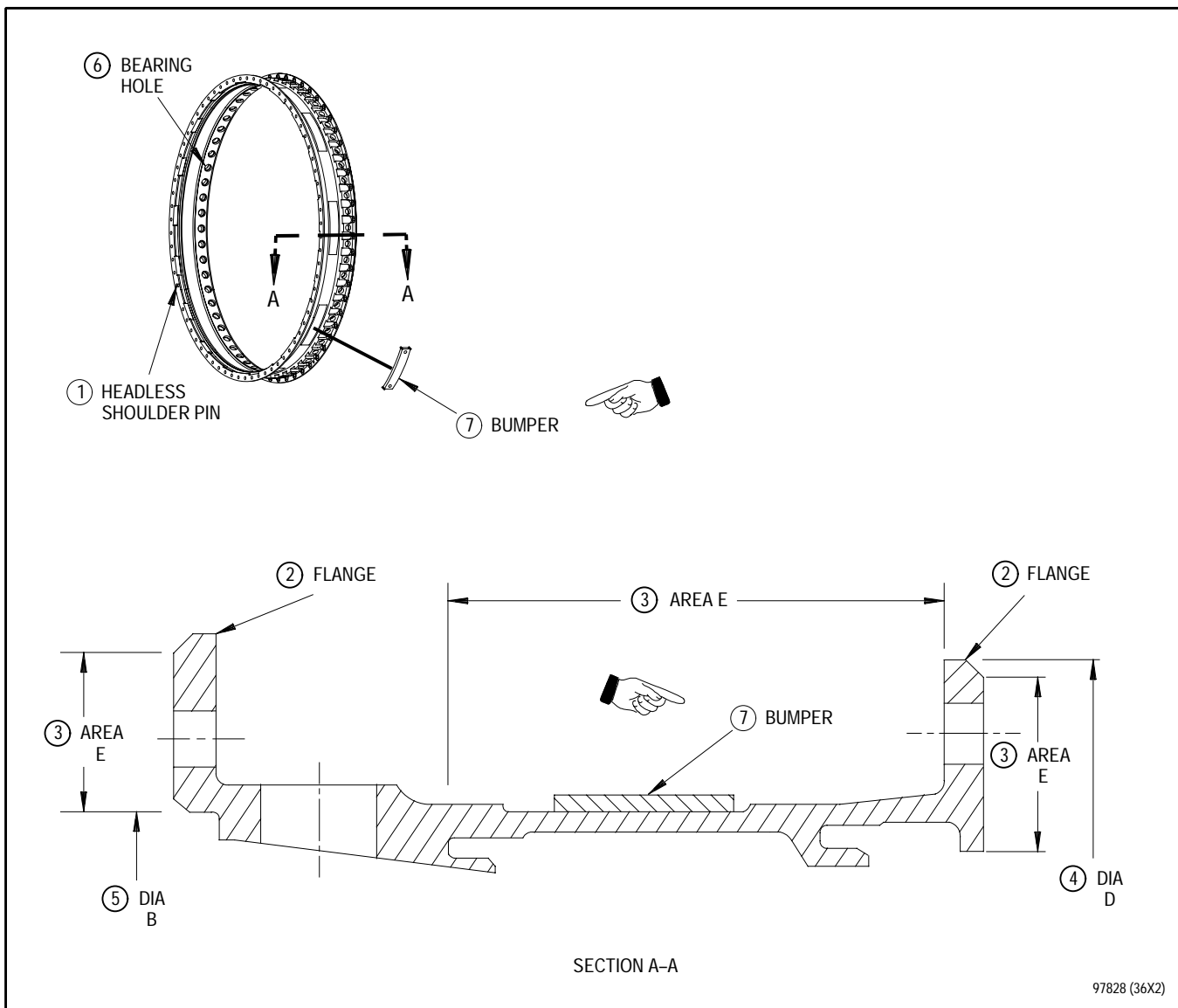


Figure 1. Fourth Stage Compressor Case Assembly - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Headless shoulder pin -			
Loose	Not serviceable	Not repairable	Replace pin per WP 464 00.
Bent	0.005 inch	Not repairable	Replace pin per WP 464 00.
Scoring	0.005 inch depth	Not repairable	Replace pin per WP 464 00.
Burrs	Not serviceable	Not repairable	Replace pin per WP 464 00.
Missing	Not serviceable	Not repairable	Replace pin per WP 464 00.
2. Flanges -			
Bent	0.010 inch	See corrective action	Replace case assembly.
Cracks	Not serviceable	See corrective action	Replace case assembly.
3. Area E -			
Pits, nicks, scratches, and surface damage	Not serviceable	See corrective action	Replace case assembly.
Cracks on front and rear flanges.	Not serviceable	See corrective action	Replace case assembly.
4. Diameter D -			
Wear	Per WP 801 00, Reference 2977	See corrective action.	Replace case assembly.
5. Diameter B -			
Wear	Per WP 801 00, Reference 2939	See corrective action.	Replace case assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
6. Bearing holes -			
Wear	Per WP 801 00, Reference 2972	See corrective action	Replace case assembly.
7. Bumper -			
Worn	Not servicable	Not repairable	Replace bumper per WP 464 00.
Cracked	Not servicable	Not repairable	Replace bumper per WP 464 00.
Chipped	Not servicable	Not repairable	Replace bumper per WP 464 00.
Loose	Not servicable	Not repairable	Replace bumper per WP 464 00.

WORK PACKAGE

TECHNICAL PROCEDURES

**SHROUD SEGMENT SETS, COMPRESSOR STATOR,
FOURTH, FIFTH, AND SIXTH STAGE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	25	2	0	3 - 4	25

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and ClearanceCharts -	WP 801 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th, 5th, and 6th stage compressor stator shroud segment sets.

2. FOURTH, FIFTH, AND SIXTH STAGE COMPRESSOR STATOR SHROUD SEGMENT SETS - INSPECTION.

(See Figure 1.)

- a. Fluorescent penetrant inspect 4th, 5th, and 6th stage compressor stator shroud segment sets. Refer to T.O. 2J-F100-9. No cracks allowed.
- b. Visually inspect shroud segment sets per figure 1.

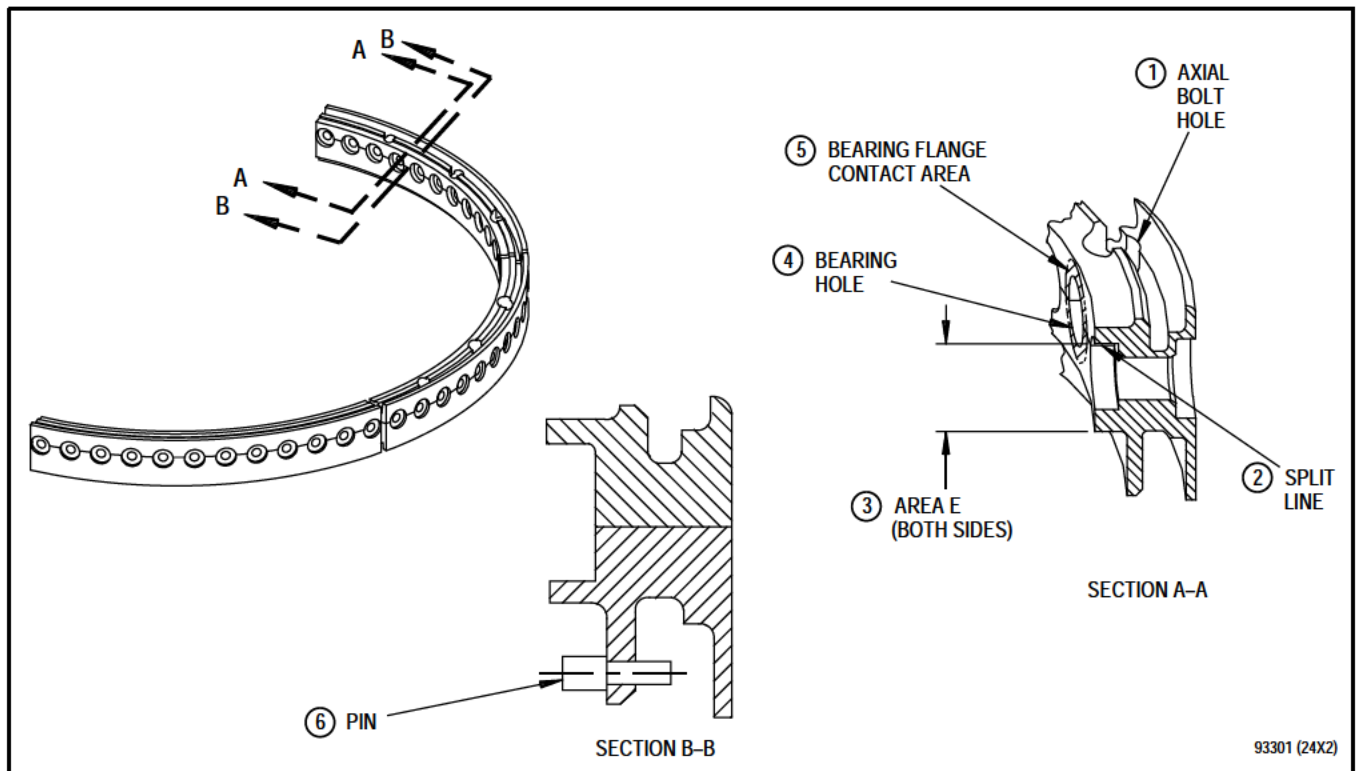


Figure 1. Fourth, Fifth, and Sixth Stage Compressor Stator Shroud Segment Sets - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Axial bolt hole - Scratches, gouges	Not serviceable	See corrective action.	Replace shroud segment set.
2. Split line - Flatness	0.005 inch	See corrective action.	Replace shroud segment set.
3. Area E - (both sides) Pits, nicks, scratches, and surface damage	Not serviceable	See corrective action.	Replace shroud segment set.
4. Bearing holes - Scratches, gouges	Per WP 801 00, Reference 3273 or 3368	See corrective action.	Replace shroud segment set.
5. Bearing flange contact area - Wear	0.010 inch depth	See corrective action.	Replace shroud segment set.
6. Pin - Missing or damaged	Not serviceable	Not reparable	Replace pin per WP 465 00.

WORK PACKAGE

TECHNICAL PROCEDURES

RING SEGMENTS, FOURTH THROUGH SIXTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	4	18	5	3
2 - 3	0			6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th, 5th, and 6th stage ring segments.

2. FOURTH, FIFTH, AND SIXTH STAGE RING SEGMENTS - INSPECTION.

(See Figure 1.)

- a. Ensure 4th, 5th and 6th stage ring segments have been cleaned per WP 201 00.

- b. Fluorescent penetrant inspect ring segments for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Visually inspect ring segments per figure 1.

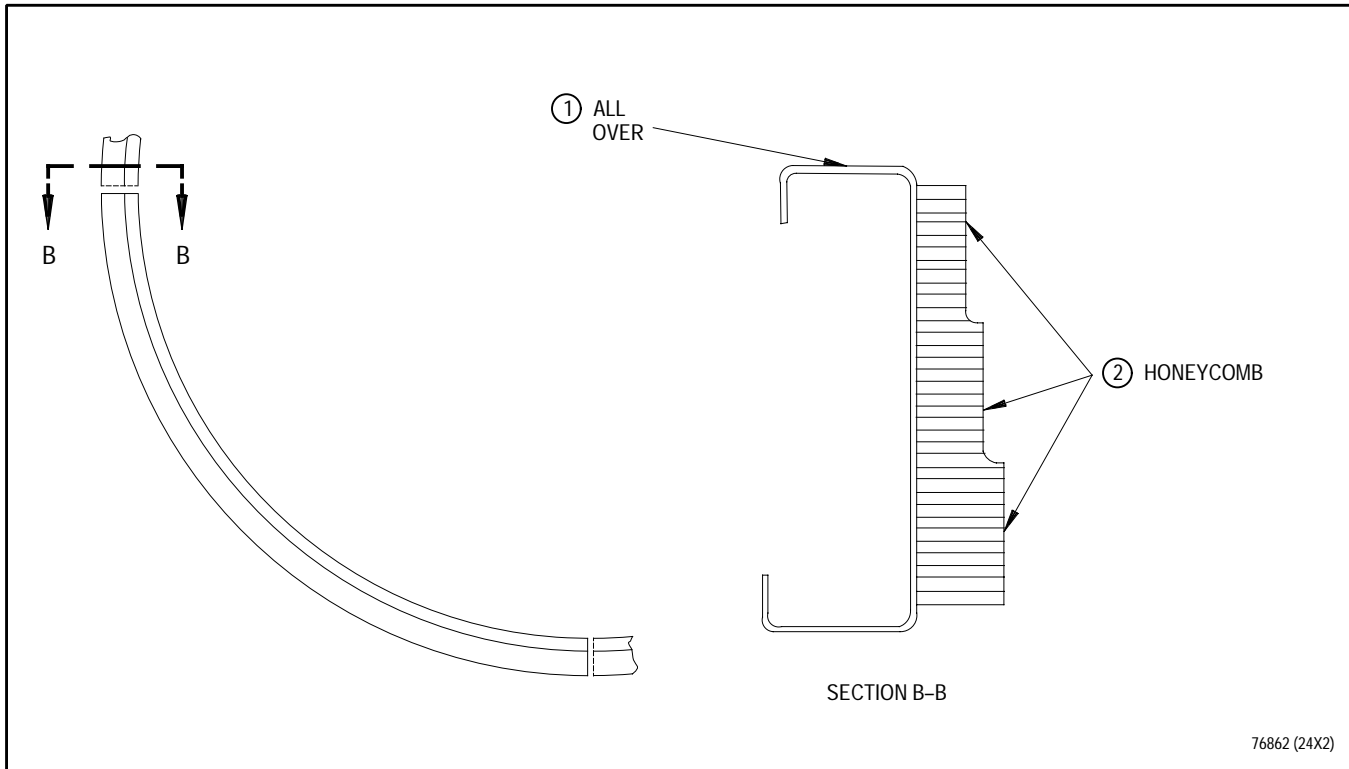


Figure 1. Fourth, Fifth, and Sixth Stage Ring Segments - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action.
1. All over - Pits, nicks, dents, and scratches	0.005 inch depth	Blend to 0.010 inch depth.	Replace ring segment.
2. Honeycomb - Abrasion, rub, grooves	0.031 inch maximum radial depth X full segment length	Not reparable	Replace honeycomb.
Nicks, dents, gouges, missing honeycomb, crushed cells	a. Damage along edges up to 3 cells wide X full feature length. Honeycomb must be fully bonded.	No blending allowed.	Replace honeycomb.
	b. Damage up to full depth separated from existing knife edge seal rub groove. Honeycomb must be fully bonded.	Not reparable	Replace honeycomb.
	c. Damage overlapping existing rub groove up to 0.062 inch depth. Total accepted arc length of rub groove must be 0.750 inch or less per land. Damage along edges not included in 0.750 inch limit.	Not reparable	Replace honeycomb.

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, COMPRESSOR EXIT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	25	3	0	5	4
2	4	4	18	6	25

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module - Table of Limits and Clearance	
Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

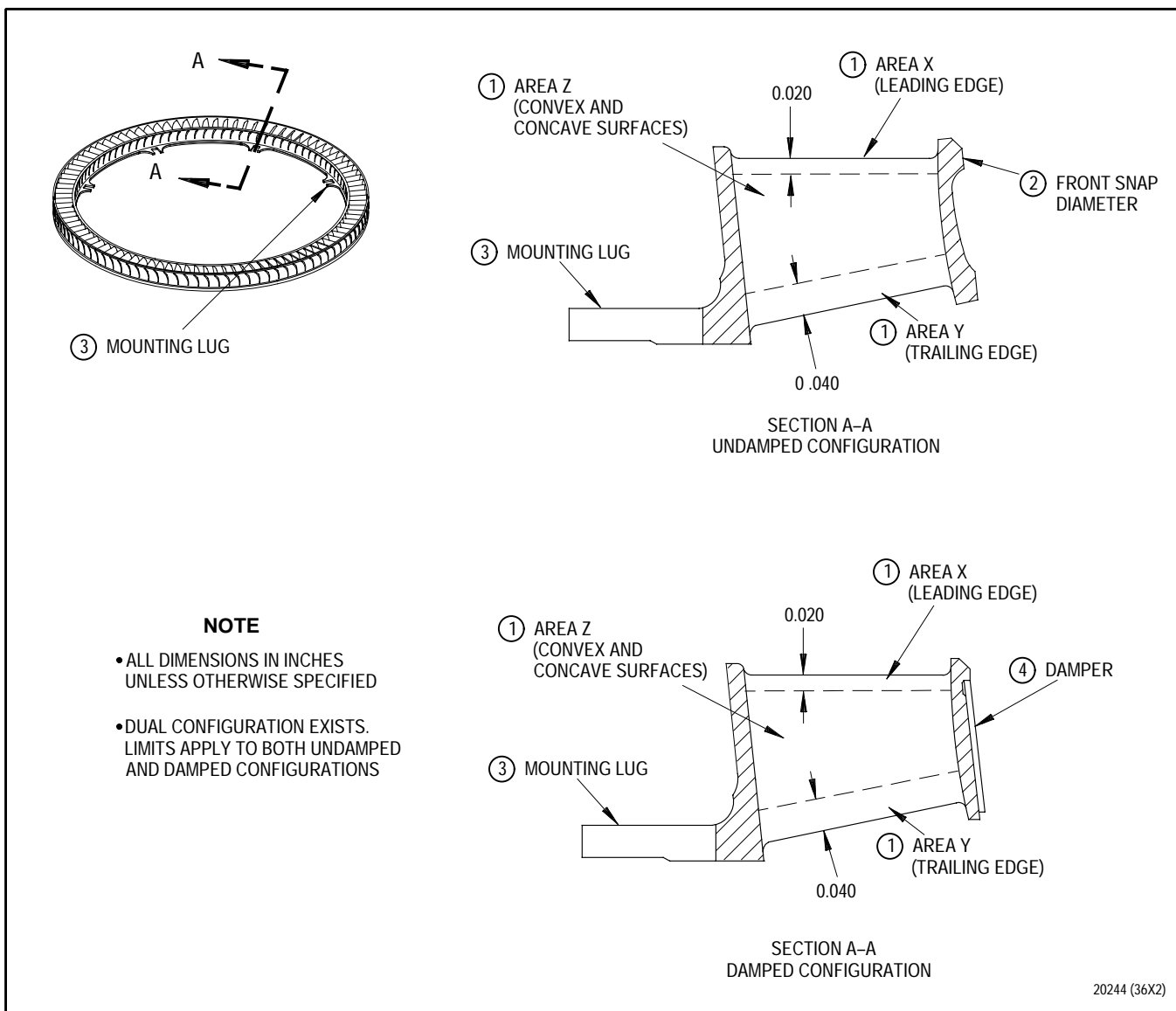
1. INTRODUCTION.

- a. This work package contains instructions for inspection of compressor exit stator.

2. COMPRESSOR EXIT STATOR - INSPECTION.

(See Figure 1.)

- a. Ensure compressor exit stator has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect stator for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.040 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect stator per figure 1.
- d. After inspection and repair, if necessary, apply dry film lubricant. Refer to T.O. 2-1-111.
- e. Fluorescent penetrant inspect airfoil blend repairs, as required.

**Figure 1. Compressor Exit Stator - Inspection**

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Vane airfoil surfaces -			
Area X (Leading edge) -			
Nicks, dents	Not serviceable	Blend depth not to exceed 0.020 inch. Blends allowed up to full length of area. Blends allowed on 12 airfoils per stage maximum.	Blend or replace stator.
Bends	a. 0.025 inch along edges b. Displacement of edge up to 0.025 inch for a depth into airfoil (chordal direction) of 0.150 inch c. One bend per edge d. Maximum of 24 vanes may be bent, independent of blends.	Not reparable	Replace stator.
Area Y (Trailing edge) -			
Nicks, dents	Not serviceable	Blend depth not to exceed 0.040 inch. Blends allowed up to full length of area. Blends allowed on 12 airfoils per stage maximum.	Blend or replace stator.
Bends	a. 0.025 inch along edges b. Displacement of edge up to 0.025 inch for a depth into airfoil (chordal direction) of 0.150 inch c. One bend per edge d. Maximum of 24 vanes may be bent, independent of blends.	Not reparable	Replace stator.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Vane airfoil surfaces (continued) - Area Z (convex and concave surfaces) - Nicks, dents	Not serviceable	Blend up to 20% of airfoil thickness. Maximum blend diameter is 0.125 inch. 2 blends allowed per airfoil. Blends allowed on 12 airfoils per stage maximum.	Blend or replace stator.
2. Front snap diameter (undamped configuration only) - Wear, galling	Not serviceable	Not reparable	Replace stator.
3. Mounting Lug - Wear Bent Hard face chipping, wear	Not serviceable Not serviceable Not serviceable	Not reparable Not reparable Chipping/wear of hard face to parent metal	Replace stator. Replace stator. Strip and recoat hard face per WP 467 00.
4. Damper ring (damped configuration only) - Nicks, dents	Not serviceable	Blend depth not to exceed 0.015 inch	Replace damper ring.

WORK PACKAGE

TECHNICAL PROCEDURES

CASE ASSEMBLY, COMPRESSOR, TENTH THROUGH TWELFTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					
					25

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 10th through 12th stage compressor case assembly.

- b. Fluorescent penetrant inspect case assembly for cracks on a system currently qualified per MIL-STD-1823 at 90% probability of detection and 50% confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

2. TENTH THROUGH TWELFTH STAGE COMPRESSOR CASE ASSEMBLY - INSPECTION.

(See Figures 1 and 2.)

- a. Ensure 10th through 12th stage compressor case assembly has been cleaned per WP 201 00.

- c. Inspect case assembly. See figure 1.

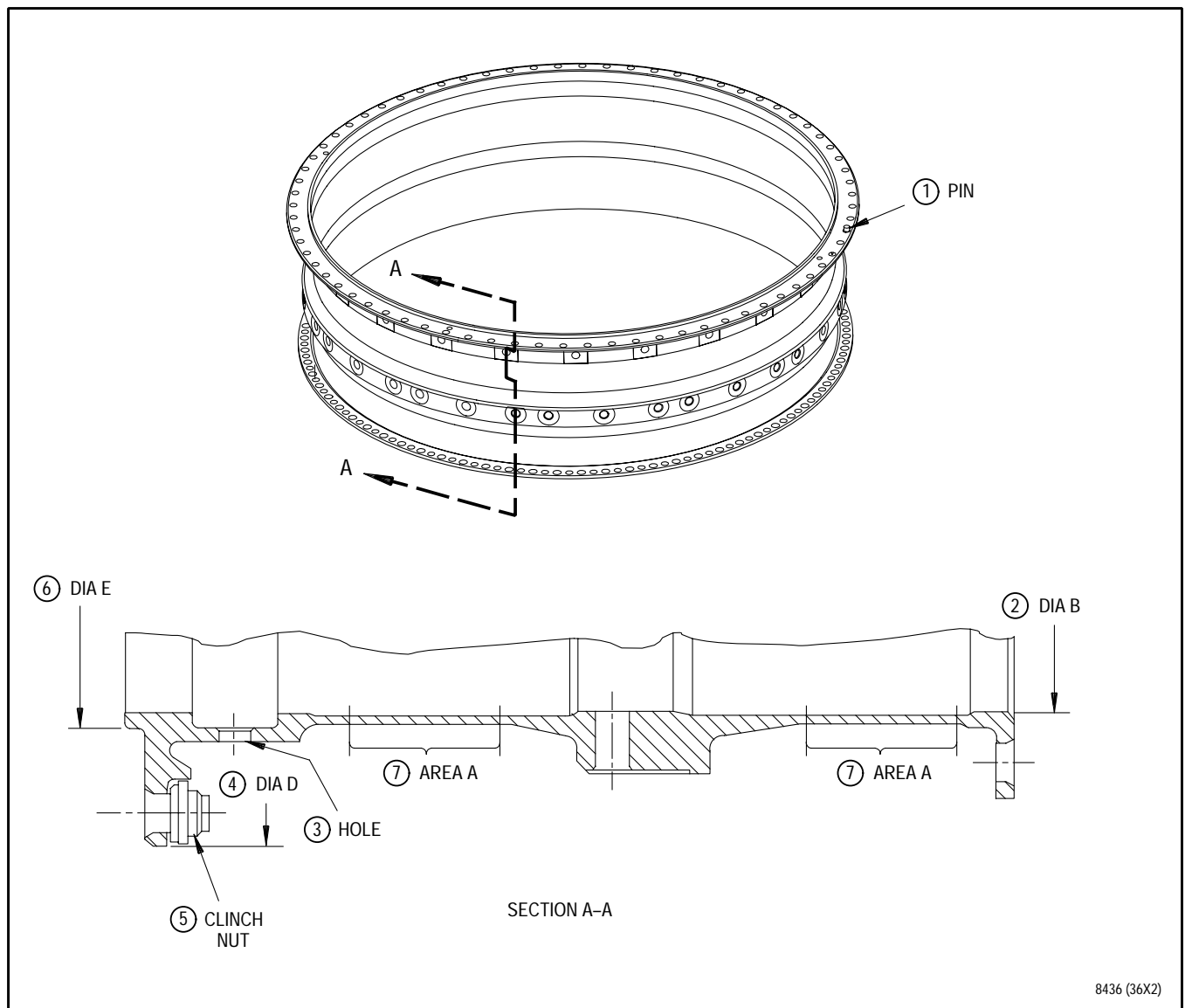
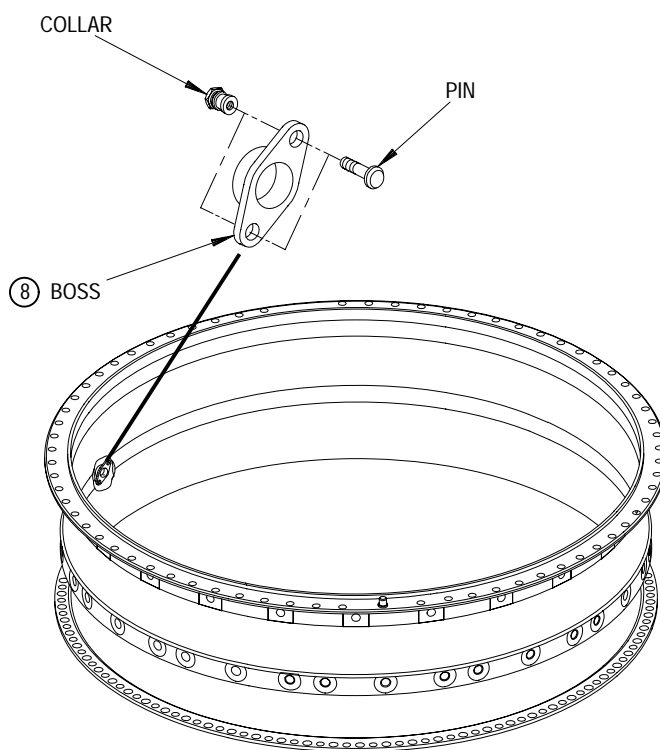


Figure 1. Tenth Through Twelfth Stage Compressor Case Assembly - Inspection (Sheet 1 of 2)



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Figure 1. Tenth Through Twelfth Stage Compressor Case Assembly - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Pin -			
Bent, scored, burred, loose	Not serviceable	Not repairable	Replace pin per WP 468 00.
Burred	TBD	Repairable	Deburr pin.
2. Dia B -			
Wear	Per WP 801 00, Reference 2991	Not repairable	Replace case.
3. Hole -			
Fretting	0.005 inch	Not repairable.	Replace case.
4. Dia D -			
Wear	Per WP 801 00, Reference 2983	Not repairable	Replace case.
5. Clinch nut -			
Missing, stripped threads, loss of bolt locking friction or rounded-off anti-rotation flats	Not serviceable	Not repairable	Replace nuts per WP 468 00.
6. Dia E -			
Wear	Per WP 801 00, Reference 2984	Not repairable	Replace case.
7. Area A -			
Dents	TBD	0.020 inch deep maximum by 3.000 inch long maximum	Repair per WP 468 00.
Nicks, pits, scratches	TBD	0.015 inch deep after blending	Blend per WP 468 00.
Corrosion	TBD	Not repairable	Clean per WP 201 00.
8. Boss -			
Loose	Not serviceable	Not repairable	Replace pins and collars securing boss to case per WP 468 00.
Threads damaged beyond use (see figure 2)	Not serviceable	Not repairable	Replace boss per WP 468 00.

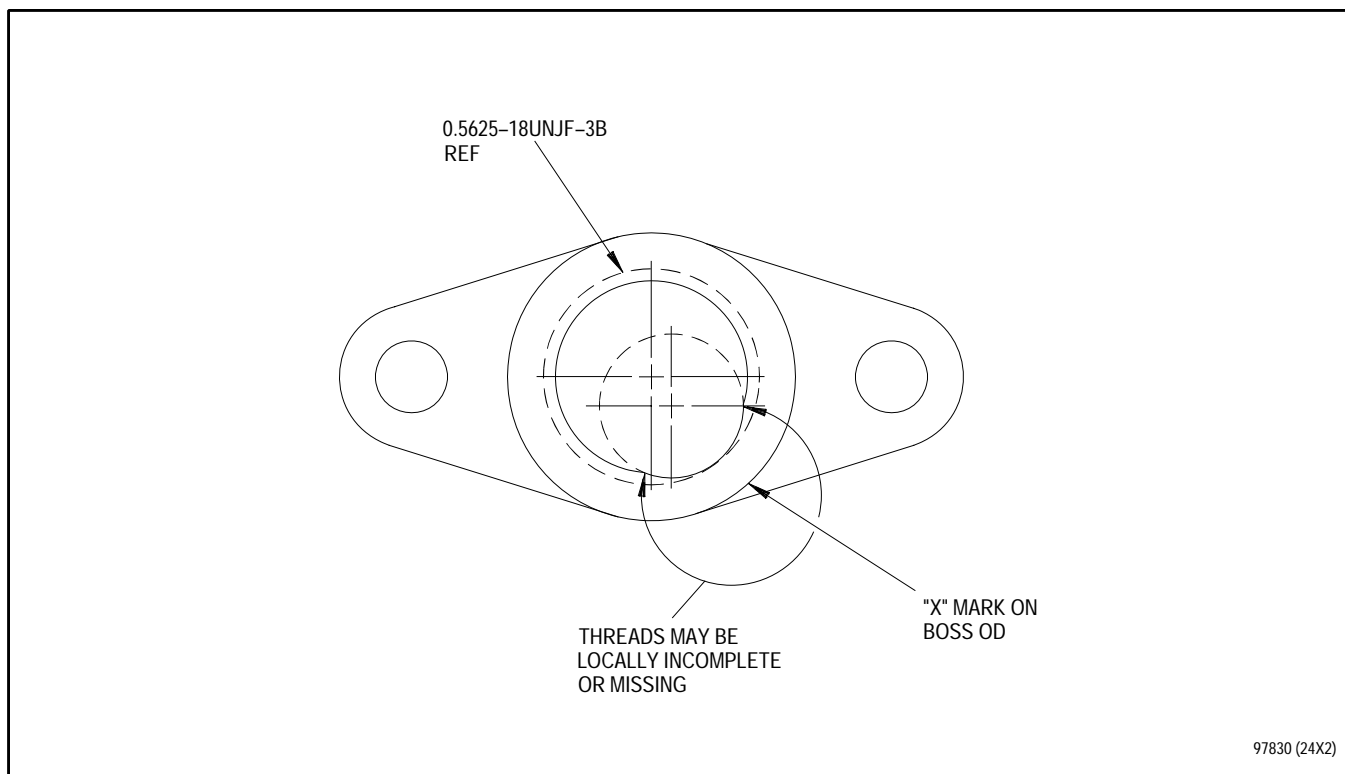


Figure 2. Compressor Case Borescope Boss - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

CASE ASSEMBLY, COMPRESSOR INTERMEDIATE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4	27	5 - 8	1
2	25	4A - 4B	25	9	29
3	18			10 Blank	25

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, CROCUS, ABRASIVE	P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

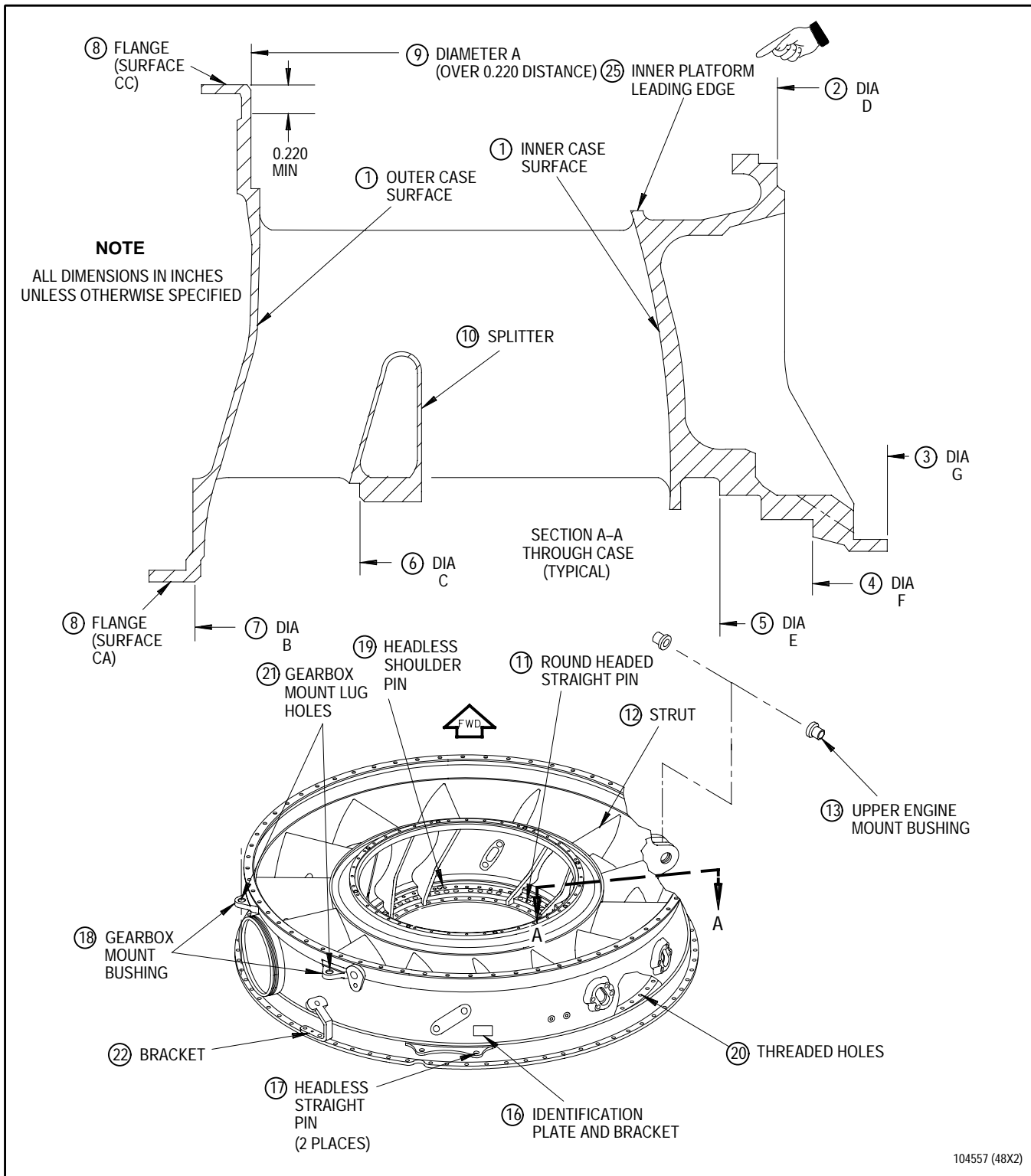
- a. This work package contains instructions for inspection of compressor intermediate case assembly.

2. COMPRESSOR INTERMEDIATE CASE ASSEMBLY - INSPECTION.

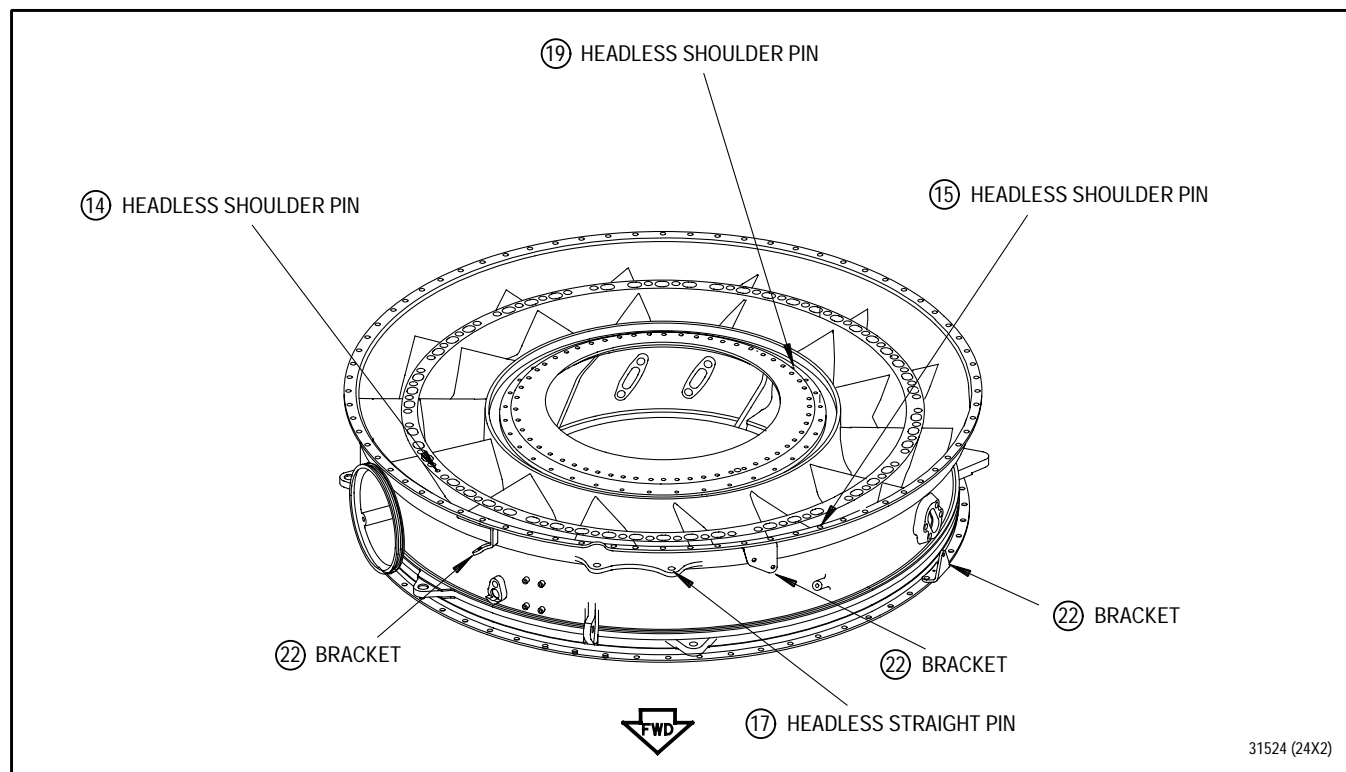
(See Figure 1.)

- a. Ensure compressor intermediate case assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect case assembly for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.070 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.

- c. Inspect all diameters when Surfaces CA and CC are flat within 0.001 inch total and Diameters A and B are round within 0.005 inch free state or constrained. Constraint contact allowed only on Surfaces CA and CC and Diameters A and B.
- d. If case assembly is not reparable, identification plate is not a detail of intermediate case assembly, but should be transferred from nonreparable case to new case.



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Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Inner and outer case surfaces -			
Cracks	Not serviceable	See corrective action	Replace case.
Impact, damage, nicks or dents (none permitted in strut radii)	Well-rounded damage to depth of 0.015 inch	0.020 inch depth after blending	Blend by hand. Refer to T.O. 2-1-111.
2. Diameter D -			
Wear	16.279 inch diameter	See corrective action	Plasma spray per WP 469 00.
3. Diameter G -			
Wear	12.780 inch diameter	See corrective action	Plasma spray per WP 469 00.
4. Diameter F -			
Wear	15.002 inch diameter	See corrective action	Plasma spray per WP 469 00.

Figure 1. Compressor Intermediate Case Assembly - Inspection (Sheet 2 of 3)

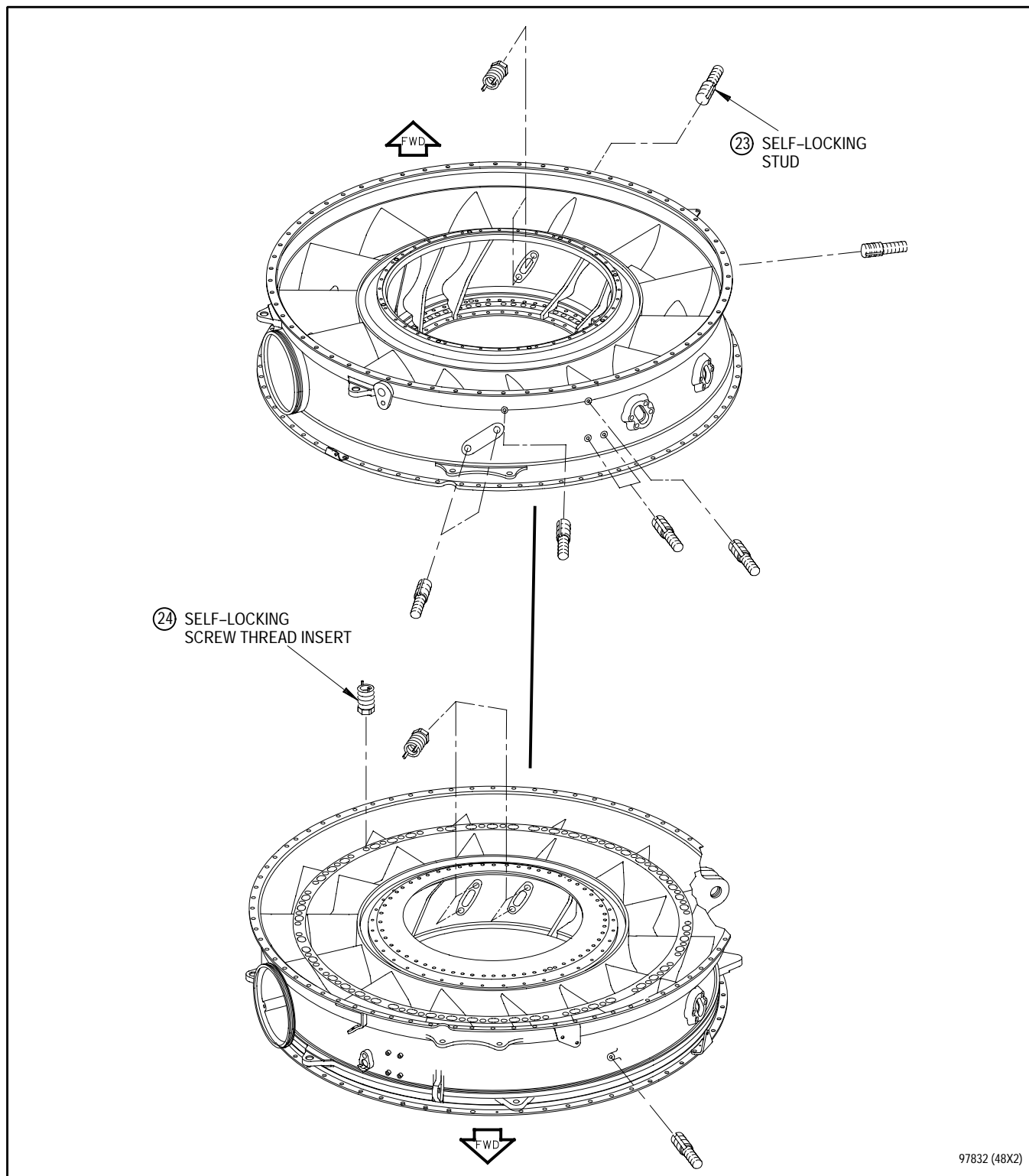


Figure 1. Compressor Intermediate Case Assembly - Inspection (Sheet 3 of 3)

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
5. Diameter E - Wear	17.756 inch diameter	See corrective action.	Plasma spray per WP 469 00.
6. Diameter C - Wear	28.442 inch diameter	See corrective action.	Plasma spray per WP 469 00.
7. Diameter B - Wear	33.271 inch diameter	See corrective action.	Plasma spray per WP 469 00.
8. Flanges - Bent	Up to 0.005 inch provided cracks are not present.	See corrective action.	Replace case.
Cracks	Not serviceable	See corrective action.	Replace case.
Nicks, dents, and scratches	Not serviceable	0.035 inch depth after blending.	Hand blend. Refer to T.O. 2-1-111.
9. Diameter A - Wear	31.862 inch diameter	See corrective action.	Plasma spray per WP 469 00.
10.Splitter - Cracks	Not serviceable	See corrective action.	Replace case.
Nicks, dents, and scratches	Not serviceable	0.010 inch depth.	Hand blend. Refer to T.O. 2-1-111.
11.Round headed straight pin (PN 444613) - Bend	0.005 inch	See corrective action.	Replace pin per WP 469 00.
Loose	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 469 00.
Nicked	Not serviceable	See corrective action.	Replace pin per WP 469 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
12.Struts -			
Cracks	Not serviceable	See corrective action.	Replace case.
Nicks, dents, and scratches	Not serviceable	0.010 inch depth after blending. No blend repair in strut radii.	Hand blend. Refer to T.O. 2-1-111.
13.Upper engine mount bushings -			
Wear	Maximum allowable ID is 0.5648 inch and maximum allowable gap is 0.590 inch.	See corrective action.	Replace case.
Loose	Not serviceable	See corrective action.	Replace case.
ID corrosion	Not serviceable	See corrective action.	Replace case.
End surface minor corrosion, galling	Not serviceable	See corrective action.	Clean up end surface with fine emery paper and crocus cloth.
14.Headless shoulder pin (PN 4069985) -			
Loose	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 469 00.
Nicked	Not serviceable	See corrective action.	Replace pin per WP 469 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
15.Headless shoulder pin (PN 476067) -			
Bent	0.005 inch	See corrective action.	Replace pin per WP 469 00.
Loose	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 469 00.
Nicked	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Loose or missing	Not serviceable	See corrective action.	Replace pin per WP 469 00.
16.Identifi-cation plate			
Missing or cracked	Not serviceable	See corrective action.	Replace plate per WP 469 00.
17.Headless straight pin (PN 425422) -			
Bent	0.005 inch	See corrective action.	Replace pin per WP 469 00.
Loose	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 469 00.
Nicked	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Missing	Not serviceable	See corrective action.	Replace pin per WP 469 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
18.Gearbox mount bushings -			
Wear	0.3772 inch diameter	See corrective action.	Replace bushing per WP 469 00.
Loose	Not serviceable	See corrective action.	Replace bushing per WP 469 00.
ID corrosion	Not serviceable	See corrective action.	Replace bushing per WP 469 00.
End surface minor corrosion, galling	Not serviceable	See corrective action.	Clean up end surface with fine emery paper or crocus cloth.
19.Headless shoulder pin -			
Bent	0.005 inch	See corrective action.	Replace pin per WP 469 00.
Loose	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 469 00.
Nicked	Not serviceable	See corrective action.	Replace pin per WP 469 00.
Missing	Not serviceable	See corrective action.	Replace pin per WP 469 00.
20.Threaded holes -			
Damaged	Not serviceable	See corrective action.	Install helicoil per WP 469 00.
21.Gearbox mount lug holes -			
Wear	0.005 inch diameter	See corrective action.	Sleeve repair per WP 469 00.
Galling	Not serviceable	See corrective action.	Sleeve repair per WP 469 00.
22.Brackets -			
Missing or damaged	Not serviceable	Not repairable	Replace bracket per WP 469 00.
Loose rivets	Not serviceable	See corrective action.	Replace rivet per WP 469 00.

Legend for figure 1 (continued)

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
23.	Self-locking stud -			
	Missing	Not serviceable	Not repairable	Replace stud per WP 469 00.
	Damaged	Not serviceable	Not repairable	Replace stud per WP 469 00.
24.	Self-locking screw thread insert -			
	Missing	Not serviceable	Not repairable	Replace insert per WP 469 00.
	Stripped or damaged	Not serviceable	Not repairable	Replace insert per WP 469 00.
25.	Inner platform leading edge -			
	Wear	0.010 inch	0.020 inch	Plasma spray per WP 469 00.

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, DIFFUSER -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 28

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	7	21	10 - 22	29
2 - 3	21	8	29	22A Added	18
4 - 5	29	9	0	22B Blank Added	18
6	0			23 - 26	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Table of Limits and Clearance Charts	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

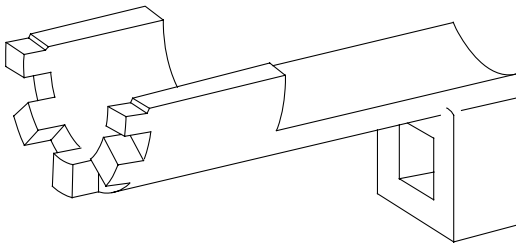
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

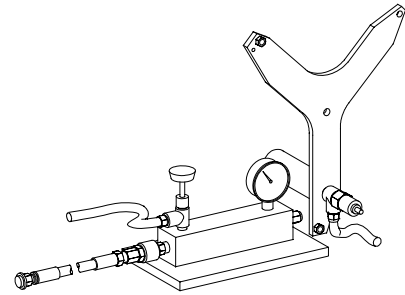
Paragraph	Function - Tool Nomenclature	Tool Number
3	No. 4 Bearing Internal Scavenge Tube Assembly - Pressure Test	
	Fixture, plug, pressure test No. 4 bearing scavenge tube - - - - -	PWA 71405
	Wrench, No. 4 bearing oil scavenge tube retaining nut - - - - -	PWA 57734
	Adapter, pressure test - - - - -	SAALC 7744972

ILLUSTRATED SUPPORT EQUIPMENT



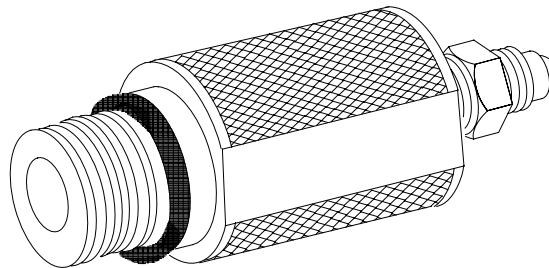
PWA 57734 -C

Figure T1. PWA 57734 Wrench



PWA 71405 -C

Figure T2. PWA 71405 Fixture



SAALC 7744972 -C

Figure T3. SAALC 7744972 Adapter

1. INTRODUCTION.

- a. This work package contains instructions for inspection of long skirt and short skirt diffuser case assemblies.

2. DIFFUSER CASE ASSEMBLY - INSPECTION.

(See Figures 1, 1A and 2 through 4.)

- a. Ensure diffuser case assembly has been cleaned per WP 201 00.
- b. Visually inspect diffuser case per figure 1. Use 10X magnifying glass to inspect for indications in skirt, casting, flanges and shoulder bolts.
- c. Fluorescent penetrant inspect diffuser case assembly for cracks on a system with capability defined in figure 1A. Refer to T.O. 2J-F100-9. No cracks allowed. All crack indications observed are cause for rejection and require Material Review Board (MRB) evaluation.
- d. Inspect diffuser case assembly per figures 1 through 4.

3. NO. 4 BEARING INTERNAL SCAVENGE TUBE ASSEMBLY - PRESSURE TEST.

- a. Install PWA 71405 pressure test fixture on rear ID flange of diffuser case assembly, aligning extension with spanner nut on scavenge tube assembly. Ensure rubber gasket is installed in extension. Secure with three nuts.
- b. Thread spanner nut into pressure test adapter extension and tighten, using PWA 57734 wrench.
- c. Install SAALC 7744972 pressure test adapter into connector.
- d. Hook up water supply to SAALC 7744972 adapter.
- e. Flow water slowly through scavenge tube assembly to purge air by releasing bleed valve on PWA 71405 fixture until water comes out.
- f. Close bleed valve and pressure test scavenge tube assembly to 275 to 325 psi water pressure. Refer to T.O. 2-1-111. Hold test pressure for minimum of five minutes. After pressure test, release pressure with bleed valve.

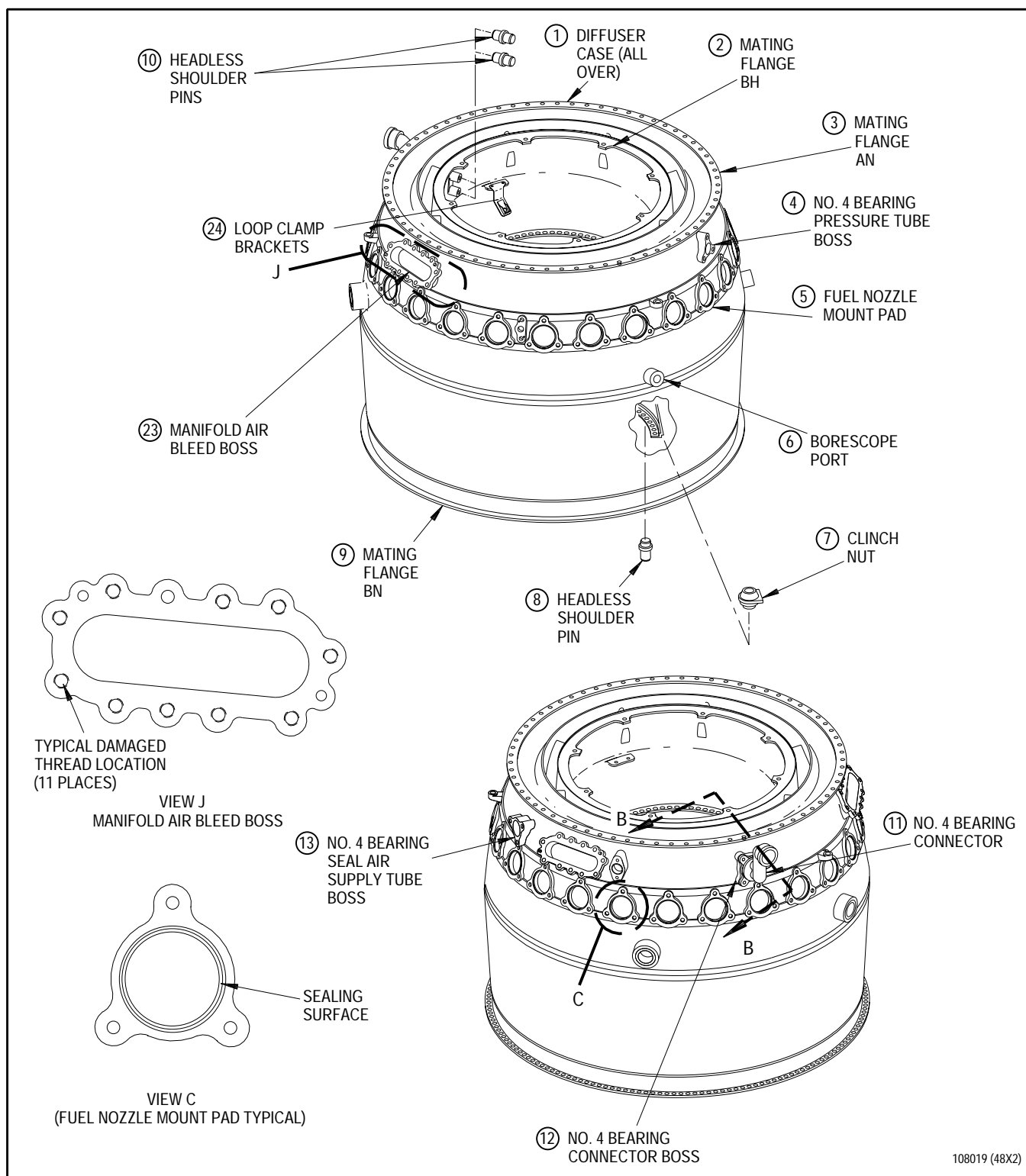
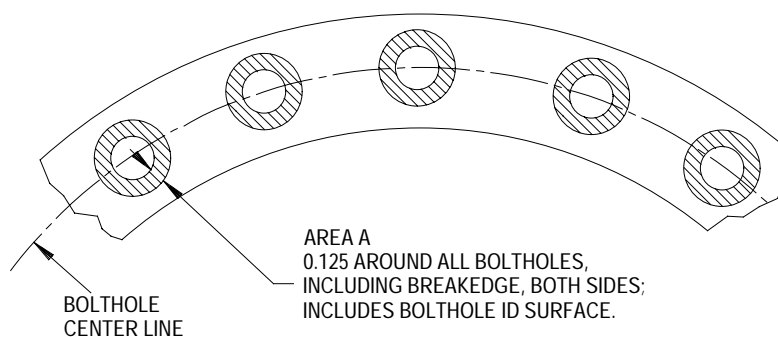
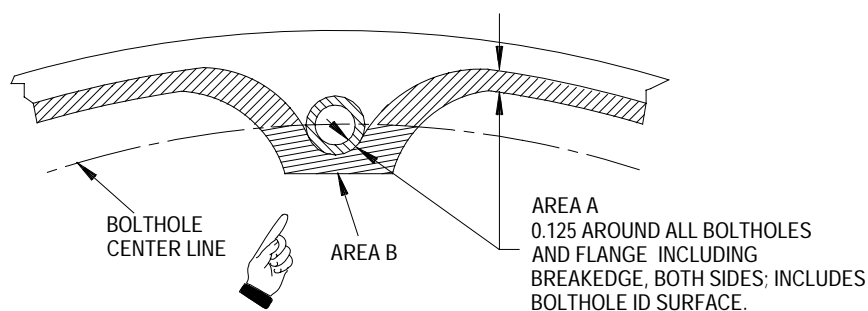


Figure 1. Diffuser Case Assembly - Inspection (Sheet 1 of 5)





VIEW TYPICAL FOR FLANGES BJ, AN, AND BN



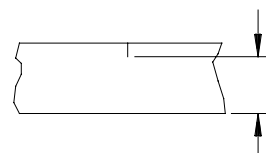
VIEW TYPICAL FOR LUG FLANGE BH

FLANGE	MINIMUM WALL THICKNESS
AN	0.160
BJ	0.150
BN	0.165
BH	0.277

NOTE

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

REMAINING WALL THICKNESS
MEASURED FROM BOTTOM
OF NICK OR SCRATCH



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Figure 1. Diffuser Case Assembly - Inspection (Sheet 3 of 5)

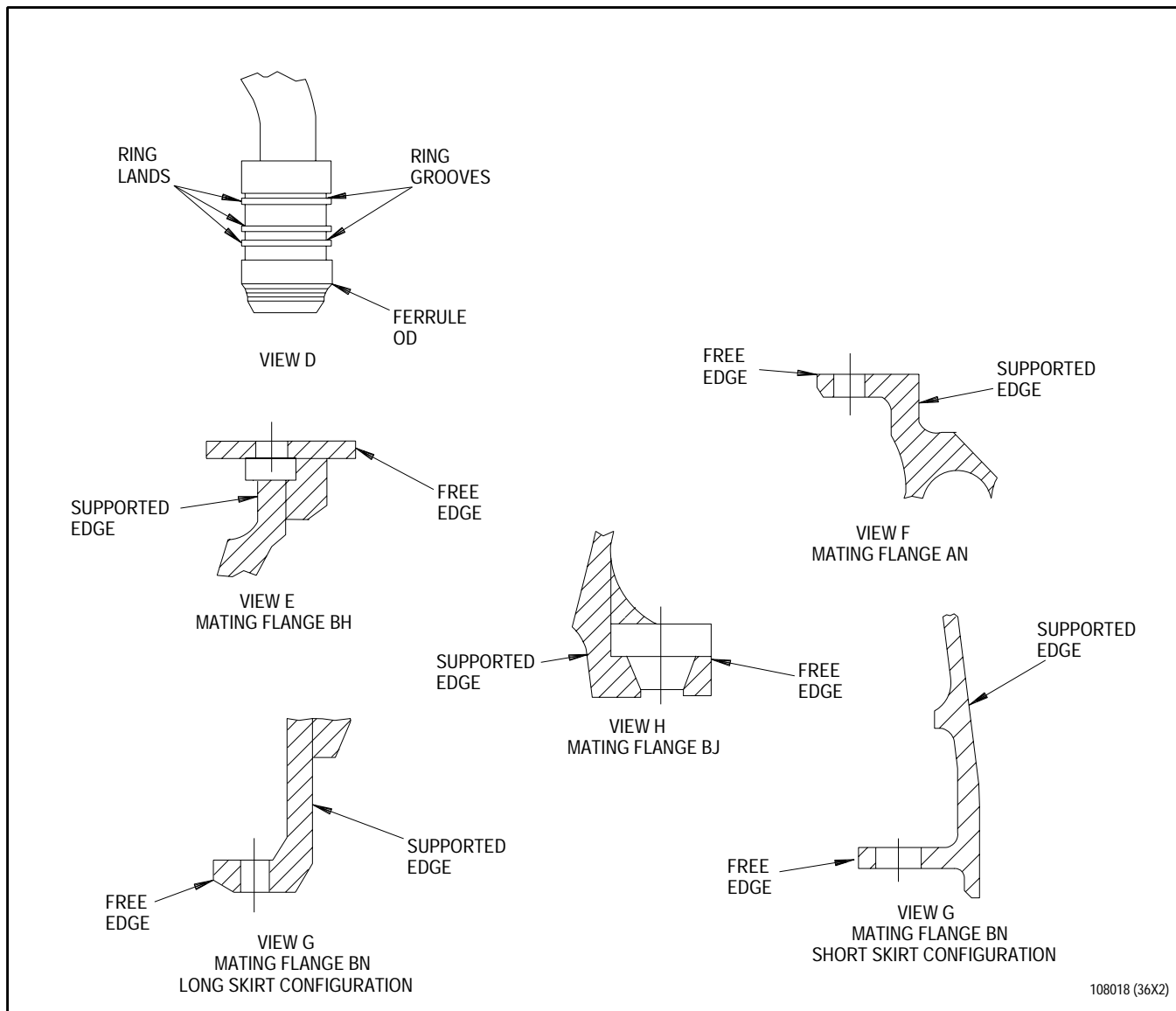


Figure 1. Diffuser Case Assembly - Inspection (Sheet 4 of 5)

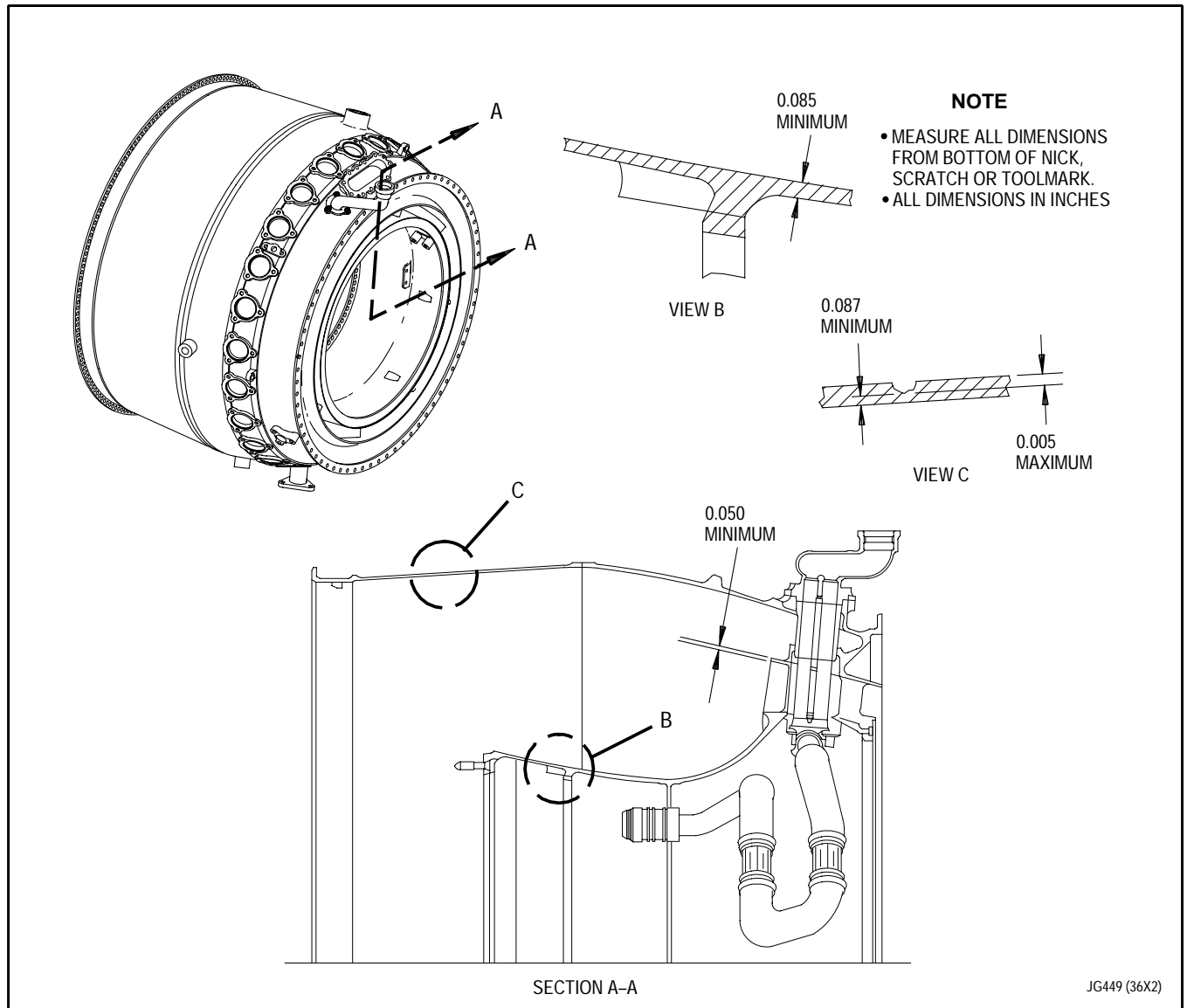


Figure 1. Diffuser Case Assembly - Inspection (Sheet 5 of 5)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Diffuser case (All over) -			
Cracks	Not serviceable	Not repairable	Replace case.
Bulges	1/4 inch, provided flanges are not distorted	Not repairable	Replace case.
Smooth, round-bottom dents without raised edges except in air bleed supply manifold	Dents shall not extend within 0.500 inch of any weld. Ratio(W/D) of minimum width(W) of dent to depth(D) of dent shall be 15/1.	Not repairable	Replace case.
Nicks, scratches, toolmarks except flanges	0.005 inch maximum depth by 6.000 inch maximum length provided: a. There is 1.000 inch minimum distance from edge of any dent. b. Minimum wall thickness dimensions in Sheet 5 are maintained.	See corrective action.	Blend repair per WP 434 00.
Porosity, voids, shrinkage on diffuser cast surfaces	Total of 6 discontinuities per square inch. Maximum 0.045 inch non-linear indication allowed. Maximum of 1 linear indication up to 0.032 inch per square inch. Alternatively: 1 cluster up to 0.375 inch is allowed in any 2.0 square inches provided the maximum non-linear indication within the cluster is 0.032 inch and the maximum linear indication within the cluster is 0.015 inch.	See corrective action.	Blend repair per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Mating Flange BH -			
NOTE			
It is recommended that nicks and scratches extending from a bolthole to flange free edge be blended out where possible to preclude crack initiation.			
Nicks, scratches inside Area A. (See Sheets 3 and 4.)	0.002 inch maximum depth by 1.000 inch maximum length provided: a. Minimum wall thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Nicks, scratches inside Area B. (See Sheets 3 and 4.)	0.010 inch maximum depth by 1.000 inch maximum length provided: a. Minimum wall thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Nicks, scratches outside Areas A and B. (See Sheets 3 and 4.)	0.005 inch maximum depth by 1.000 inch maximum length provided: a. Minimum wall thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Mating Flange BH (continued) -			
Cracks	Not serviceable	Not reparable	Replace case.
Bent	Refer to paragraph 5.	Not reparable	Replace case.
Thread damage	Not serviceable	Damage to 2 threads	Thread repair per WP 434 00.
3. Mating Flange AN -			

NOTE

It is recommended that nicks and scratches extending from a bolthole to flange free edge be blended out where possible to preclude crack initiation.

Cracks	Not serviceable	Not reparable	Replace case.
Nicks, scratches inside Area A. (See Sheets 3 and 4.)	0.002 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Nicks, scratches outside Area A. (See Sheets 3 and 4.)	0.005 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Bent	Refer to paragraph 5.	Not reparable	Replace case.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. No. 4 bearing pressure tube boss -			
Flange lug flatness	0.010 inch	Not reparable	Replace case.
Cracks	Not serviceable	Not reparable	Replace case.
5. Fuel nozzle mount pad - (See sheet 1.)			
Nicks, pits, scratches, toolmarks on sealing surface	Three maximum, 0.0025 inch depth by 0.005 inch width.	Not reparable	Replace case.
Nicks, pits, scratches, toolmarks on areas other than sealing surface	0.005 inch depth by 1.000 inch length provided no raised material is present	See corrective action.	Blend to remove raised material per WP 434 00.
Cracks	Not serviceable	Not reparable	Replace case.
Bolthole thread damage	Not serviceable	Damage to 2 threads	Thread repair per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Borescope port -			
Galling	Not serviceable	Not reparable	Replace case.
Surface wear, boss face	Full ring 0.020 inch depth	Not reparable	Replace case.
Cracks	Not serviceable	Not reparable	Replace case.
7. Clinch nuts -			
Threads stripped or cross-threaded	Not serviceable	See corrective action.	Replace nut per WP 434 00.
Nut missing	Not serviceable	See corrective action.	Replace nut per WP 434 00.
8. Headless shoulder pin -			
Missing	Not serviceable	See corrective action.	Replace pin per WP 434 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 434 00.
Bent	0.005 inch	See corrective action.	Replace pin per WP 434 00.
Nicks	Not serviceable	See corrective action.	Remove burrs by blending per WP 434 00 or using crocus cloth or fine files or stones.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
9. Mating Flange BN -			
NOTE			
It is recommended that nicks and scratches extending from a bolthole to flange free edge be blended out where possible to preclude crack initiation.			
Cracks	Not serviceable	Not reparable	Replace case.
Bent	Refer to paragraph 5.	Not reparable	Replace case.
Nicks, scratches inside Area A. (See Sheets 3 and 4.)	0.002 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Nicks, scratches outside Area A. (See Sheets 3 and 4.)	0.005 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
10. Headless shoulder pins -			
Missing, loose	Not serviceable	See corrective action.	Replace pin per WP 434 00.
Scored, bent	0.005 inch depth	See corrective action.	Replace pin per WP 434 00.
Nicks	Not serviceable	See corrective action.	Remove burrs by blending, or replace pin per WP 434 00.
11. No. 4 bearing connector -			
Cracked or broken lugs	Not serviceable	Not reparable	Replace case.
12. No. 4 bearing connector boss -			
Flange lug flatness	0.010 inch	Not reparable	Replace case.
Cracks	Not serviceable	Not reparable	Replace case.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
13. No. 4 bearing seal air supply tube boss -			
Flange flatness	0.010 inch	Not reparable	Replace case.
Cracks	Not serviceable	Not reparable	Replace case.
Bolthole thread damage	Not serviceable	Damage to 2 threads	Thread repair per WP 434 00.
14. Diameter A -			
Wear	22.673 inches diameter	Not reparable	Replace case.
Out-of-round	0.015 inch	Not reparable	Replace case.
Cracks, nicks, dents, scratches or depressions	Not serviceable	Not reparable	Replace case.
15. No. 4 bearing left internal scavenge tube assembly (brazed-in) -			
Heat shield dents	Any shape up to 0.080 inch depth with total length and width not to exceed 1 inch. Dents must have smooth round bottom, with a radius not less than 0.047 inch.	Not reparable	Replace scavenge tube per WP 434 00 or replace heat shield per WP 472 00.
Heat shield looseness	Up to 1/8 inch rotation around tube providing insulation material is not disintegrated or exposed.	Not reparable	Replace scavenge tube per WP 434 00 or tighten or replace heat shield per WP 472 00.
Pressure test	See paragraph 3.	Not reparable	Replace scavenge tube per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
15. No. 4 bearing left internal scavenge tube assembly (brazed-in) (continued) -			
NOTE			
Seal rings are not removed unless rings are damaged, stuck, or not free to float.			
Ring grooves	0.984 inch minimum diameter	Not reparable	Replace scavenge tube per WP 434 00.
Bent lands	Not serviceable	Not reparable	Replace scavenge tube per WP 434 00.
Worn lands	0.063 inch minimum width	Not reparable	Replace scavenge tube per WP 434 00.
Heat shield cracks and chafing	Not serviceable	Not reparable	Replace scavenge tube per WP 434 00 or replace heat shield per WP 472 00.
Heat shield creases	0.750 inch long with round bottom, radius not less than 0.047 inch	Not reparable	Replace scavenge tube per WP 434 00 or replace heat shield per WP 472 00.
Heat shield nicks	0.005 inch depth	Not reparable	Replace scavenge tube per WP 434 00 or replace heat shield per WP 472 00.
Antirootation pin hole wear	See paragraph 4	See corrective action	Remove scavenge tube and repair per WP 472 00.
Coated area damage	Damage on 10% of area	Not reparable	Replace coating per WP 472 00.
Sleeve wear	0.007 inch maximum depth	Not reparable	Replace scavenge tube per WP 434 00.
Sleeve dents	0.007 inch maximum depth with no sharp corners. Not serviceable if in loop clamp location.	Not reparable	Replace scavenge tube per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
16. Retainer -			
Cracks	Not serviceable	See corrective action.	Replace retainer per WP 434 00.
Local damage (but no cracks)	Not serviceable	See corrective action.	Straighten retainer or replace per WP 434 00.
17. Shoulder bolt -			
Cracks	Not serviceable	See corrective action.	Replace damaged bolts per WP 434 00.
Damaged threads	Not serviceable	See corrective action.	Replace damaged bolts per WP 434 00.
18. Diameter FM -			
Wear	12.8805 inches diameter	Not reparable	Replace case.
19. Diameter EN -			
Wear (Long skirt configuration)	27.312 inches diameter	Not reparable	Replace case.
Wear (Short skirt configuration)	28.330 inches diameter	Not reparable	Replace case.
Out-of-round	0.030 inch	Not reparable	Replace case.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
20. Mating Flange BJ -			

NOTE

It is recommended that nicks and scratches extending from a bolthole or dowel pin hole to flange free edge be blended out where possible to preclude crack initiation.

Cracks	Not serviceable	Not reparable	Replace case.
Bent	Refer to paragraph 5.	Not reparable	Replace case.
Nicks, scratches inside Area A. (See Sheets 3 and 4.) (Except as noted above)	0.002 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.
Nicks, scratches outside Area A. (See Sheets 3 and 4.)	0.005 inch maximum depth by 1.000 inch maximum length provided: a. Minimum flange thickness dimensions in Sheet 3 are maintained. b. No raised material above adjacent mating flange surface.	See corrective action.	Blend to remove raised material per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
21. Inner skirt -			
Scratches, pits, nicks	0.005 inch depth	See corrective action.	Blend repair per WP 434 00.
Porosity, voids, shrinkage	Total of 6 discontinuities per square inch. Maximum 0.045 inch non-linear indication allowed. Maximum of 1 linear indication up to 0.032 inch per square inch. Alternatively: 1 cluster up to 0.375 inch is allowed in any 2.0 square inches provided the maximum non-linear indication within the cluster is 0.032 inch and the maximum linear indication within the cluster is 0.015 inch.	See corrective action.	Blend repair per WP 434 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
22. Headless shoulder pin -			
Missing	Not serviceable	See corrective action.	Replace pin per WP 434 00.
Scored	0.005 inch depth	See corrective action.	Replace pin per WP 434 00.
Bent	0.005 inch	See corrective action.	Replace pin per WP 434 00.
Nicks	Not serviceable	See corrective action.	Blend to remove burrs or replace pin per WP 434 00.
23. Manifold air bleed boss -			
Thread damage	Not serviceable	Damage to 2 threads	Thread repair per WP 434 00.
Flange lug flatness	0.005 inch	Not reparable	Replace case.
24. Loop clamp brackets -			
Missing, damaged	Not serviceable	Not reparable	Replace bracket per WP 434 00.
Worn	Not serviceable	Not reparable	Replace bracket per WP 434 00.
Loose	Not serviceable	Not reparable	Tighten or replace bracket per WP 434 00.

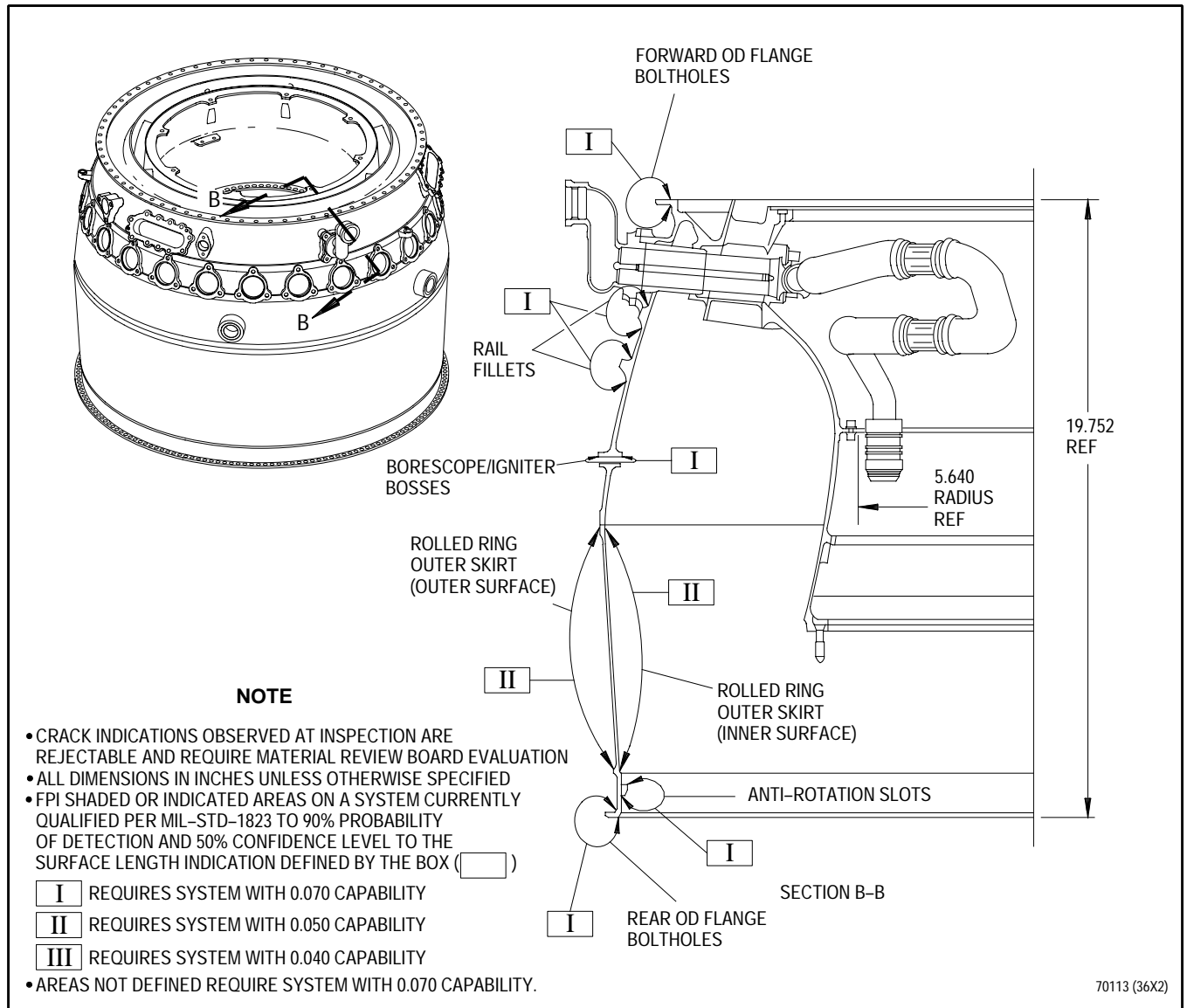


Figure 1A. Diffuser Case Assembly - Required Fluorescent Penetrant System Capability

4. NO. 4 BEARING INTERNAL SCAVENGE TUBE ASSEMBLY - ANTI-ROTATION PIN HOLE INSPECTION.

(See Figure 2.)

- a. With pin installed, dimensionally inspect around hole area. (See dimensions 4 and 5 in figure 2.)

- b. With pin removed, dimensionally inspect hole. (See dimensions 2 and 3.) Do not take measurements from Planes EA and DJ in swaged area(1).

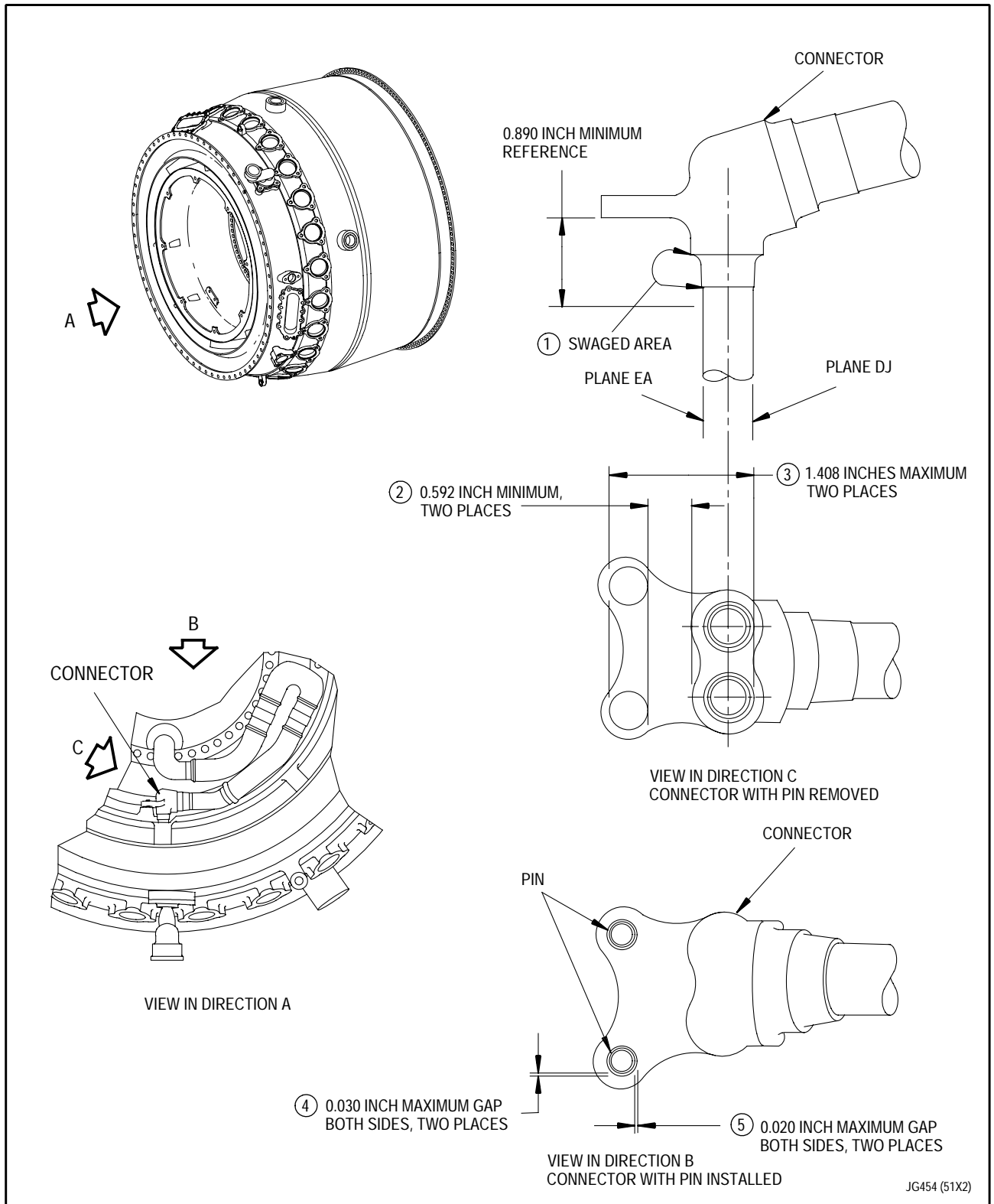


Figure 2. No. 4 Bearing Internal Scavenge Tube Assembly - Anti-Rotation Pin Hole Inspection

**5. DIFFUSER CASE ASSEMBLY - INSPECTION
METHOD TO DETERMINE BENT MATING
FLANGES.**

(See Figures 3 and 4.)

- a. Wipe rotary table and diffuser case with clean dry cloth.
- b. Position flange to be inspected on rotary table. (See figures 3 and 4).
- c. Carefully place three size blocks of same size at equally spaced positions under flange to be inspected.
- d. Move size blocks towards Point D to allow indicator contact on Point C.
- e. Carefully position dial indicator at Point C.
- f. Rotate table 360 degrees and mark high and low points of flange.
 - (1) Return to high point and traverse from Point C to Point D. Reading is amount of taper.
 - (2) If taper reading is positive, flange is bent forward at point of reading.
 - (3) If taper reading is negative, flange is bent aft at point of reading.
 - (4) Repeat steps (1), (2), and (3) for low point.
- g. Maximum serviceable taper in forward direction is 0.010 inch.
- h. Maximum serviceable taper in aft direction is 0.010 inch.

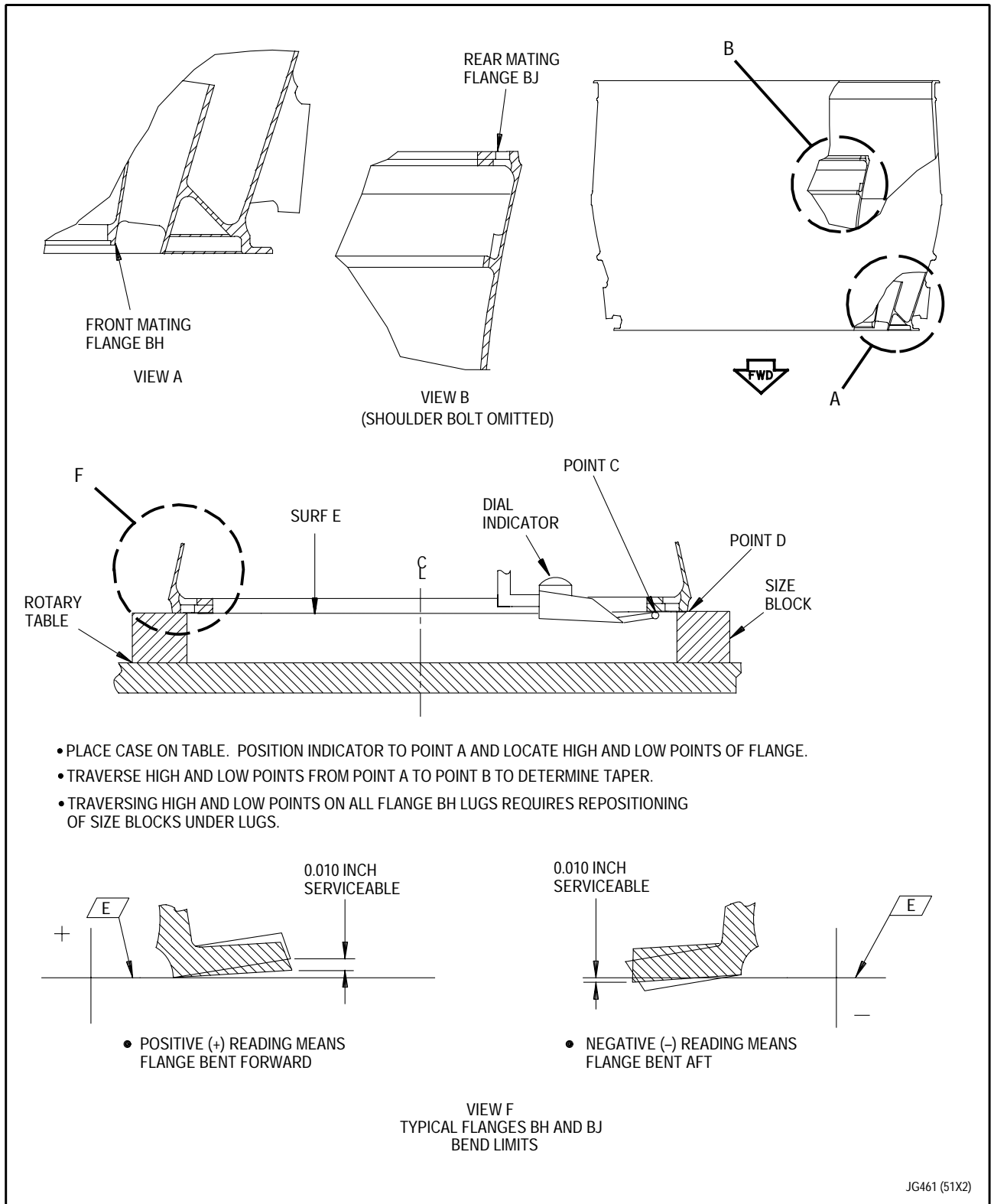


Figure 3. Diffuser Case Assembly - Inspection For Bent Front and Rear ID Flanges

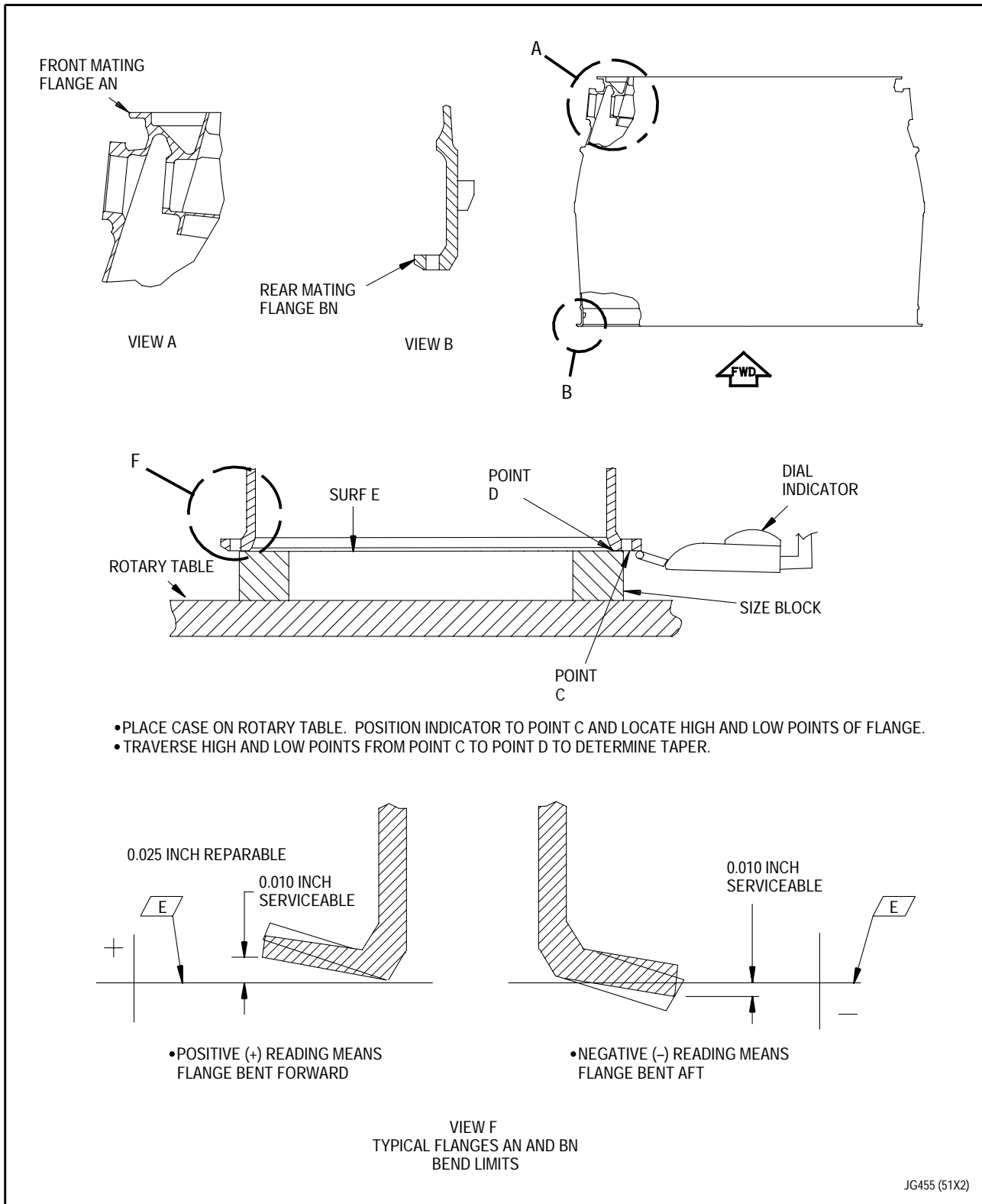


Figure 4. Diffuser Case Assembly - Inspection For Bent Front and Rear OD Flanges

WORK PACKAGE

TECHNICAL PROCEDURES

TIEROD AND TIEROD NUTS, REAR COMPRESSOR -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	7
2	0
3	-	5	.	.	7
6	0

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Cleaning Steel, Magnesium or Titanium Parts, Paint and Varnish Removal (SPOP 250) - - - - -	SWP 031 15
Cleaning Aluminum Parts, Paint and Varnish Removal (SPOP 251) - - - - -	SWP 031 16
Cleaning, Wet Abrasive Blast (SPOP 9) - - - - -	SWP 031 19
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Kit, local fluorescent penetrant inspection	Magnaflux ZA-43

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of rear compressor tierod nuts and tierods.

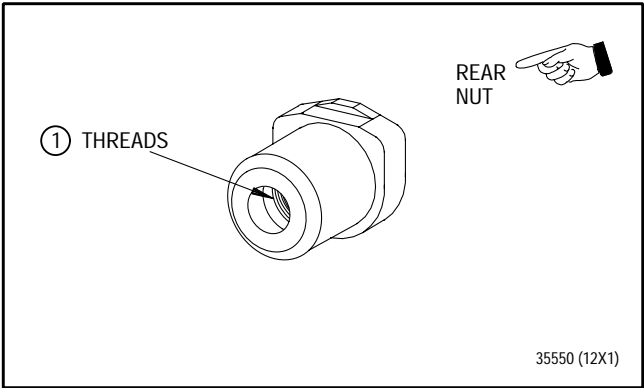
- b. Local fluorescent penetrant inspect all nuts with Magnaflux ZA-43 kit. No cracks allowed.
- c. Visually inspect nuts.
(See figures 1 and 1A.)

2. REAR COMPRESSOR TIEROD NUTS - INSPECTION.

(See Figures 1 and 1A.)

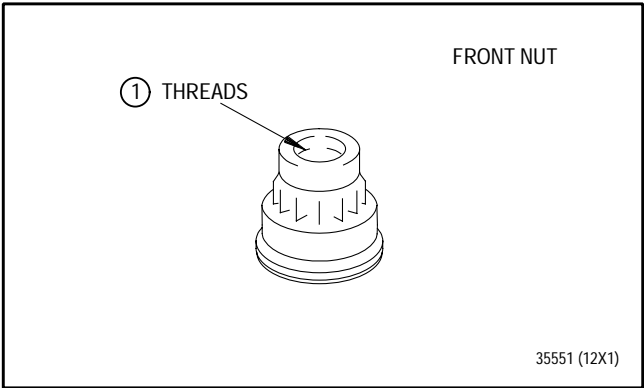
NOTE

- Tierod nuts shall be free of all coating, oil, and dirt.
 - Antigalling compound shall be stripped from front nuts only. This procedure does not apply to rear nuts.
- a. Strip antigalling compound from rear compressor tierod nuts. Refer to T.O. 2J-F100-53-1, SWP 031 15, 031 16, or 031 19 (SPOP 250, 251, or 9).



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Threads - Damage orgalling	Not serviceable	Not reparable	Replace nut.

Figure 1. Rear Compressor Tierod Nuts (Rear Nut) - Inspection



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Threads - Damage orgalling	Not serviceable	Not reparable	Replace nut.

Figure 1A. Rear Compressor Tierod Nuts (Front Nut) - Inspection

3. REAR COMPRESSOR TIERODS - INSPECTION.

(See Figure 2.)

NOTE

Tierods shall be free of all coatings, oil, and dirt.

- a. Perform fluorescent penetrant inspection of rear compressor tierods. Refer to T.O. 2J-F100-9. Reject cracked tierods.

NOTE

Tierod stretch measurement is required each time rear compressor is disassembled. This requirement holds even if rotor has not been engine operated.

- b. Tierods have closely controlled overall length at manufacture. Measure these tierods for stretch as follows:

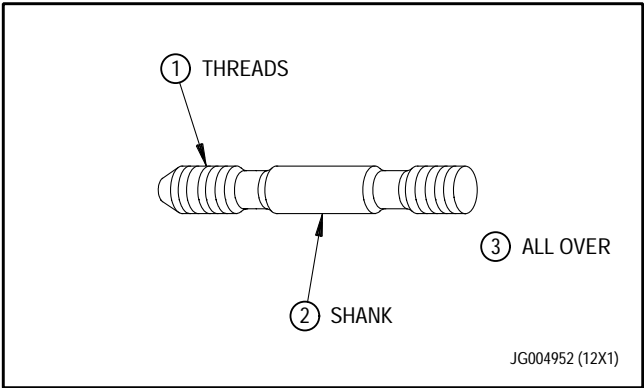
NOTE

Stretch measurement shall be accomplished using surface plate and dial indicator with accuracy readable to ± 0.0002 inch.

- (1) Measure overall length of tierod.

- (2) Reject tierods over maximum length of 2.609 inches.

- c. Visual inspection of rear compressor tierods.
(See figure 2.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Threads - Damage orgalling	Not serviceable	Not repairable.	Replace tierod.
2. Shank - Scratches,pits, nicks,dents	Not serviceable	Not repairable.	Replace tierod.
3. All Over - Bent	Not serviceable	Not repairable.	Replace tierod.
Raisedmaterial	Not serviceable	Not repairable.	Replace tierod.

Figure 2. Rear Compressor Tierods - Inspection

WORK PACKAGE**TECHNICAL PROCEDURES****TUBING, DIFFUSER CASE -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 20

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	9 - 10	0	13 - 14	19
2 - 5	27	11	29	15 - 16	0
6 - 7	0	12	0	17 - 18	27
8	29			19 - 20 Added	27

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Brazing, General - - - - -	WP 094 00
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Case Assembly, Diffuser - Inspection - - - - -	WP 370 00
Tubing, Diffuser Case - Repair - - - - -	WP 472 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE CROCUS	P-C-458

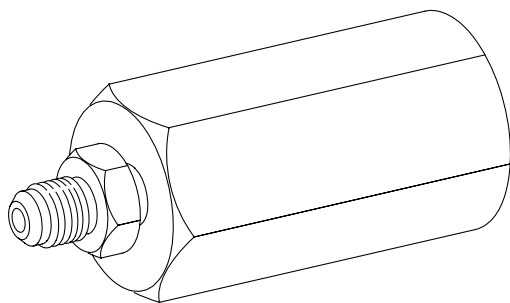
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

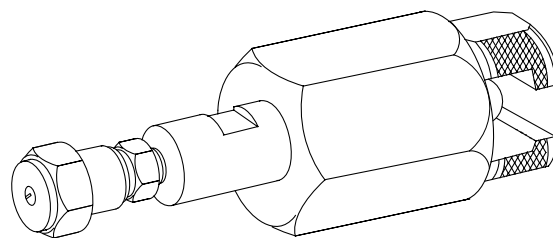
Paragraph	Function - Tool Nomenclature	Tool Number
4	DIFFUSER CASE TUBING - PRESSURE CHECKING	
	ADAPTER, TUBE, PRESSURE TEST - - - - -	PWA 53759
	PLUG, TUBE, PRESSURE TEST - - - - -	PWA 53758
	ADAPTER, TUBE, PRESSURE TEST - - - - -	PWA 53399
	PLUG, TUBE, PRESSURE TEST - - - - -	PWA 53424
9	NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - INSPECTION	
	GAGE, CLEARANCE ENVELOPE - - - - -	PWA 71641

ILLUSTRATED SUPPORT EQUIPMENT



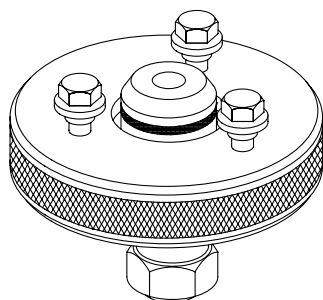
PWA 53399 -C

Figure T1. PWA 53399 ADAPTER



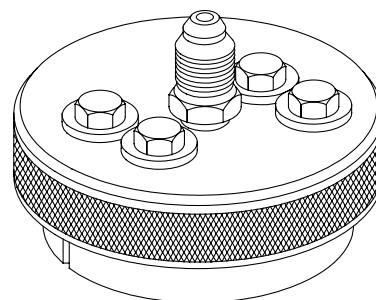
PWA 53424 -C

Figure T2. PWA 53424 PLUG



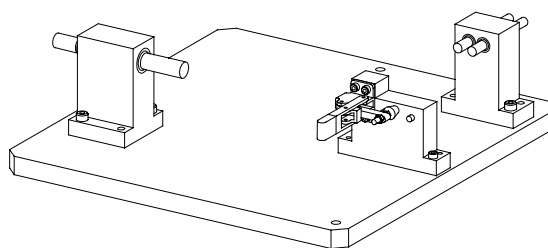
PWA 53758 -C

Figure T3. PWA 53758 PLUG



PWA 53759 -C

Figure T4. PWA 53759 ADAPTER



PWA 71641 -C

Figure T5. PWA 71641 GAGE

1. INTRODUCTION.

NOTE

When installed, No. 4 bearing left internal scavenge tube assembly is brazed into diffuser case assembly. Refer to WP 370 00 for inspection of installed scavenge tube assembly.

- a. This work package contains instructions for inspection of No. 4 bearing internal pressure tube assembly, No. 4 bearing seal air supply tube assembly, No. 4 bearing internal air vent tubes assembly, No. 4 bearing internal pressure manifold assembly, static pressure probe assembly, and No. 4 bearing left internal scavenge tube assembly when removed from diffuser case.

- b. Flattening: flattening due to bends shall not exceed 5% of nominal tube OD oil lines and 10% on all other lines.
- c. Nicks and gouges: nicks and gouges less than 0.004 inch deep are acceptable. All others shall be blend repaired per WP 472 00 or replaced.
- d. Chafing: chafing less than 0.004 inch deep is acceptable. Deeper chafing shall be blended to remove sharp edges or corners with less than 0.060 inch radius. Blend repair per WP 472 00. Chafe shall not extend more than 180 degrees of tube circumference.

- (1) Pointed micrometer is required for chafing inspection. Measure tube OD with point of micrometer in cavity of chafed area.
- (2) Measure tube OD with point of micrometer on tube outer wall immediately adjacent to chafed area.
- (3) The difference between two dimensions equals depth of chafe.

2. DIFFUSER CASE TUBING - SURFACE DAMAGE INSPECTION.

(See Table 1.)

NOTE

Table 1 contains tubing material, type system, and diameters.

- a. Dents (all dents are acceptable provided):
- (1) Depth shall not exceed 5% of nominal tube OD.
- (2) No portion of dent has sharp edges or corners with radius less than 0.060 inch. Blend repair per WP 472 00.

e. Scratches: minor scratches of a depth less than 0.002 inch are acceptable. Deeper scratches shall be blended to remove all sharp edges or corners with less than 0.060 radius. Blend repair per WP 472 00. Scratches extending 180 degrees or around tube circumference are unacceptable.

f. Pits: visible corrosion pits and/or minor isolated pitting is acceptable provided depth is not greater than 0.002 inch. Deeper pitting (isolated pits or clusters of pits) shall be blended per WP 472 00.

Table 1. Diffuser Case Tubing - Material, Size, and Type System

Part Number	Nomenclature	Material	OD (Inch)	Wall Thickness (Inch)	Type System
4035859	No. 4 bearing pressure manifold	Stainless steel	0.300	0.035	Oil
4070082	No. 4 bearing seal air supply tube assembly	Nickel alloy	1.000	0.035	Air
4069160	No. 4 bearing internal pressure tube assembly	Stainless steel	0.438	0.028	Oil
4074872, 4069897	No. 4 bearing internal air vent tube assembly	Nickel alloy	0.245	0.028	Air
4072991, 4081460	No. 4 bearing left internal scavenge tube assembly	Stainless steel	0.750	0.030	Oil

3. DIFFUSER CASE TUBING - BRAZED JOINTS INSPECTION.

(See Figure 1 and table 1.)

- a. Tubes and manifold assemblies brazed joints shall meet visual inspection limits. Refer to T.O. 2J-F100-53-1, WP 094 00.
- b. Exterior of brazed joints shall show complete ring of braze material around entire circumference of joint. Joints having recessed braze are not acceptable.
- c. Brazed fillets shall conform to dimensional requirements as shown in figure 1.
- d. Excess braze or staining away from fillet is acceptable provided thickness of brazed material is no greater than 0.003 inch. Braze on cone seats is not acceptable. Staining is acceptable on conical seats provided:
 - (1) There is evidence of continuous circumferential sealing for 360 degrees.
 - (2) Surface scratches are less than 0.001 inch deep.
- e. Excess braze over 0.003 inch thick or scaling may be removed by light polish with P-C-458 crocus cloth or rag wheel without abrasive dressing or by vapor blast. Minimum wall thickness shall be maintained.
- f. Fillet or line of braze at edges of stand-off collars (tube clamp reinforcement) may be interrupted provided that fillet or line of braze is present for at least 50% of length of each edge and that braze is evident within 25% of edge length from each corner.
- g. Tubes shall meet radiographic inspection requirements. Refer to T.O. 2J-F100-53-1, WP 094 00.

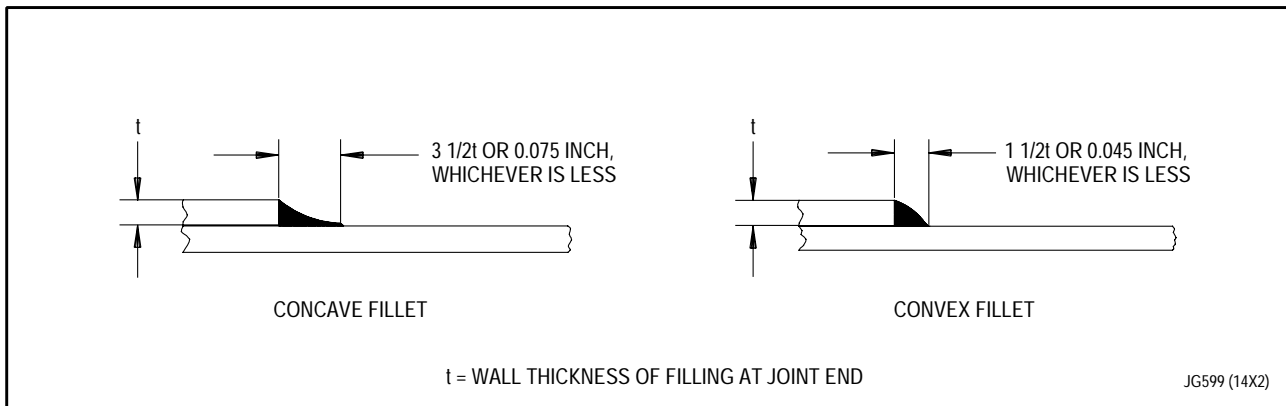


Figure 1. Acceptable Braze Fillets on Tube Assemblies

4. DIFFUSER CASE TUBING - PRESSURE CHECKING.

(See Table 2.)

NOTE

No. 4 bearing internal air vent tube assemblies do not require pressure test.

- a. Use appropriate plugs and adapters per table 2 to cap tube assemblies and install tube in test bench.
- b. Use test bench which uses water as fluid to check and locate leaks by pressurizing parts per table 2.
- c. Pressure check using standard pressure checking procedure. Required test pressure shall be held for a minimum of one minute. (See table 2.) No leakage in any amount or deformation due to test pressure is acceptable.

Table 2. Diffuser Case Tubing Pressure Testing Tools and Pressure Levels

Tube PN	Adapter	Plug	Wrench	Pressure Level (psig)
4035859	TBD	TBD	-	275 - 325
4070082	PWA 53759	PWA 53758	-	1000
4069160	PWA 53399	PWA 53424	-	275 to 325

(See Figure 2.)

- Tube is replaced at scheduled inspection. Following inspection limits apply during unscheduled maintenance only.
- Do not remove heat shields unless loose or damaged beyond inspection limits.

- a. If heat shields are serviceable, inspect tube areas not covered by heat shield. (See figure 2.) If heat shields are removed, inspect exposed tube areas. (See figure 2.)
- b. Apply PWA 298 antigalling compound per WP 472 00.



Legend for figure 2

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Heat shield -			
Loose	0.005 inch movement in any direction at ends. No movement allowed at center welded end of heat shields.	See corrective action.	Replace tube.
Cracks	Not serviceable	See corrective action.	Replace tube.
Dents	0.080 inch depth, 0.060 inch minimum bottom radius. No dents within 1/2 inch of heat shield ends.	See corrective action.	Replace tube.
Scratches	0.004 inch maximum depth. Maximum length one inch in any direction.	See corrective action.	Replace tube.
2. Insulation -			
Deteriorated or missing	Not serviceable	See corrective action.	Replace tube.
3. Loop clamp stiffener (sleeve) -			
Wear	0.004 inch maximum allowed for loop clamp contact area. No sharp corners.	See corrective action.	Replace tube.
	Local round-bottom wear areas not to exceed 0.003 inch depth or 0.125 inch diameter.	See corrective action.	Replace tube.
Cracks	Not serviceable	See corrective action.	Replace tube.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
3. Loop clamp stiffener (sleeve) - (continued)			
Scratches	0.004 inch maximum depth	Not repairable.	Replace tube.
Dents	0.004 inch maximum depth. Area not to exceed 0.125 inch diameter.	Not repairable.	Replace tube.
NOTE			
If heat shields were removed for damage, inspect tube and fitting wear surfaces per item 3.			
4. Coated area -			
Damage	90% of coating shall be intact.	Not repairable.	Replace tube.
5. Fitting wear surface with heat shields removed -			
Wear	0.005 inch maximum diametrical wear	Not repairable.	Replace tube.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Ring groove B - Wear	0.550 inch minimum diameter	Not reparable	Replace tube.
7. Ring groove A -			
NOTE			
Do not remove metal seal rings unless rings are damaged, stuck, or not free to float.			
Wear	0.886 inch diameter minimum (View A ref.)	Not reparable	Replace tube.
7A. Conical sealing surface -			
Nicks	Not serviceable	Not reparable	Replace tube.
Scratches	Not serviceable	Not reparable	Replace tube.
Dents	Not serviceable	Not reparable	Replace tube.
8. Threads -			
Nicks	Not serviceable	Not reparable	Replace tube.
Scratches on thread face	Not serviceable	Not reparable	Replace tube.
Stripped	Not serviceable	Not reparable	Replace tube.
Rolled	Not serviceable	Not reparable	Replace tube.

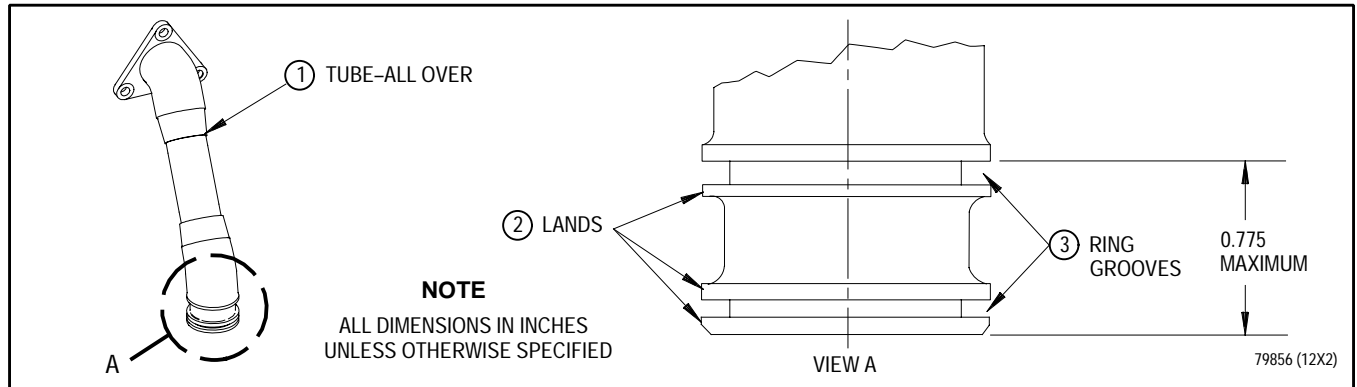
Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
9. Ring groove land A -			
Bent	Not serviceable	See corrective action.	Replace tube.
Wear	0.040 inch minimum width. 1.055 inch minimum diameter (View A ref.)	See corrective action.	Replace tube.
10. Ring groove land B -			
Wear	0.040 inch width 0.990 inch minimum diameter.	See corrective action.	Replace tube.
Bent	Not serviceable	See corrective action.	Replace tube.
11. Bushing -			
Loose	Not serviceable	See corrective action.	Replace tube.
Wear	0.004 inch wear or elongation	See corrective action.	Replace tube.

6. NO. 4 BEARING SEAL AIR SUPPLY TUBE ASSEMBLY - INSPECTION.

(See Figure 3.)

- a. Visually inspect No. 4 bearing seal air supply tube assembly per figure 3.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Tube (all over) - See paragraph 2.	See paragraph 2.	See corrective action.	Replace tube.
2. Lands - Wear	0.055 inch minimum width. 1.185 inch minimum diameter.	See corrective action.	Replace detail or weld repair per WP 472 00.

Figure 3. No. 4 Bearing Seal Air Supply Tube Assembly - Inspection

Legend for figure 3 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Ring grooves -			

NOTE

Removal of metal seal rings for inspection of ring groove is only necessary if rings are damaged, stuck, or not free to float.

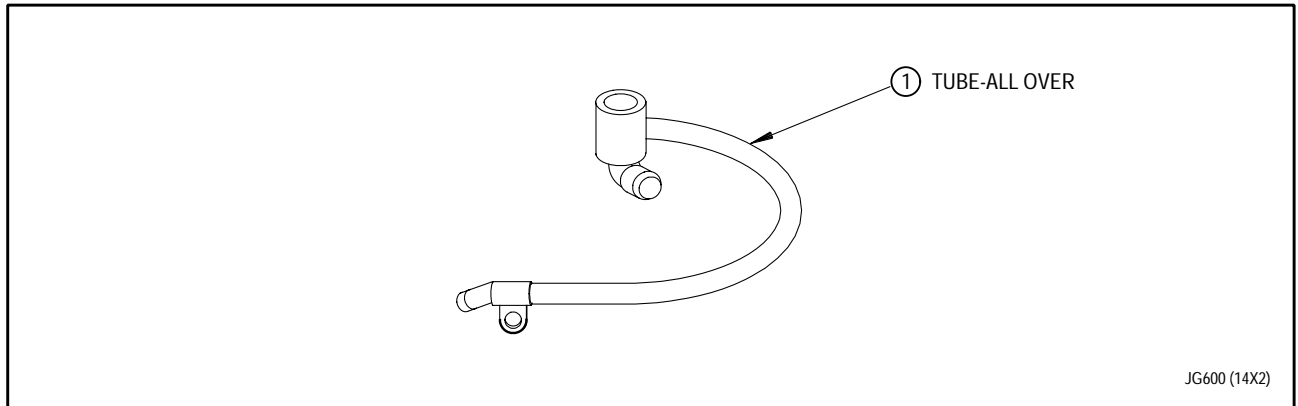
Wear (Face)	Refer to WP 801 00, Reference 3216.	See corrective action.	Replace detail or weld repair per WP 472 00.
Wear (OD)	0.990 inch diameter minimum. Maintain 0.775 inch maximum dimension shown.	See corrective action.	Replace detail or weld repair per WP 472 00.

7. NO. 4 BEARING INTERNAL MANIFOLD ASSEMBLY - INSPECTION.

(See Figure 4.)

- b. Pressure check manifold assembly. (See paragraph 4.)

- a. Visually inspect No. 4 bearing internal manifold assembly.
(See figure 4.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Tube (all over) - See paragraph 2.	See paragraph 2.	See corrective action.	Replace tube.

Figure 4. No. 4 Bearing Internal Manifold Assembly - Inspection

8. STATIC PRESSURE PROBE ASSEMBLY - INSPECTION.

(See Figure 5.)

- a. Fluorescent penetrant inspect static pressure probe assembly. No cracks allowed. Refer to T.O. 2J-F100-9.
- b. Visually inspect probe assembly. (See figure 5.)

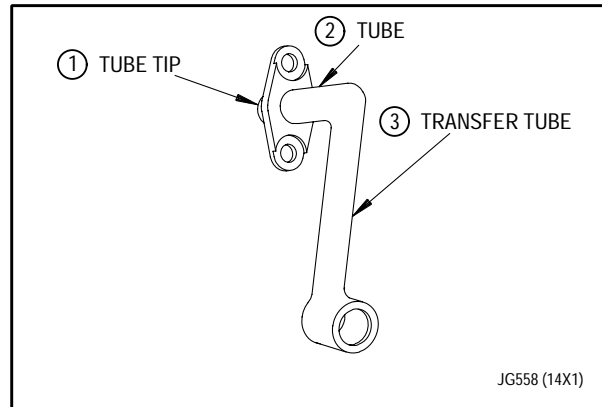


Figure 5. Static Pressure Probe Assembly - Inspection

Legend for figure 5

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Tube tip -			
Wear, chafing	Minimum wall thickness of 0.070 inch shall be maintained	Not reparable.	Replace tube assembly.
2. Tube -			
Nicks	0.004 inch depth	Reparable	Blend repair per WP 472 00.
Dents	Depth shall not exceed 5% of nominal tube OD. No portion of dent shall have sharp edges or corners with radius of less than 0.060 inch.	Reparable	Blend repair per WP 472 00.
Scratches	0.002 inch depth	Reparable	Blend repair per WP 472 00. Replace tube assembly if scratch extends more than 180° around tube.
3. Transfer tube -			
Nicks, dents, scratches	Not serviceable	Reparable	Blend repair per WP 472 00.

9. NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - INSPECTION.

(See Figure 6.)

a. Visually inspect tube assembly per figure 6.

b. Inspect clearance envelope of tube assembly end points using PWA 71641 gage. Replace deviated tube.

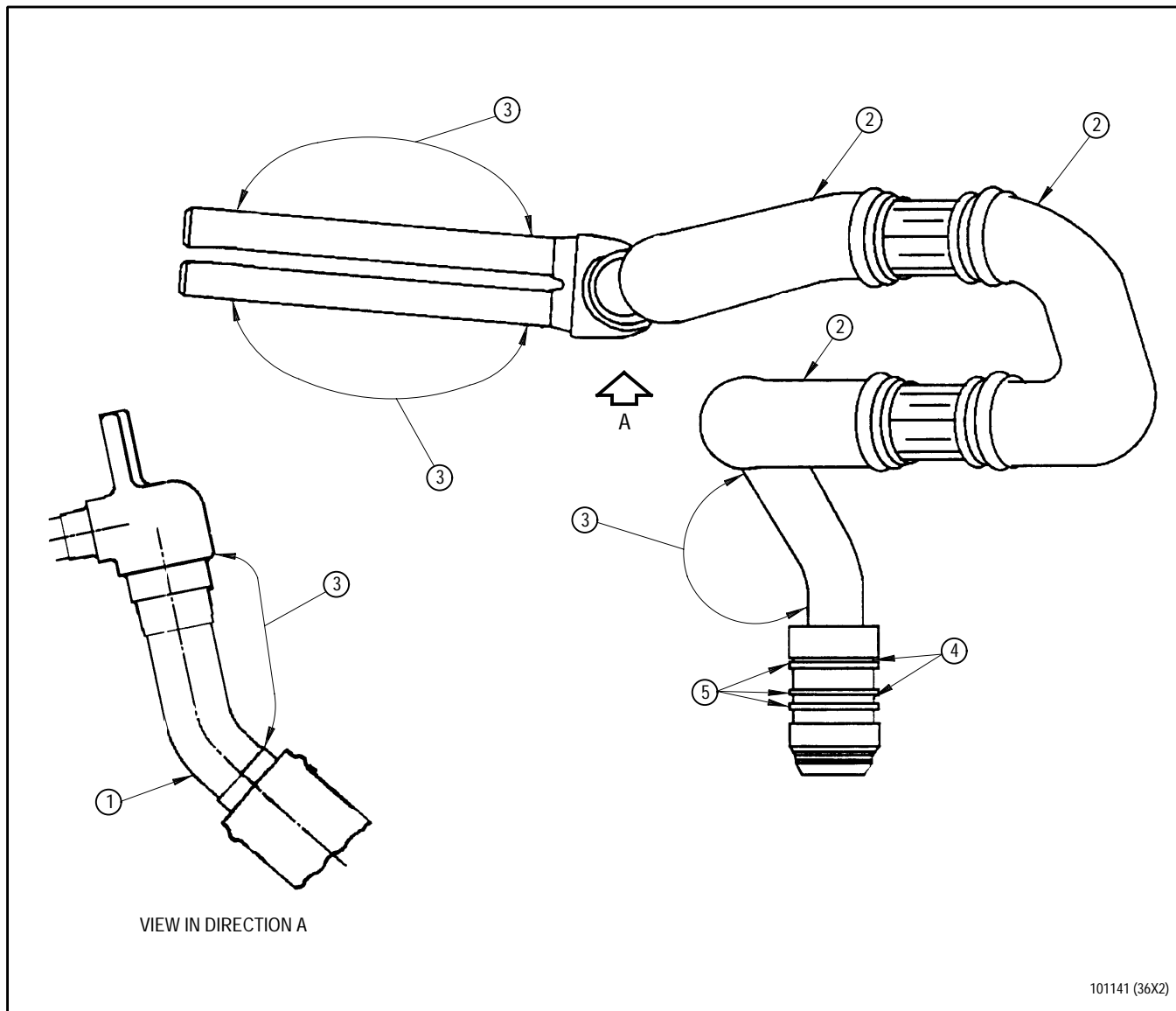


Figure 6. No. 4 Bearing Left Internal Scavenge Tube Assembly - Inspection

Legend for figure 6

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
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NOTE

Removal of heat shields for inspection of tube is necessary only if wire wrap is broken or missing, or if heat shields are loose with more than 0.250 inch rotation.

1. Tube (all over) -			
See paragraph 2	See paragraph 2	Any amount	Blend per WP 472 00.
2. Heat shield -			
Dents (round bottom)	Any shape up to 0.080 inch depth with total length and width not to exceed 1 inch. Must be smooth bottomed with no sharp corners. Four dents allowed for each heat shield section.	Not reparable	Replace heat shield per WP 472 00.
Creases	3/4 inch long with round bottom and no sharp corners	Not reparable	Replace heat shield per WP 472 00.
Nicks and gouges	0.005 inch maximum	Not reparable	Replace heat shield per WP 472 00.
Cracks and chafing	Not serviceable	Not reparable	Replace heat shield per WP 472 00.
Loose	0.100 inch rotation of heat shield at stand-off	Any amount	Replace or tighten heat shield per WP 472 00.
3. Coated area -			
Damage	90% shall be intact	Any amount	Replace coating per WP 472 00.

Legend for figure 6 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
4. Ring groove -			
NOTE			
Metal seal rings are not removed unless rings are damaged, stuck, or not free to float.			
Wear	0.984 inch diameter minimum	Not reparable	Replace ring per WP 472 00.
5. Ring lands -			
Bent	Not serviceable	Not reparable	Replace ring per WP 472 00.
Wear	0.063 inch minimum width	Not reparable	Replace ring per WP 472 00.
Worn in steps	Not serviceable	Not reparable	Replace ring per WP 472 00.

WORK PACKAGE

TECHNICAL PROCEDURES

RING ASSEMBLY, AIR SEALING, NO. 4 BEARING, FRONT (MULTIPLE LANDS) -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	1
2	-	3	.	.	0
4	1
5	-	6	.	.	0

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Ring - Assembly of, Air sealing, No. 4 Bearing Front and Air seal, No. 4 Bearing Front - Measurement - - - - -	WP 338 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 4 bearing front air sealing ring assembly (multiple lands).

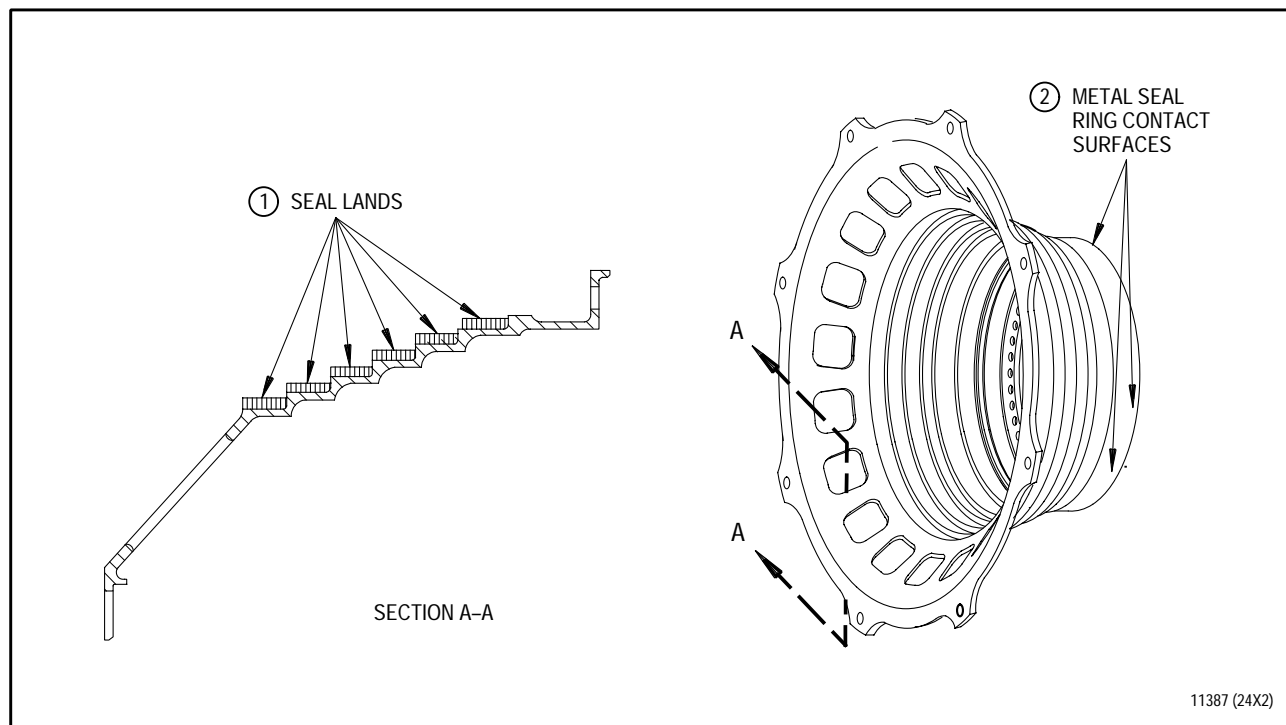
2. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (MULTIPLE LANDS) - MEASUREMENT OF INSIDE DIAMETERS.

- a. Measure seal lands (abradable surfaces) diameters per WP 338 00.

3. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (MULTIPLE LANDS) - INSPECTION.

(See Figure 1.)

- a. Visually inspect No. 4 bearing front air sealing ring assembly.
(See figure 1.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Seal lands - Abrasive rub grooves	a. 360 degrees b. 1/32 inch depth	Not repairable	Replace ring assembly.

Figure 1. No. 4 Bearing Front Air Sealing Ring Assembly (Multiple Lands) - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. Seal lands - Nicks, gouges, dents and missing abrable material	<p>a. 3/32 inch width extending along front and rear land edges up to 360 degrees on all lands except rearmost. See b.</p> <p>b. 3/32 inch width extending along front edge and 3/16 inch wide extending along rear edge up to 360 degrees of rearmost seal land.</p> <p>c. 3/16 inch diameter (two per land).</p> <p>d. Less than 1/16 inch diameter over entire shroud.</p> <p>e. Depth of damaged areas may extend to full depth of abrable material and any single damage may intersect front or rear, but not both edges of any single seal land.</p> <p>f. Unbonded abrable material is acceptable in damage areas (a, b, c, and d) above provided bond of surrounding material is sound.</p>	See corrective action.	Replace ring assembly.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Metal seal ring contact surface -			
Abrasion, wear, grooves, nicks and gouges	a. 360 degrees b. 0.010 inch below adjacent surface. Remove raised metal by honing before measuring. Measure with dial indicator having 0.038 to 0.040 inch diameter point. Traverse surface axially.	Not reparable	Replace ring assembly.

WORK PACKAGE**TECHNICAL PROCEDURES****BLADES, COMPRESSOR ROTOR, FOURTH THROUGH THIRTEENTH STAGE -****INSPECTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	28	4 - 4B	26	9	28
2	0	5 - 8	26	10 Blank	28
3	28				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Blades, Compressor Rotor (Fourth Through Thirteenth Stage) - Repair - - - - -	WP 474 00
Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Application of Adhesive Sealant PWA 36056 - - - -	WP 627 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th through 13th stage compressor rotor blades.

2. FOURTH THROUGH THIRTEENTH STAGE COMPRESSOR ROTOR BLADES - INSPECTION.

(See Figures 1 through 1C.)

NOTE

- Compressor blade blend limits in this work package are evaluated from the standpoint of structural integrity only. Use of substantial number of blades reworked at or near maximum limits, or blades having many reworked areas, may adversely affect compressor efficiency and engine performance.
- Limits of figures apply to damaged area after blending, not to size of damage measured before blending.
- a. Visually inspect compressor rotor blades for nicks, cracks, dents, galling, fretting, abrasible splatter, and discoloration. See figures 1 and 1A. Evaluate damage considering the following:
 - (1) Nicks in leading and trailing edge become more critical closer to blade root.
 - (2) Damage with small radii or ragged edges are critical.
 - (3) Dents and nicks near leading and trailing edge corners of blade tip are not critical.

- (4) Damage on blade leading and trailing edges shall be separated at least 1/4 inch radially.
- (5) Well-rounded damage to leading and trailing edges and airfoil surface which can be seen on opposite side of blade is acceptable provided damage is in upper half of blade and indentations do not exceed limits specified in this WP.

- (6) Remove blade root Cu-Ni (copper-nickel) coating and inspect for galling per WP 474 00.

- (7) Abradable splatter or loss of tip coating.

- b. Determine whether blade tips(6, figures 1 and 1A) are burned or discolored.

- (1) Burned blade tips have ragged or rounded edges. Blades may have splattered abrasible material on airfoils.
- (2) Discolored blade tips have multicolored, heat-affected appearance.

- c. Fluorescent penetrant inspect compressor rotor blades. Refer to T.O. 2J-F100-9. No cracks allowed.

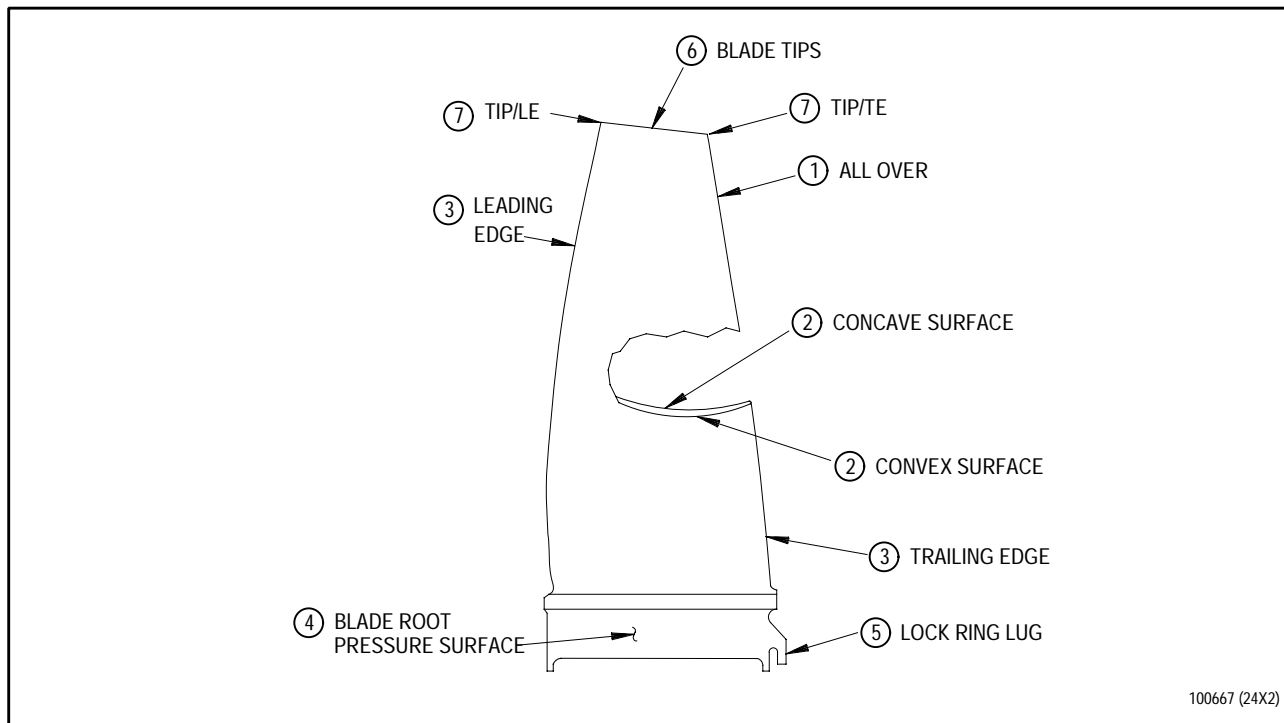


Figure 1. Compressor Rotor Blades (Fourth and Fifth Stage) - Inspection (Sheet 1 of 2)

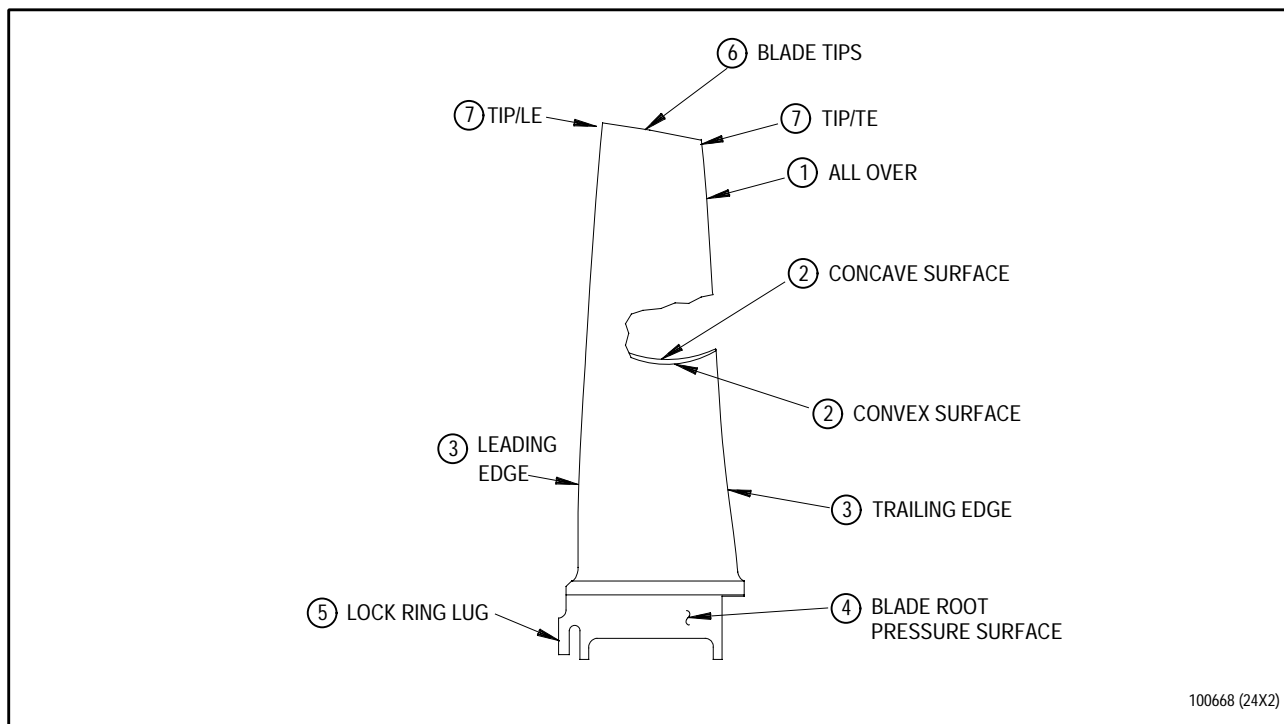


Figure 1. Compressor Rotor Blades (Sixth and Seventh Stage) - Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not reparable	Replace blade.
2. Concave and convex surfaces - Smooth or well-rounded dents	0.010 inch depth	See figure 1B for 4th stage limits and figure 1C for 5th through 7th stage limits	Blend per WP 474 00.
3. Leading and trailing edges - Nicks or dents	0.003 inch depth	See figure 1B for 4th stage limits and figure 1C for 5th through 7th stage limits	Blend per WP 474 00.
4. Blade root pressure surface - Galling (See note 4)	0.005 inch depth	Not reparable	Replace blade.
5. Lock ring lug - Fretting	0.005 inch depth	Not reparable	Replace blade.
Cracks	Not serviceable	Not reparable	Replace blade.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Blade tips -			
Discoloration	Not serviceable	Not reparable	Replace blade.
Abradable splatter (See note 1)	Not serviceable	Not reparable	Replace blade.
Coating loss (See note 2)	May be missing completely up to 0.060 inch from LE(leading edge) or TE(trailing edge) only. May be missing or have voids up to 50% of blade width for remaining blade tip length.	Any amount provided tip LE/TE not blended beyond 0.060 inch radius. See figures 1B and 1C, views Y and Z.	Strip and recoat per WP 474 00.
Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.
7. Tip/LE and tip/TE -			
Bent, bowed, curled, burred, or nicked (See note 3)	Not serviceable	See figure 1B for 4th stage limits and figure 1C for 5th through 7th stage limits	Blend per WP 474 00.

NOTE

1. Abradable splatter: Condition resulting from tip stator shroud abradable material deposited on blade tip abrasive coating. Abradable splatter is typically a silver metallic color and has a very smooth surface finish.

2. Coating loss: Chipped, spalled, or missing blade tip coating. Parent blade material is typically a silver color for titanium 4th through 7th blades and a yellowish color for 8th through 13th nickel blades. This differs from abradable splatter due to lack of visual rub damage.

3. LE/TE blade wear: Caused by worn abrasive blade tips rubbing against abradable material. Typically noted after HPC stall events and indicates blade length has shortened. Viewed as an obvious tip contour change (angled tip contour) at LE(leading edge) or TE(trailing edge). Burrs or tip feathering are typically noted on convex airfoil surface in areas with contour change.

4. Strip, inspect, and recoat with copper-nickel and antigallant per WP 474 00.

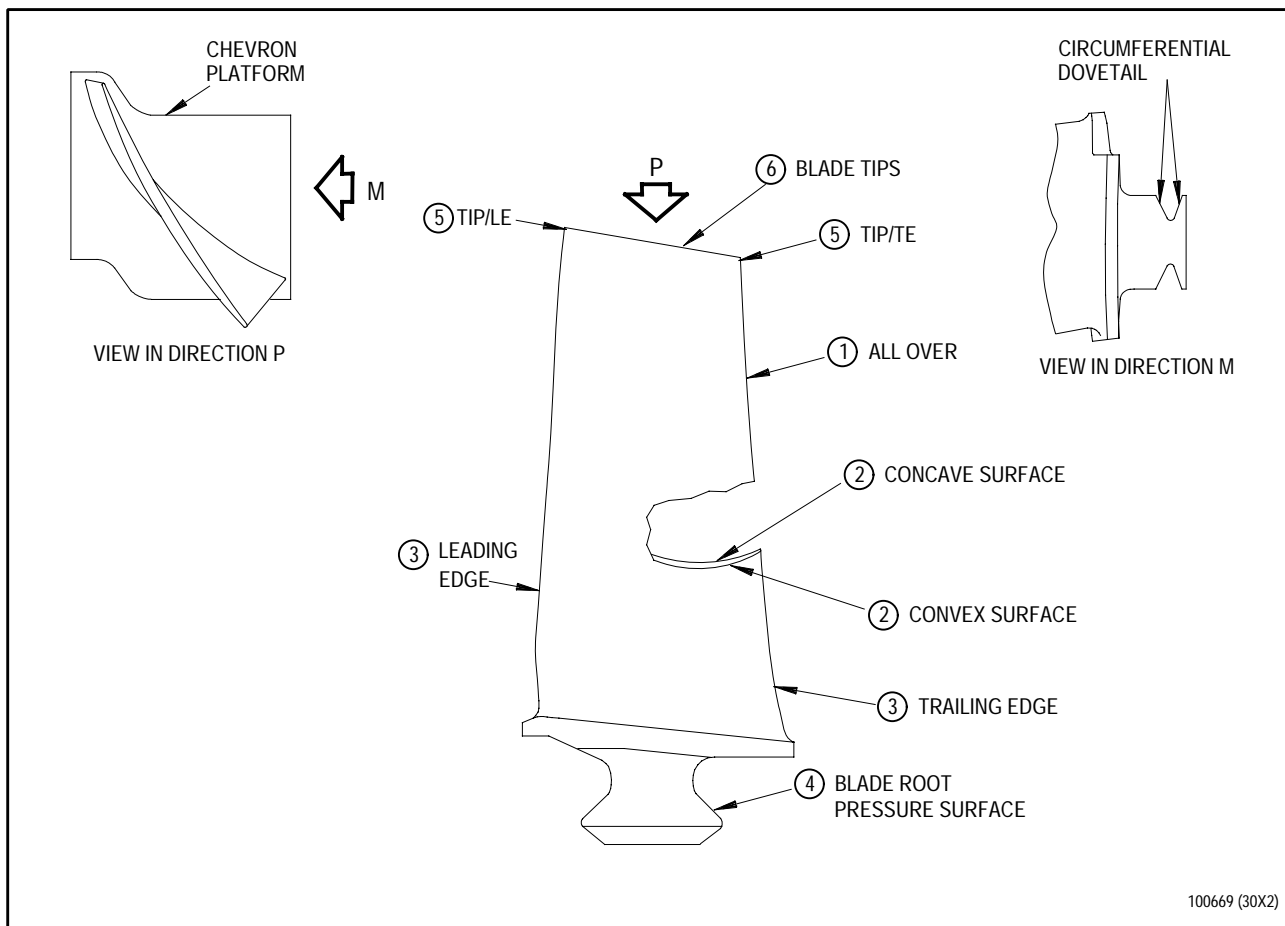


Figure 1A. Eighth Through Thirteenth Stage Compressor Rotor Blades - Inspection

Legend for figure 1A

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1.	All over - Cracks	Not serviceable	Not reparable	Replace blade.
2.	Concave and convex surfaces - Smooth or well-rounded dents	0.005 inch depth	See figure 1C	Blend per WP 474 00.
3.	Leading and trailing edges - Nicks or dents	0.003 inch depth	See figure 1C	Blend per WP 474 00.
4.	Blade root pressure surface - Galling (See note 4)	0.005 inch depth	Not reparable	Replace blade.
5.	Tip/LE and tip/TE - Bent, bowed, curled, burred, or nicked (See note 3)	Not serviceable	See figure 1C	Blend per WP 474 00.
6.	Blade tips - a) 8th through 13th stage, uncoated			
	Discoloration	Serviceable	-	-
	Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.

Legend for figure 1A (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Blade tips (continued) - b) 8th through 13th stage, coated			
Discoloration	Serviceable	-	-
Abradable splatter (See note 1)	Not serviceable	Any amount	Strip and recoat per WP 474 00.
Coating loss (See note 2)	May be missing completely up to 0.060 inch from LE(leading edge) or TE(trailing edge) only. May be missing or have voids up to 50% of blade width for remaining blade tip length.	Any amount provided tip LE/TE not blended beyond 0.060 inch radius. See figure 1C, views Y and Z.	Strip and recoat per WP 474 00.
Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.

NOTE

1. Abradable splatter: Condition resulting from tip stator shroud abradable material deposited on blade tip abrasive coating. Abradable splatter is typically a silver metallic color and has a very smooth surface finish.

2. Coating loss: Chipped, spalled, or missing blade tip coating. Parent blade material is typically a silver color for titanium 4th through 7th blades and a yellowish color for 8th through 13th nickel blades. This differs from abradable splatter due to lack of visual rub damage.


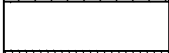


3. LE/TE blade wear: Caused by worn abrasive blade tips rubbing against abradable material. Typically noted after HPC stall events and indicates blade length has shortened. Viewed as an obvious tip contour change (angled tip contour) at LE(leading edge) or TE(trailing edge). Burrs or tip feathering are typically noted on convex airfoil surface in areas with contour change.

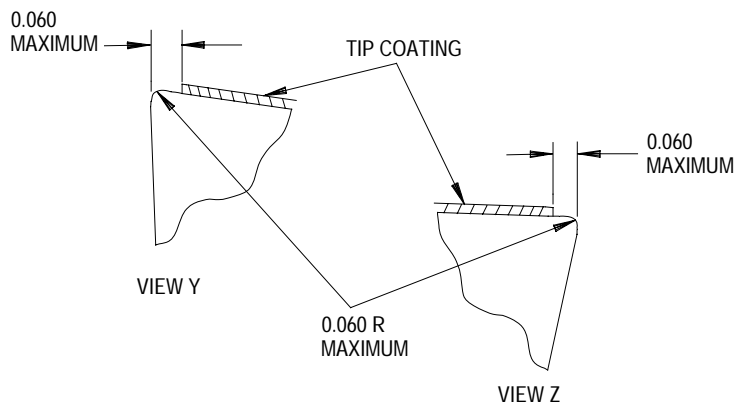
4. Strip, inspect, and recoat with copper-nickel and antigallant per WP 474 00.

BLEND LIMITS

- MAXIMUM OF 2 BLEND REPAIRS ARE PERMITTED PER BLADE.
- MAXIMUM OF 30 PERCENT OF TOTAL NUMBER OF BLADES IN ANY STAGE MAY BE BLENDED EXCEPT NICKS AND DENTS WHICH DO NOT EXCEED 0.003 DEEP ARE ACCEPTABLE IN ANY QUANTITY.
- DAMAGE ON BLADE LEADING AND TRAILING EDGE SHALL BE SEPARATED AT LEAST 0.250 RADially.
- WELL-ROUNDED DAMAGE TO LEADING AND TRAILING EDGES AND AIRFOIL SURFACE WHICH CAN BE SEEN ON OPPOSITE SIDE OF BLADE IS ACCEPTABLE PROVIDED DAMAGE IS IN OUTER HALF OF BLADE AND INDENTATIONS DO NOT EXCEED 0.010.

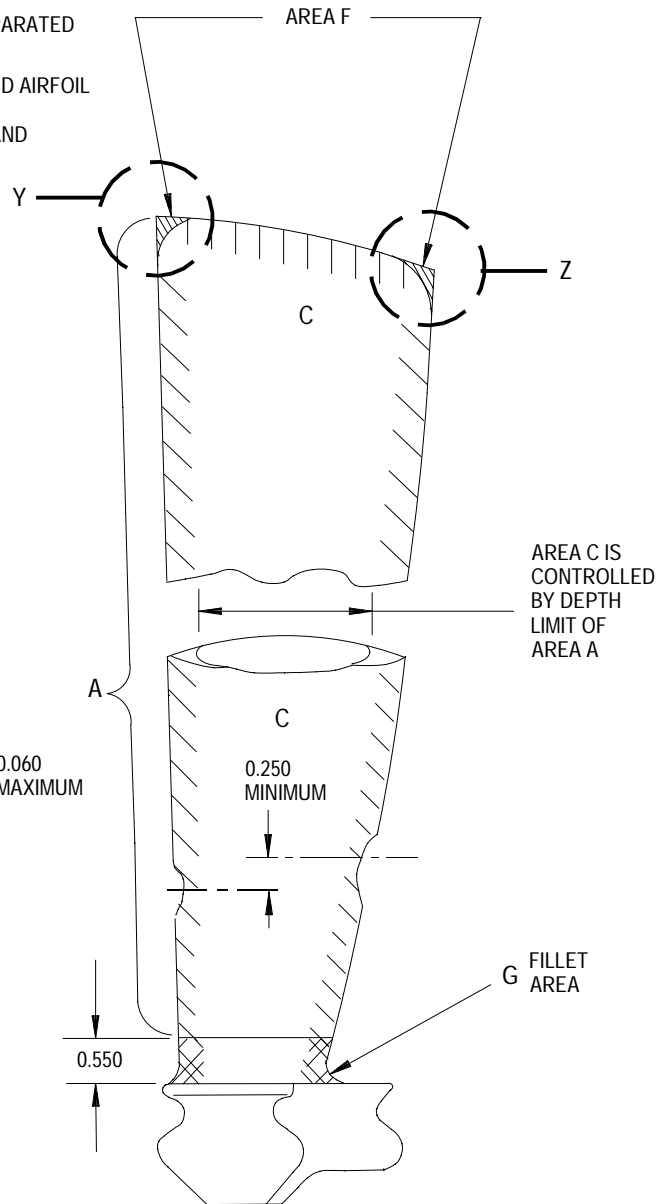
MAXIMUM ALLOWABLE
BLENDED NICK LIMITS (AFTER BLENDING)

BLADE AREA	STAGE 4
	A 0.050 DEPTH
	C 0.010 ROUND BOTTOM
	F 0.060 RADIUS
	G 0.005 DEPTH



NOTE

- CIRCULAR ROUND BOTTOM DENTS WHICH DO NOT EXCEED 0.005 ARE ACCEPTABLE IN ANY QUANTITY WITHOUT BLENDING IN AREAS A, C, AND G.
- ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED



100670 (48X2)

Figure 1B. Fourth Stage Compressor Rotor Blade - Blend Limits

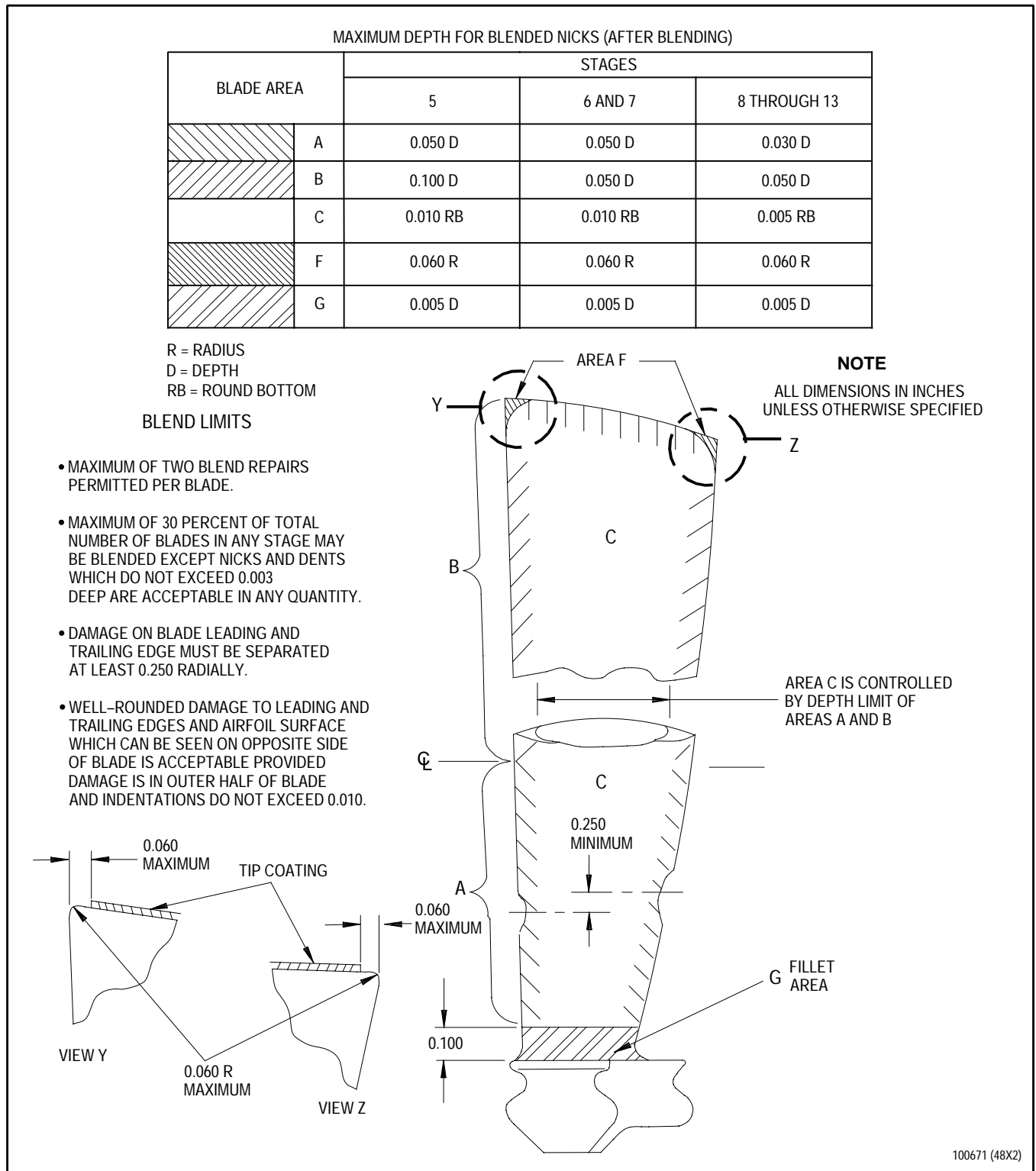


Figure 1C. Fifth Through Thirteenth Stage Compressor Rotor Blades - Blend Limits

All data on page 10, including paragraph 3 and figures 2 and 3, deleted.

SUBORDINATE WORK PACKAGE**TECHNICAL PROCEDURES****BLADES, COMPRESSOR ROTOR, FOURTH THROUGH THIRTEENTH STAGE -****INSPECTION
AFTER VOLCANIC ASH INGESTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE SWP PAGES**

Total Number of Pages in this SWP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	28	4A - 4B Added	26	10 Blank	28
2	8	5 - 8	26	11 Deleted	28
3	28	9	28	12 Blank Deleted	28
4	26				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of 4th through 13th stage compressor rotor blades after volcanic ash ingestion.

2. FOURTH THROUGH THIRTEENTH STAGE COMPRESSOR ROTOR BLADES - INSPECTION.

(See Figures 1, 1A, 2, and 3.)

NOTE

- Compressor blade blend limits in this subordinate work package are evaluated from the standpoint of structural integrity only. Use of substantial number of blades reworked at or near maximum limits, or blades having many reworked areas, may adversely affect compressor efficiency and engine performance.
- Limits of figures apply to damaged area after blending, not to size of damage measured before blending.
- a. Visually inspect compressor rotor blades for nicks, cracks, dents, galling, fretting, abradable splatter, and discoloration. See figures 1 and 1A. Evaluate damage considering the following:
 - (1) Nicks in leading and trailing edge become more critical closer to blade root.
 - (2) Damage with small radii or ragged edges are critical.

- (3) Dents and nicks near leading and trailing edge corners of blade tip are not critical.
- (4) Damage on blade leading and trailing edges shall be separated at least 1/4 inch radially.
- (5) Well-rounded damage to leading and trailing edges and airfoil surface which can be seen on opposite side of blade is acceptable provided damage is in upper half of blade and indentations do not exceed limits specified in this WP.
- (6) Remove blade root Cu-Ni (copper-nickel) coating and inspect for galling per WP 474 00.
- (7) Abradable splatter or loss of tip coating.
- b. Determine whether blade tips (6, figures 1 and 1A) are burned or discolored.
 - (1) Burned blade tips have ragged or rounded edges. Blades may have splattered abradable material on airfoils.
 - (2) Discolored blade tips have multicolored, heat-affected appearance.
- c. Fluorescent penetrant inspect compressor rotor blades. Refer to T.O. 2J-F100-9. No cracks allowed.

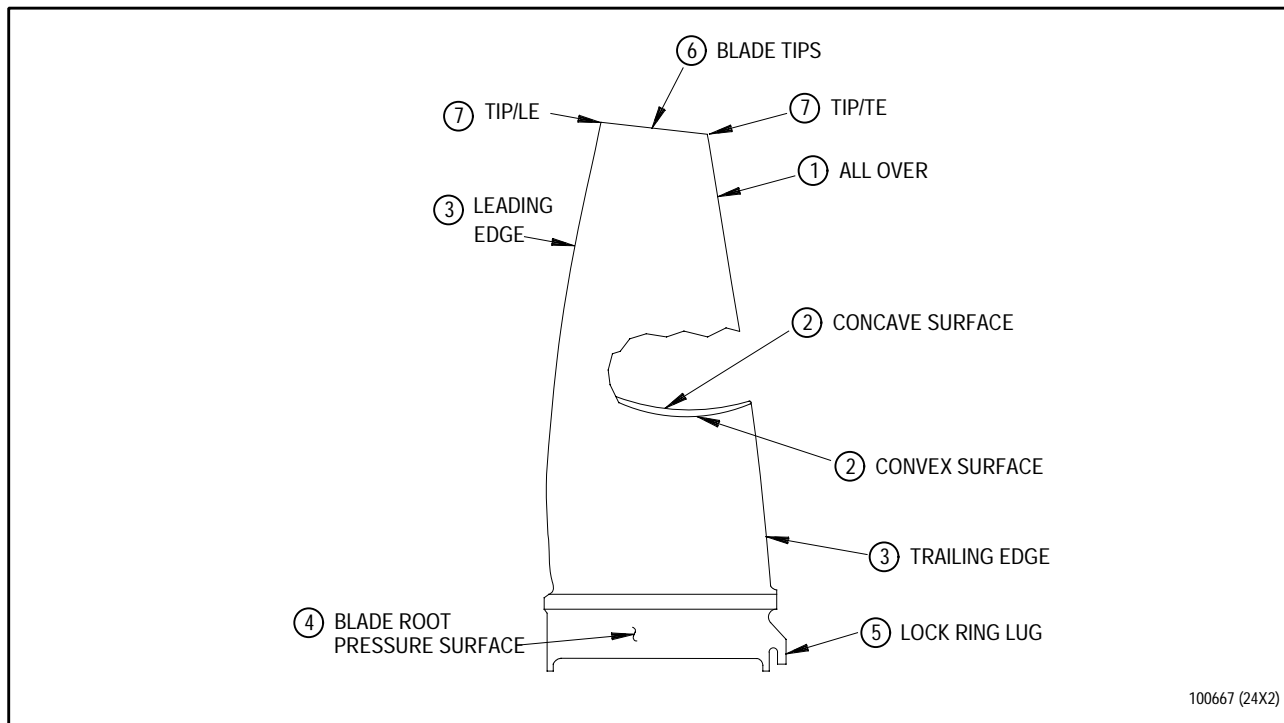


Figure 1. Compressor Rotor Blades - Fourth and Fifth Stage Inspection (Sheet 1 of 2)

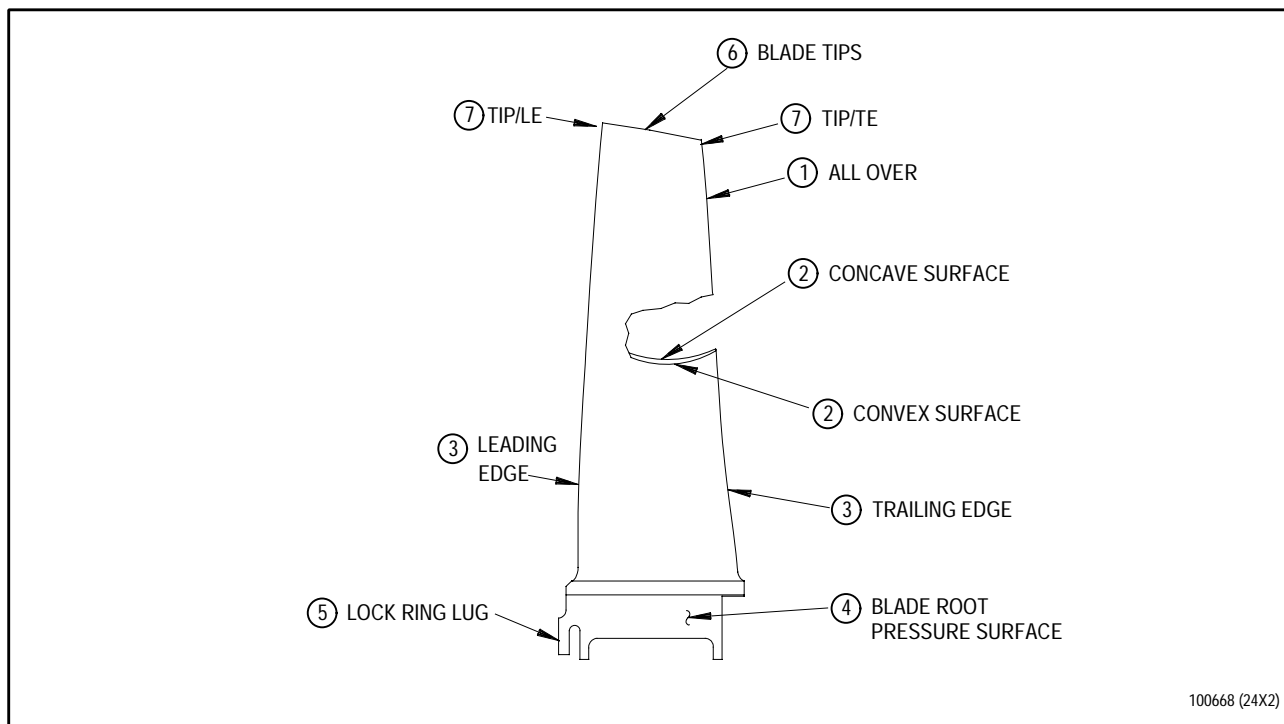


Figure 1. Compressor Rotor Blades - Sixth and Seventh Stage Inspection (Sheet 2 of 2)

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1. All over - Cracks	Not serviceable	Not reparable	Replace blade.
2. Concave and convex surfaces - Smooth or well-rounded dents	0.010 inch depth	See figure 2 for 4th stage limits and figure 3 for 5th through 7th stage limits	Blend per WP 474 00.
3. Leading and trailing edges - Nicks or dents	0.003 inch depth	See figure 2 for 4th stage limits and figure 3 for 5th through 7th stage limits	Blend per WP 474 00.
4. Blade root pressure surface - Galling (See note 4)	0.005 inch depth	Not reparable	Replace blade.
5. Lock ring lug - Fretting	0.005 inch depth	Not reparable	Replace blade.
Cracks	Not serviceable	Not reparable	Replace blade.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Blade tips -			
Discoloration	Not serviceable	Not reparable	Replace blade.
Abradable splatter (See note 1)	Not serviceable	Not reparable	Replace blade.
Coating loss (See note 2)	May be missing completely up to 0.060 inch from LE(leading edge) or TE(trailing edge) only. May be missing or have voids up to 50% of blade width for remaining blade tip length.	Any amount provided tip LE/TE not blended beyond 0.060 inch radius. See figures 2 and 3, views Y and Z.	Strip and recoat per WP 474 00.
Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.
7. Tip/LE and tip/TE -			
Bent, bowed, curled, burred, or nicked (See note 3)	Not serviceable	See figure 2 for 4th stage limits and figure 3 for 5th through 7th stage limits	Blend per WP 474 00.

NOTE

1. Abradable splatter: Condition resulting from tip stator shroud abradable material deposited on blade tip abrasive coating. Abradable splatter is typically a silver metallic color and has a very smooth surface finish.

2. Coating loss: Chipped, spalled, or missing blade tip coating. Parent blade material is typically a silver color for titanium 4th through 7th stage blades and a yellowish color for nickel 8th through 13th stage blades. This differs from abradable splatter due to lack of visual rub damage.

3. LE/TE blade wear: Caused by worn abrasive blade tips rubbing against abradable material. Typically noted after HPC stall events and indicates blade length has shortened. Viewed as an obvious tip contour change (angled tip contour) at LE(leading edge) or TE(trailing edge). Burrs or tip feathering are typically noted on convex airfoil surface in areas with contour change.

4. Strip, inspect, and recoat with copper-nickel and antigallant per WP 474 00.

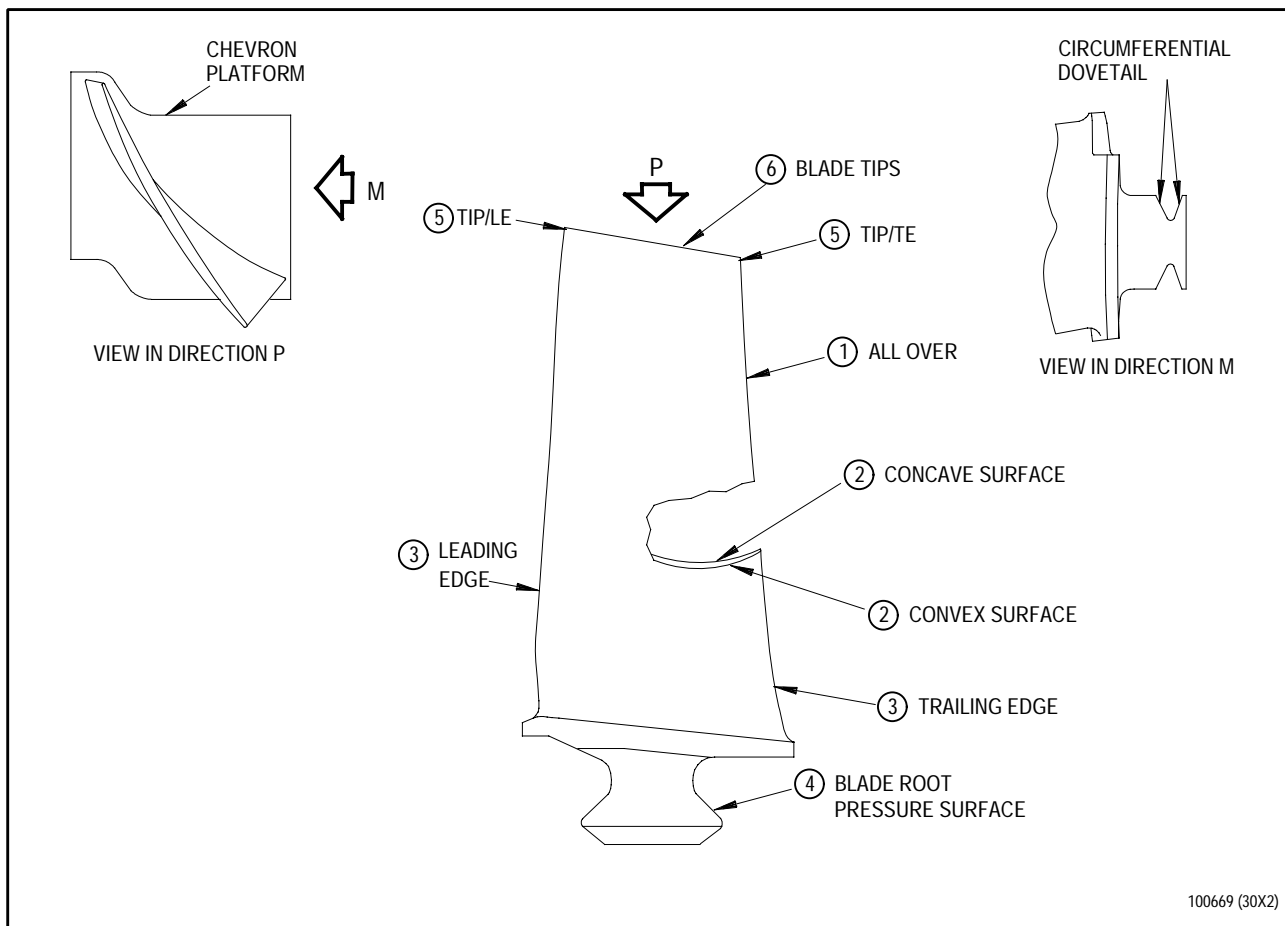


Figure 1A. Eighth Through Thirteenth Stage Compressor Rotor Blades - Inspection

Legend for figure 1A

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1.	All over - Cracks	Not serviceable	Not reparable	Replace blade.
2.	Concave and convex surfaces - Smooth or well-rounded dents	0.005 inch depth	See figure 3	Blend per WP 474 00.
3.	Leading and trailing edges - Nicks or dents	0.003 inch depth	See figure 3	Blend per WP 474 00.
4.	Blade root pressure surface - Galling (See note 4)	0.005 inch depth	Not reparable	Replace blade.
5.	Tip/LE and tip/TE - Bent, bowed, curled, burred, or nicked (See note 3)	Not serviceable	See figure 3	Blend per WP 474 00.
6.	Blade tips - a) 8th through 13th stage, uncoated			
	Discoloration	Serviceable	-	-
	Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.

Legend for figure 1A (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
6. Blade tips (continued) - b) 8th through 13th stage, coated			
Discoloration	Serviceable	-	-
Abradable splatter (See note 1)	Not serviceable	Any amount	Strip and recoat per WP 474 00.
Coating loss (See note 2)	May be missing completely up to 0.060 inch from LE(leading edge) or TE(trailing edge) only. May be missing or have voids up to 50% of blade width for remaining blade tip length.	Any amount provided tip LE/TE not blended beyond 0.060 inch radius. See figure 3, views Y and Z.	Strip and recoat per WP 474 00.
Bent, bowed, curled, or burred (See note 3)	Not serviceable	Not reparable	Replace blade.

NOTE

1. Abradable splatter: Condition resulting from tip stator shroud abradable material deposited on blade tip abrasive coating. Abradable splatter is typically a silver metallic color and has a very smooth surface finish.

2. Coating loss: Chipped, spalled, or missing blade tip coating. Parent blade material is typically a silver color for titanium 4th through 7th stage blades and a yellowish color for nickel 8th through 13th stage blades. This differs from abradable splatter due to lack of visual rub damage.





3. LE/TE blade wear: Caused by worn abrasive blade tips rubbing against abradable material. Typically noted after HPC stall events and indicates blade length has shortened. Viewed as an obvious tip contour change (angled tip contour) at LE(leading edge) or TE(trailing edge). Burrs or tip feathering are typically noted on convex airfoil surface in areas with contour change.

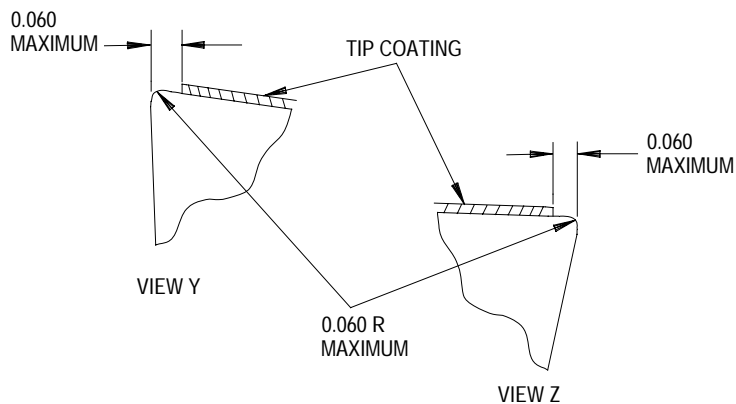
4. Strip, inspect, and recoat with copper-nickel and antigallant per WP 474 00.

BLEND LIMITS

- MAXIMUM OF 2 BLEND REPAIRS ARE PERMITTED PER BLADE.
- MAXIMUM OF 30 PERCENT OF TOTAL NUMBER OF BLADES IN ANY STAGE MAY BE BLENDED EXCEPT NICKS AND DENTS WHICH DO NOT EXCEED 0.003 DEEP ARE ACCEPTABLE IN ANY QUANTITY.
- DAMAGE ON BLADE LEADING AND TRAILING EDGE SHALL BE SEPARATED AT LEAST 0.250 RADially.
- WELL-ROUNDED DAMAGE TO LEADING AND TRAILING EDGES AND AIRFOIL SURFACE WHICH CAN BE SEEN ON OPPOSITE SIDE OF BLADE IS ACCEPTABLE PROVIDED DAMAGE IS IN OUTER HALF OF BLADE AND INDENTATIONS DO NOT EXCEED 0.010.

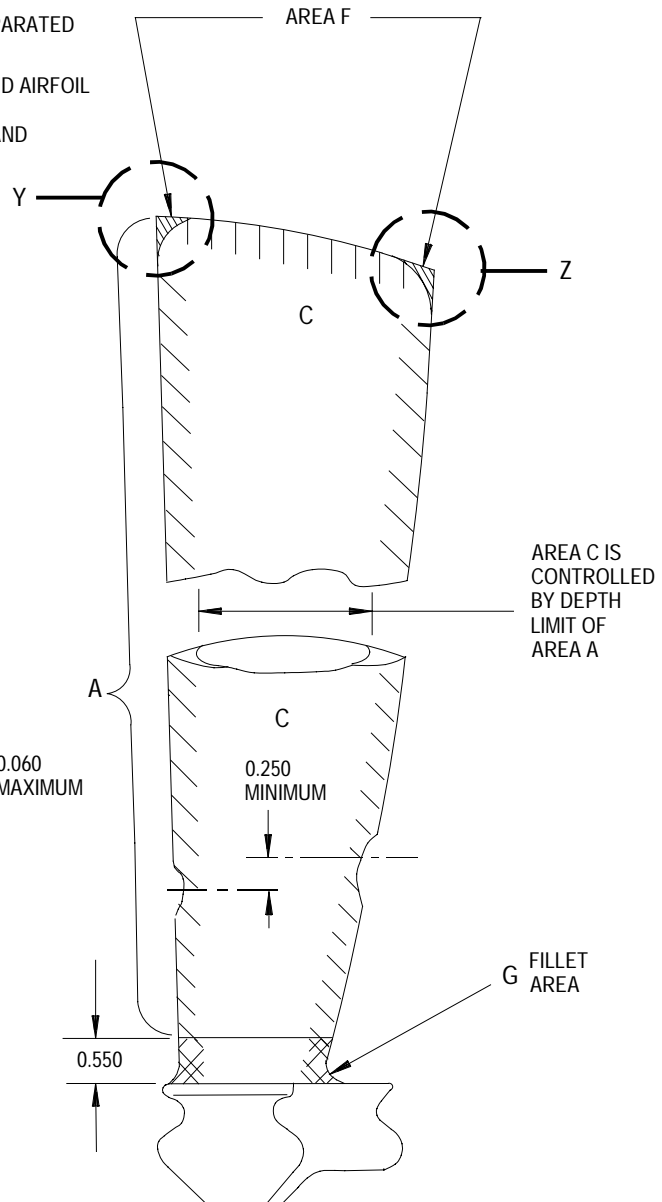
MAXIMUM ALLOWABLE
BLENDED NICK LIMITS (AFTER BLENDING)

BLADE AREA	STAGE 4
	A 0.050 DEPTH
	C 0.010 ROUND BOTTOM
	F 0.060 RADIUS
	G 0.005 DEPTH



NOTE

- CIRCULAR ROUND BOTTOM DENTS WHICH DO NOT EXCEED 0.005 ARE ACCEPTABLE IN ANY QUANTITY WITHOUT BLENDING IN AREAS A, C, AND G.
- ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED



100670 (48X2)

Figure 2. Fourth Stage Compressor Rotor Blade - Blend Limits

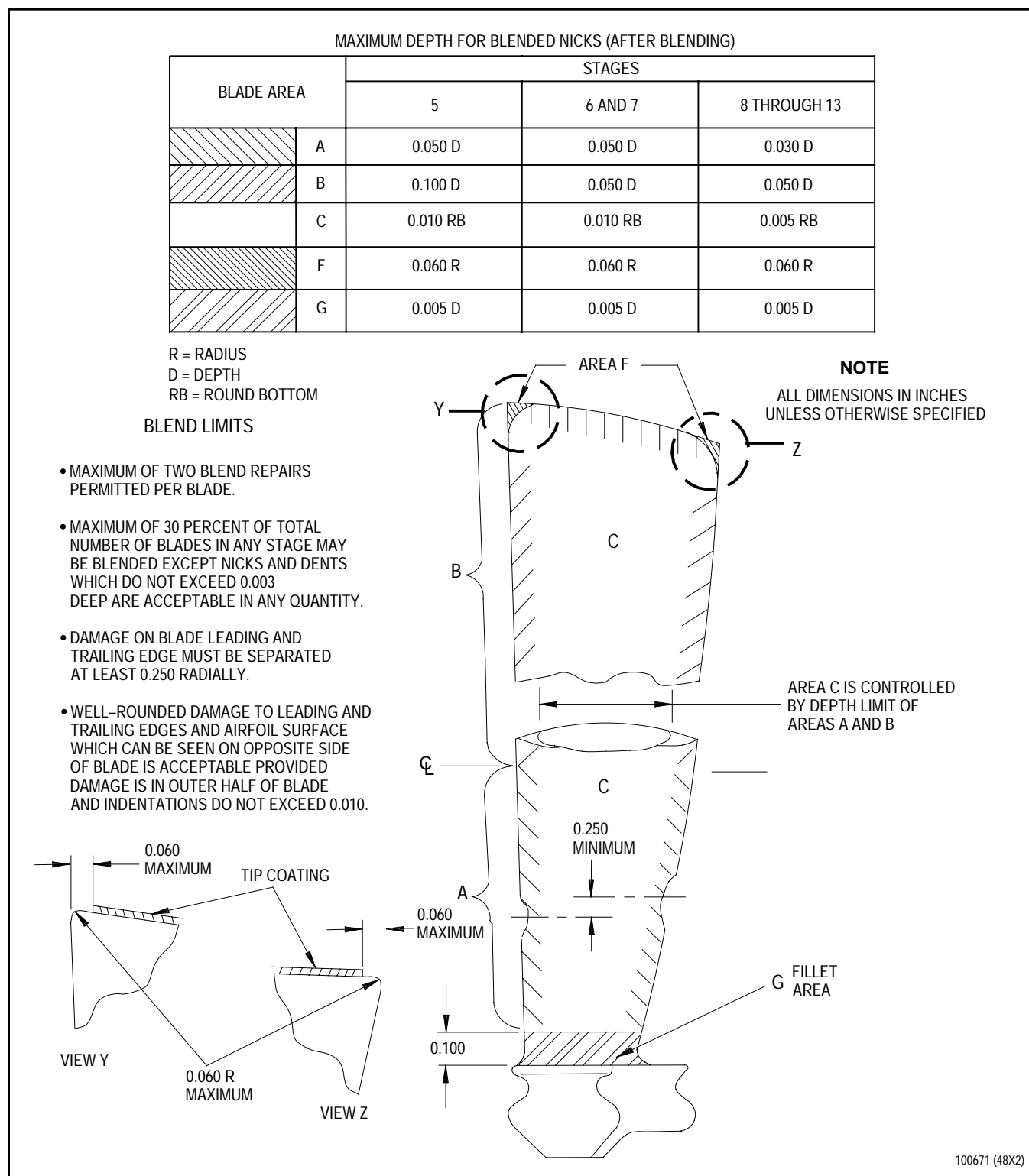


Figure 3. Fifth Through Thirteenth Stage Compressor Rotor Blades - Blend Limits

All data on pages 10 and 11/(12 blank), including paragraph 3 and figure 4, deleted.

WORK PACKAGE

TECHNICAL PROCEDURES

**VANES, COMPRESSOR STATOR,
FOURTH, FIFTH, AND SIXTH STAGE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	18	4 - 7	29
2	0			8 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

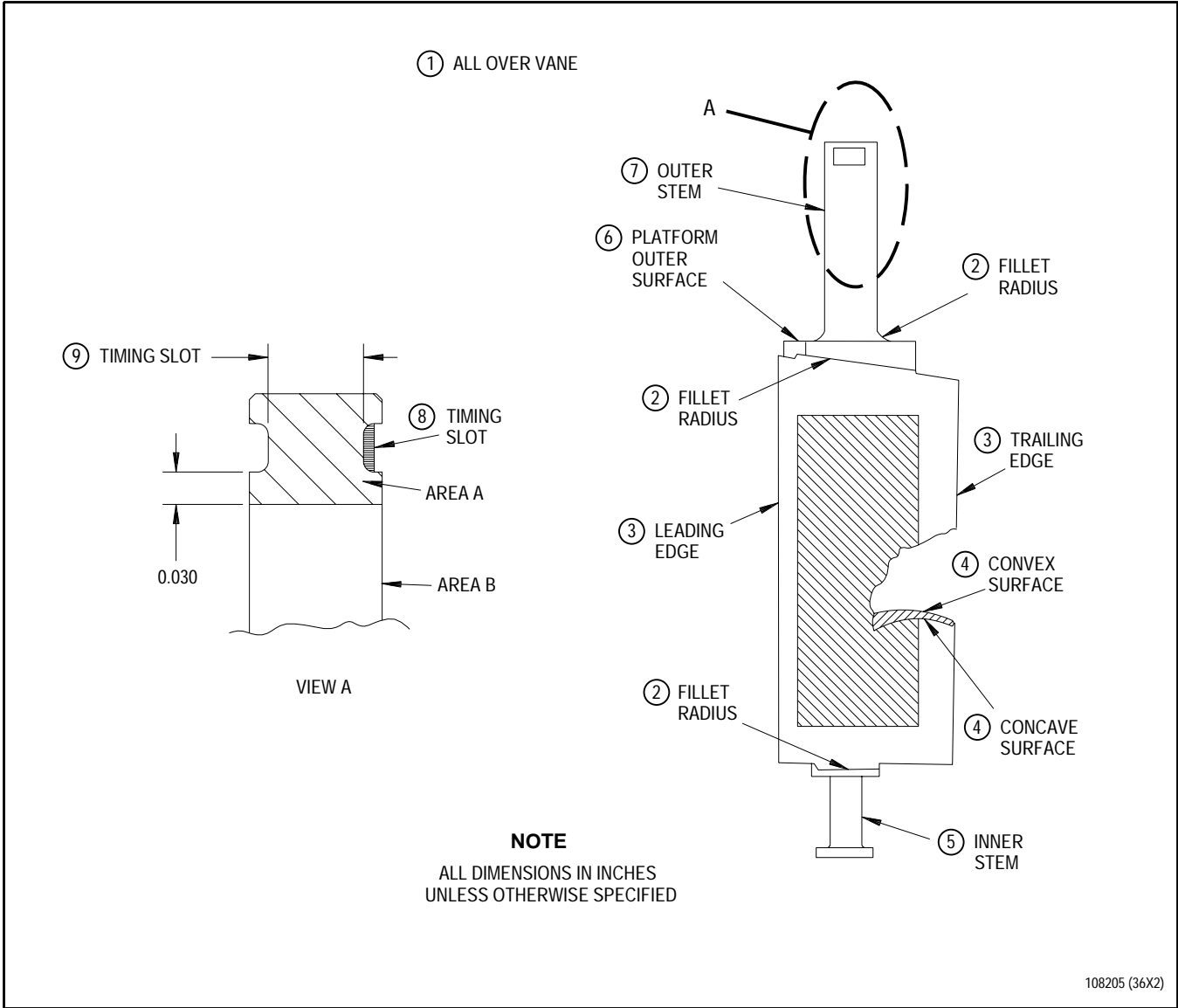
1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th, 5th, and 6th stage compressor stator vanes.

**2. FOURTH, FIFTH, AND SIXTH STAGE
COMPRESSOR STATOR VANES - INSPECTION.**

(See Figure 1.)

- a. Ensure 4th, 5th, and 6th stage compressor stator vanes have been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect stator vanes for cracks on a system currently qualified per MIL-STD-1823 at 90 percent probability of detection and 50 percent confidence level to surface length indication of 0.040 inch long. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect stator vanes per figure 1.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over vane - Cracks	Not serviceable	Not repairable	Replace vane.

Figure 1. Fourth, Fifth, And Sixth Stage Compressor Stator Vanes - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Fillet radius -			
Crack	Not serviceable	Not reparable	Replace vane.
Nicks and dents	Not serviceable	See corrective action.	Blend per WP 475 00.
3. Leading and trailing edges -			
Nicks and dents	Not serviceable	See corrective action.	Blend per WP 475 00.
4. Concave and convex surfaces -			
Nicks	Not serviceable	See corrective action.	Blend per WP 475 00.
Round-bottom dents without cracks	0.010 inch depth maximum	Not reparable	Replace vane.
Corrosion or salt buildup	Not serviceable	See corrective action.	Clean per WP 475 00.
5. Inner stem -			
Wear	0.242 inch minimum diameter	Not reparable	Replace vane.
Flat spots	Not more than 10 percent of journal cylindrical surface	Not reparable	Replace vane.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
5. Inner stem - (continued)			
Grooves	Linear: 0.004 inch depth x 0.010 inch width x circumference Non-linear: 0.002 inch depth x 0.040 inch width x 0.060 inch length	Not reparable	Replace vane.
Rough surfaces on journal	16 microinch finish	Not reparable	Replace vane.
Plating chipped	Not serviceable	Not reparable	Replace vane.
Plating missing	Not serviceable	Not reparable	Replace vane.
Plating peeling	Not serviceable	Not reparable	Replace vane.
6. Platform outer surface -			
Wear	0.002 inch depth	Not reparable	Replace vane.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
7. Outer stem -			
Wear	0.394 inch minimum diameter	Not reparable	Replace vane.
Grooves	Linear: 0.004 inch depth x 0.010 inch width x circumference Non-linear: 0.002 inch depth x 0.040 inch width x 0.060 inch length	Not reparable	Replace vane.
Flat spots	Not more than 10 percent of journal cylindrical surface	Not reparable	Replace vane.
Rough surface on journal	16 micro inch finish	Not reparable	Replace vane.
Plating chipped	Area A - Serviceable	None	None
	Area B - Not serviceable	Not reparable	Replace vane.
Plating missing	Not serviceable	Not reparable	Replace vane.
Plating peeling	Not serviceable	Not reparable	Replace vane.
8. Timing slot (if plated) -			
Plating chipped	Not serviceable	Not reparable	Replace vane.
Plating missing	Not serviceable	Not reparable	Replace vane.
Plating peeling	Not serviceable	Not reparable	Replace vane.
9. Timing slot -			
Width	0.277 inch minimum	Not reparable	Replace vane.

WORK PACKAGE

TECHNICAL PROCEDURES

BEARINGS, COMPRESSOR STATOR VANE, INLET GUIDE,
FOURTH, FIFTH, AND SIXTH STAGE -

THRUST WASHERS, INLET GUIDE, FOURTH, FIFTH, AND SIXTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

This Work Package Supersedes WP 376 00 Through and Including Change 6.

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
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1 - 6 17

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of inlet guide, 4th, 5th, and 6th stage compressor stator vane bearings and thrust washers.

**2. INLET GUIDE, FOURTH, FIFTH, AND SIXTH
STAGE COMPRESSOR STATOR VANE BEARING
- INSPECTION.**

(See Figure 1.)

- a. Visually inspect bearings.
(See figure 1.)
- b. Dimensionally inspect bearings.
(See figure 1.)

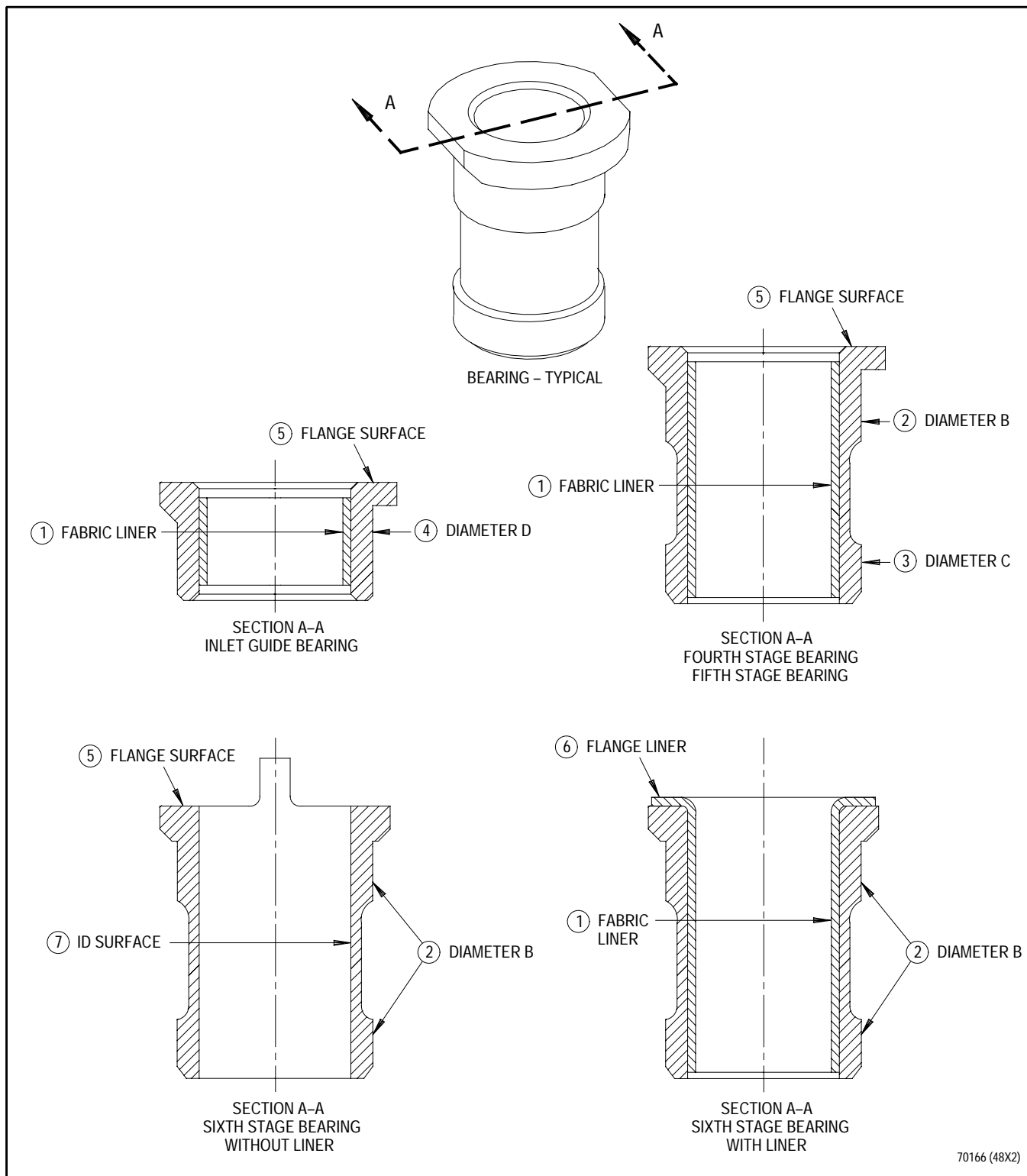


Figure 1. Inlet Guide, Fourth, Fifth, and Sixth Stage Compressor Stator Vane Bearing - Inspection

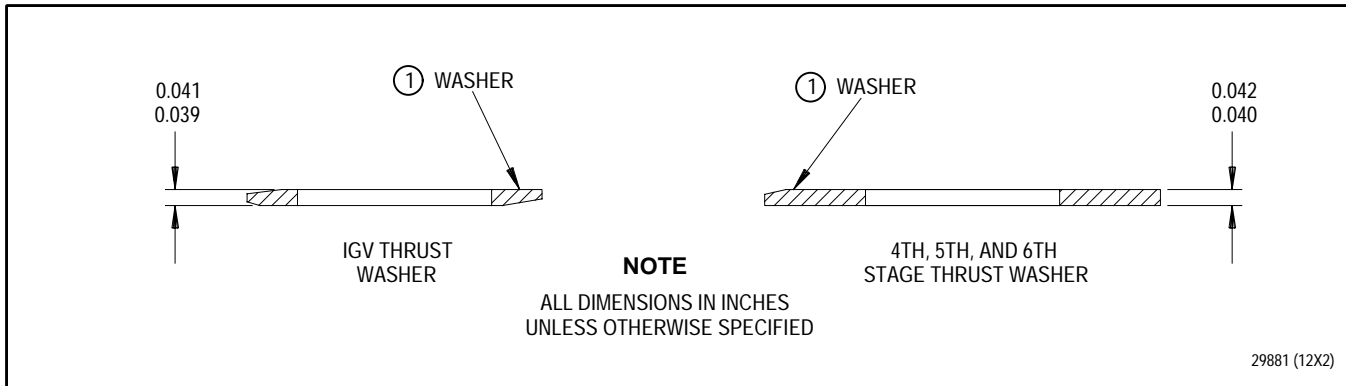
Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Fabric liner -			
Chipped or missing sections	Area not to exceed 0.040 inch by 0.075 inch, depth may be full thickness of liner.	Not reparable	Replace bearing.
Wear	0.400 inch maximum diameter	Not reparable	Replace bearing.
2. Diameter B -			
Wear	0.5458 inch minimum diameter	Not reparable	Replace bearing.
Scratches	0.001 inch depth	Not reparable	Replace bearing.
3. Diameter C -			
Wear	0.543 inch minimum diameter	Not reparable	Replace bearing.
Scratches	0.001 inch depth	Not reparable	Replace bearing.
4. Diameter D -			
Wear	0.5445 inch minimum diameter	Not reparable	Replace bearing.
Scratches	0.001 inch depth	Not reparable	Replace bearing.
5. Flange surface (No liner) -			
Wear	0.001 inch maximum depth	Not reparable	Replace bearing.
6. Flange liner material-			
Chipped, cracked, missing	Area not to exceed 0.040 inch by 0.100 inch at OD of flange only, depth may be full thickness of liner	Not reparable	Replace bearing.
7. ID surface -			
Wear	0.3995 inch maximum diameter	Not reparable	Replace bearing.

3. INLET GUIDE, FOURTH, FIFTH, AND SIXTH STAGE THRUST WASHERS - INSPECTION.

(See Figure 2.)

- a. Inspect inlet guide (IGV), fourth, fifth, and sixth stage thrust washers. (See figure 2.)



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Washer (Metal and Composite) -			
Wear marks	0.002 inch depth permissible in circular grooves less than 0.010 inch wide	Not reparable	Replace washer.
Nicks, dents, gouges	0.002 inch depth in areas not to exceed 0.030 inch by 0.030 inch. No raised material permitted above washer surfaces.	Not reparable	Replace washer.
Cracks	Not serviceable	Not reparable	Replace washer.
Discoloration	Permissible		
Overall wear	IGV: 0.039 inch minimum thickness. 4th, 5th, 6th stage: 0.040 inch minimum thickness	Not reparable	Replace washer.
Exposed fibers (composite only)	Not serviceable	Not reparable	Replace washer.

Figure 2. Inlet Guide, Fourth, Fifth, and Sixth Stage Thrust Washers - Inspection

WP 377 00 Deleted

WORK PACKAGE

TECHNICAL PROCEDURES

INSERT, SCREW THREAD (IGNITER PLUG BOSS INSERT) -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	0				
4 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Insert, Screw Thread (Igniter Plug Boss Insert) - Repair	WP 478 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of screw thread insert (igniter plug boss insert).

2. SCREW THREAD INSERT (IGNITER PLUG BOSS INSERT) - INSPECTION.

(See Figure 1.)

- a. Inspect for damaged threads.
- b. Thread damage is not serviceable.
- c. Repair damaged threads per WP 478 00.
- d. After inspection and repair, apply antigalling compound per WP 478 00.

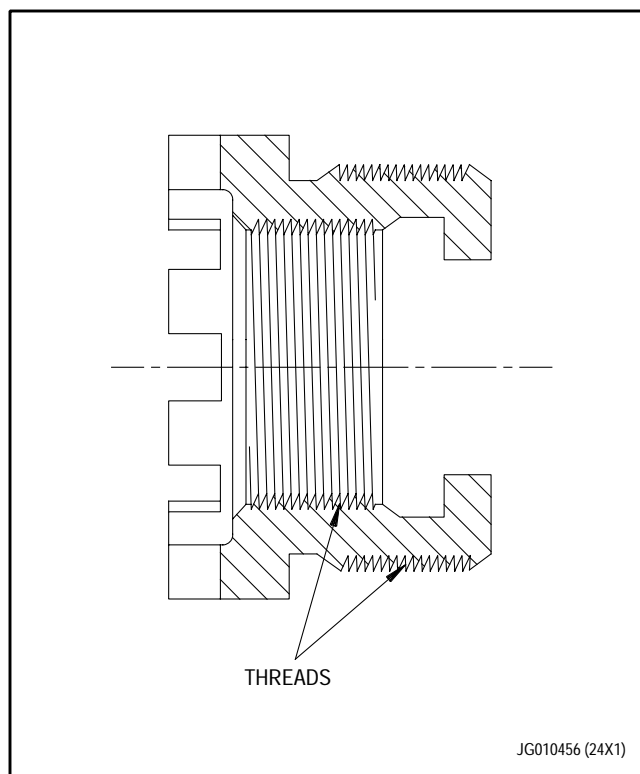


Figure 1. Screw Thread Insert (Igniter Plug Boss Insert) - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

BAFFLE, GEARBOX -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	4	0
2	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

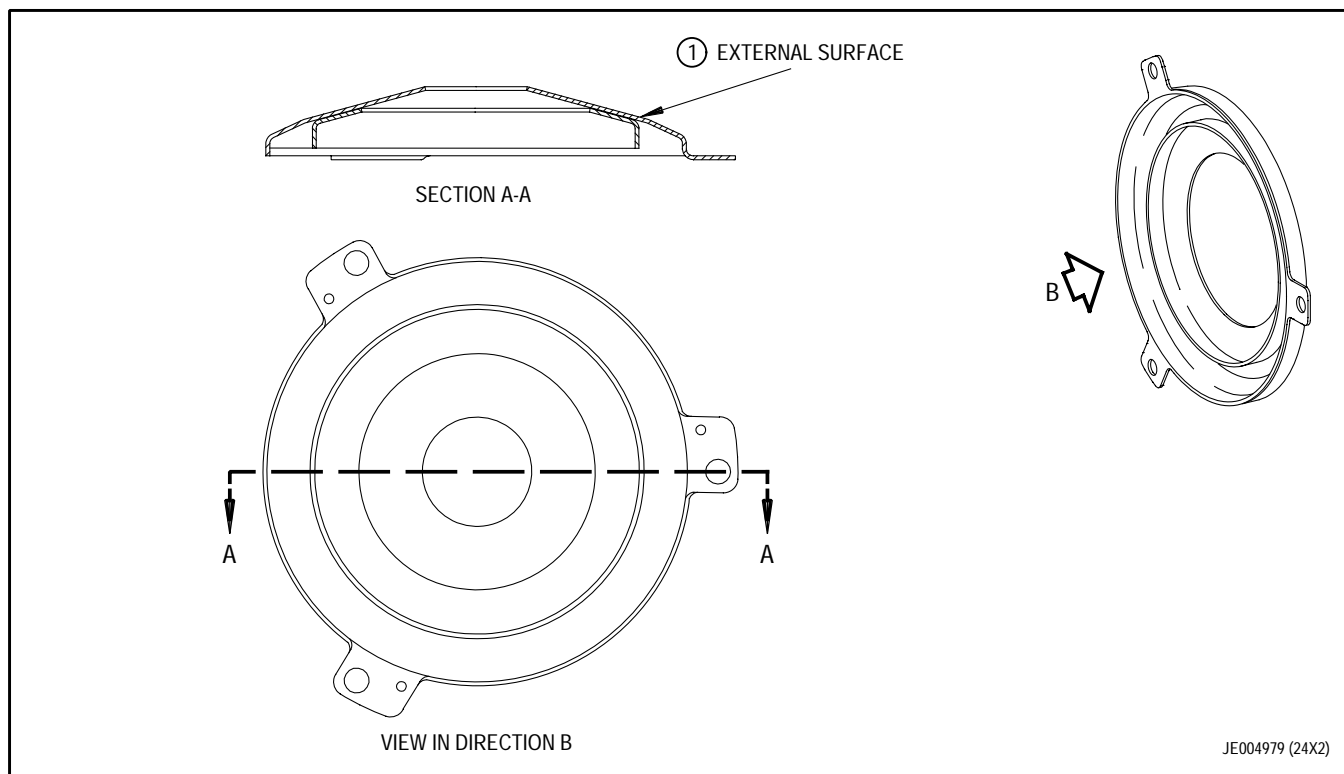
1. INTRODUCTION.

- a. This work package contains instructions for inspection of gearbox baffle.

2. BAFFLE, GEARBOX - INSPECTION.

(See Figure 1.)

- a. Ensure gearbox baffle has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect gearbox baffle for cracks.
Refer to T.O. 2J-F100-9.
No cracks allowed.
- c. Inspect gearbox baffle per figure 1.
- d. Visually inspect spotwelds.
No cracks allowed.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. External surface -			
Scratches	Not serviceable	0.010 inch depth	Blend repair per WP 479 00.
Nicks	Not serviceable	0.010 inch depth	Remove raised metal per WP 479 00.
Dents	Not serviceable	0.050 inch depth	Repair dents per WP 479 00.
Cracks	Not serviceable	Not repairable	Replace baffle.

Figure 1. Gearbox Baffle - Inspection

WORK PACKAGE

TECHNICAL PROCEDURES

**TUBE ASSEMBLY, NO. 2 and 3 BEARING
INTERNAL PRESSURE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0				
2 Blank	0				

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WORK PACKAGE

TECHNICAL PROCEDURES

TUBE, PRESSURE, NO. 2 and 3 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3	18	4	1
2	1				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of No. 2 and 3 bearing pressure tube.

2. NO. 2 AND 3 BEARING PRESSURE TUBE - INSPECTION.

(See Figure 1.)

- a. Ensure No. 2 and 3 bearing pressure tube has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect tube for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Visually inspect tube per figure 1.

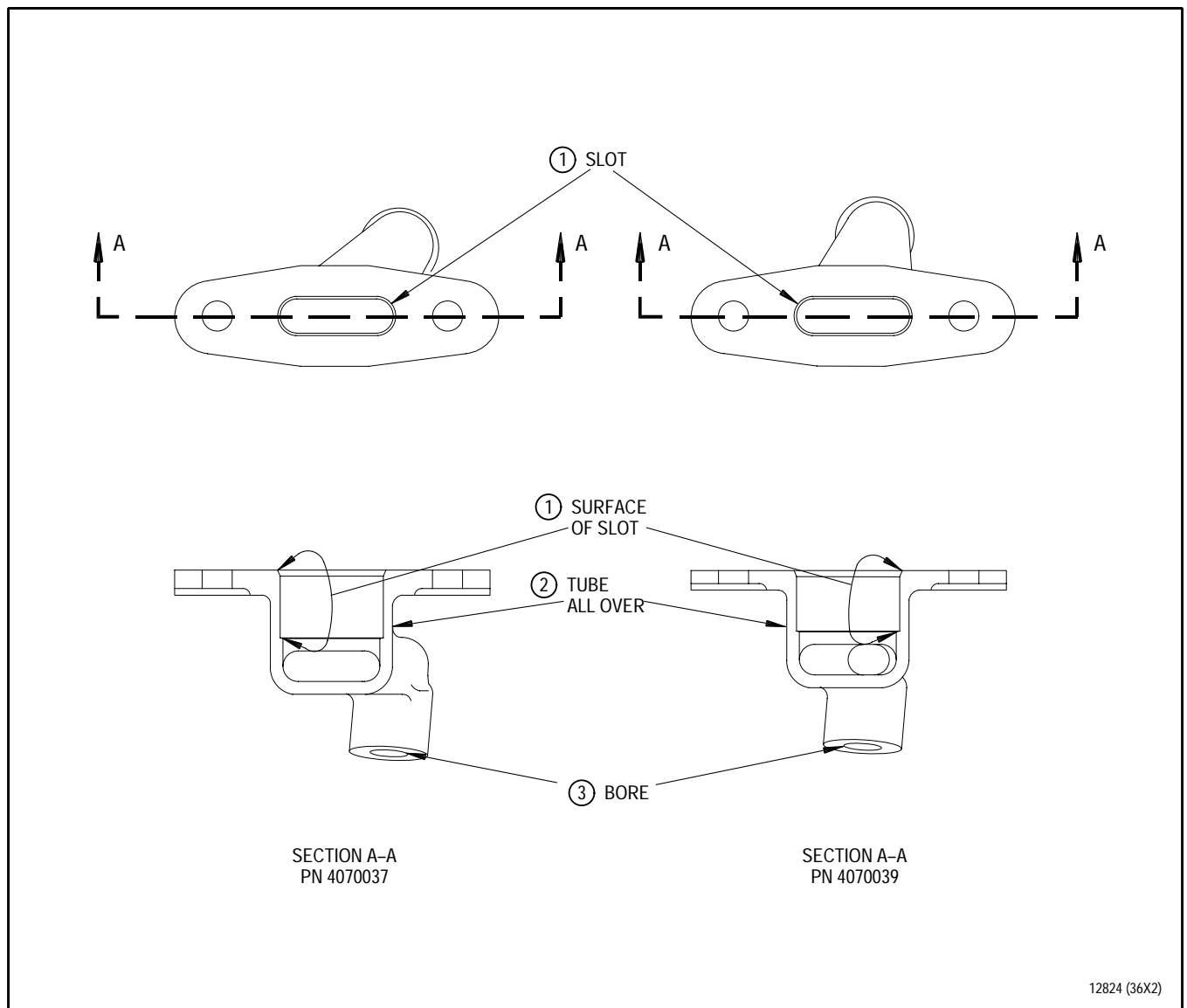


Figure 1. No. 2 and 3 Bearing Pressure Tube - Inspection

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Slot -			
Wear (with burrs)	0.005 inch per side	See corrective action	Remove burrs with fine file or stone. Replace tube worn over serviceable limit.
Wear (without burrs)	0.005 inch per side	See corrective action	Replace tube.
Nicks, scratches (with burrs)	0.005 inch deep and any width	See corrective action	Remove burrs with fine file or stone. Replace tube with over limit defect.
Nicks, scratches (without burrs)	0.005 inch deep and any width	See corrective action	Replace tube.
2. Tube all over -			
Cracks	Not serviceable	Not repairable	Replace tube.
Nicks, dents, scratches (without burrs)	0.010 inch deep and any width	See corrective action	Replace tube.
Nicks, dents, scratches (with burrs)	0.010 inch deep and any width	See corrective action	Remove burrs with fine file or stone. Replace tube with over limit defect.
3. Bore -			
Wear (with burrs)	0.003 inch per side	See corrective action	Remove burrs with fine file or stone. Replace tube worn over serviceable limit.
Wear (without burrs)	0.003 inch per side	See corrective action	Replace tube.
Nicks, scratches (with burrs)	0.003 inch deep and any width	See corrective action	Remove burrs with fine file or stone. Replace tube with over limit defect.
Nicks, scratches (without burrs)	0.003 inch deep and any width	See corrective action	Replace tube.

TECHNICAL PROCEDURES

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	25

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of compressor bleed tube assembly.

2. COMPRESSOR BLEED TUBE ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Visually inspect compressor tube assembly. See figure 1.

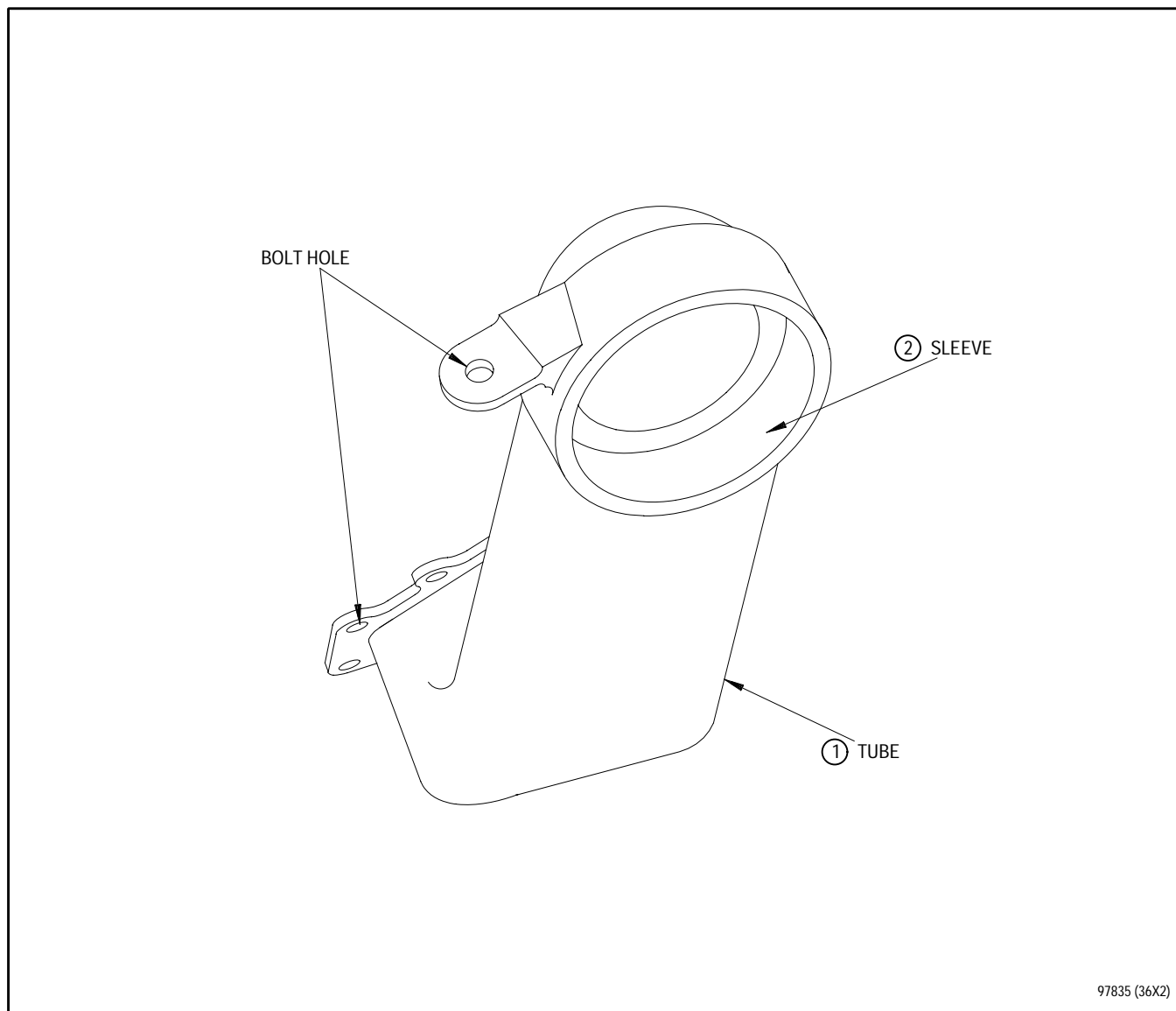


Figure 1. Compressor Bleed Tube Assembly - Inspection

Legend for figure 1

Inspection Area - Condition		Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
1.	Tube -			
	Wear	Not servicable	Not reparable	Replace tube assembly.
	Bolt hole wear	Not servicable	Not reparable	Replace tube assembly.
2.	Sleeve -			
	Wear	Not servicable	Not reparable	Replace sleeve per WP 482 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAT, BLEED VALVE STRAP -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

BUMPER -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

INSERT, SCREW THREAD -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

BEARING HALF, COMPRESSOR STATOR, FOURTH AND FIFTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2					
3 Added					
4 Blank Added					
	9		9		9

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

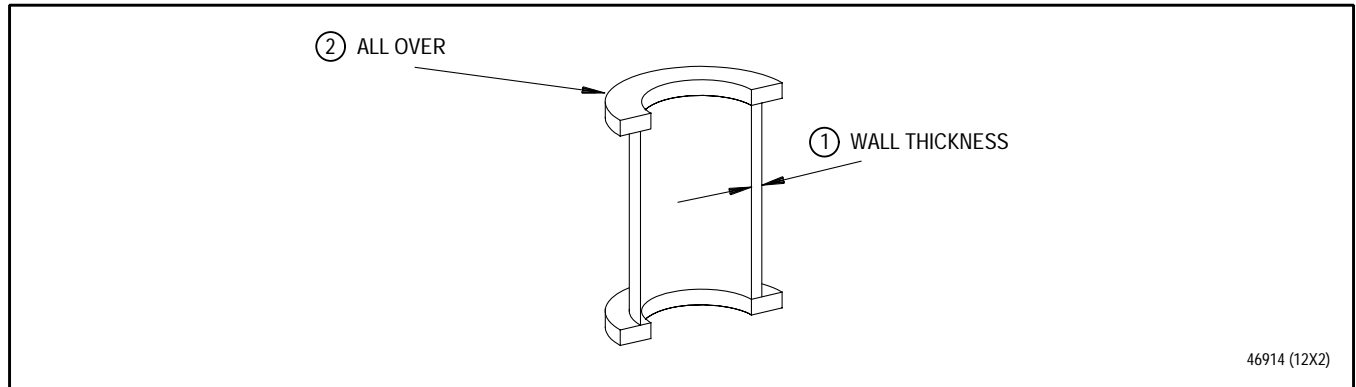
1. INTRODUCTION.

- a. This work package contains instructions for inspection of fourth and fifth stage compressor stator bearing half.

2. BEARING HALF, COMPRESSOR STATOR, FOURTH AND FIFTH STAGE - INSPECTION.

(See Figure 1.)

- a. Inspect fourth and fifth stage compressor stator bearing half. Refer to figure 1.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Wall thickness -			
Wear	0.052 inch minimum thickness	Not repairable	Replace bearing.
2. All over -			
Rough or pitted surface	0.001 inch maximum depth	Not repairable	Replace bearing.
Chipped or missing plating	Not serviceable	Not repairable	Replace bearing.

Figure 1. Bearing Half, Compressor Stator, Fourth and Fifth Stage - Inspection

WP 387 00 Deleted

WORK PACKAGE

TECHNICAL PROCEDURES

DUCT SEGMENTS - COMPRESSOR, FOURTH, FIFTH, SIXTH AND SEVENTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	25	8	19	10 - 11	19
6	19	9	25	12 Blank	19
7	25				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

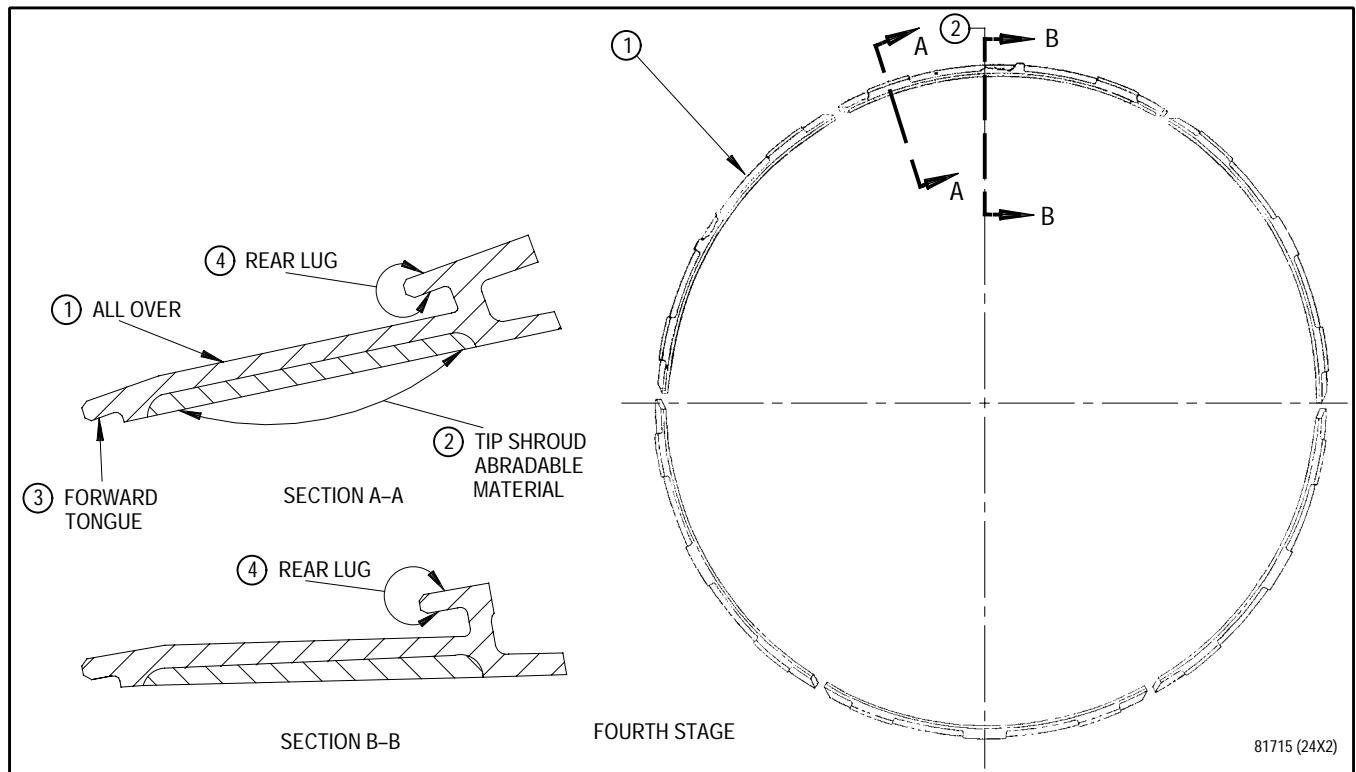
1. INTRODUCTION.

- a. This work package contains instructions for inspection of 4th, 5th, 6th and 7th stage compressor duct segments.

2. FOURTH THROUGH SEVENTH STAGE COMPRESSOR DUCT SEGMENTS - INSPECTION.

(See Figures 1 through 3 and Table 1.)

- a. Visually inspect duct segments per figures 1 through 3.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents and depressions	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
Surface body rust	0.010 inch depth	Not repairable	Replace shroud.

Figure 1. Fourth Stage Compressor Duct Segments - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material -			

NOTE

Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.

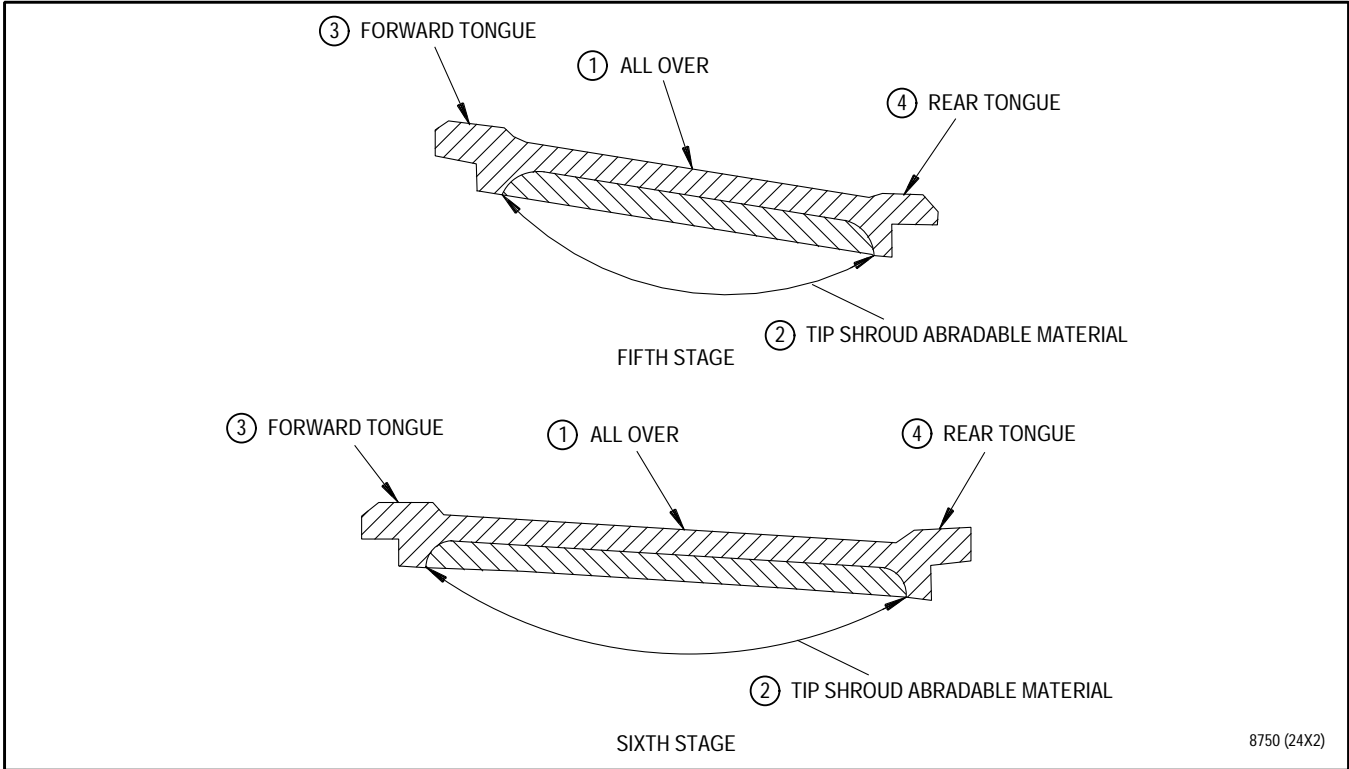
Abrasion rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00.
Scratches	1/16 inch wide	Any amount	Replace abradable per WP 488 00.
Nicks, dents, gouges and missing abradable	a. Sum of all damaged areas of all six pieces shall not exceed 2.00 square inches. b. 1/16 square inch and 1/16 inch width along front and rear edges. c. Any condition that extends full width from front to rear of abradable shall not be more than 1/2 inch wide at the widest point. This shall be included in the 2.00 square inch limit. d. Damaged areas shall be separated by a minimum of 1.00 inch.	Any amount	Replace abradable per WP 488 00.

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Forward tongue diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
4. Rear lug diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.

Table 1. Allowable Tip shroud Abradable Rub, Erosion Limits

Stage	A (inch)	B (inch)
4	.010	.005
5	.010	.005
6	.010	.005
7	.007	.003



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents, and depressions	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
Surface body rust	0.010 inch depth	Not repairable	Replace shroud.

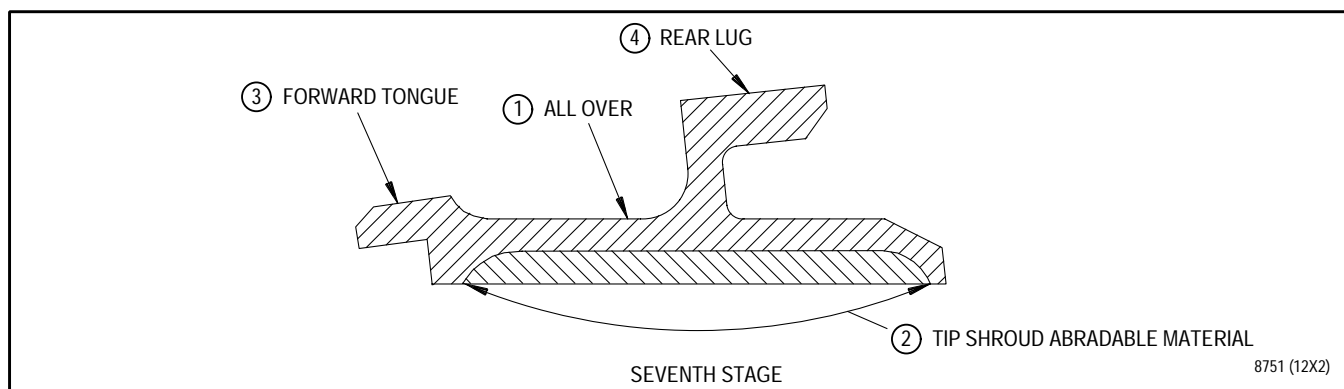
Figure 2. Fifth and Sixth Stage Compressor Duct Segments - Inspection

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material -			
NOTE			
Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.			
Abrasion rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00.
Scratches	1/16 inch wide	Any amount	Replace abradable per WP 488 00.
Nicks, dents, gouges and missing abradable	a. Sum of all damaged areas of all six pieces shall not exceed 2.00 square inches. b. 1/16 square inch and 1/16 inch maximum width along front and rear edges. c. Any condition that extends full width from front to rear of abradable shall not be more than 1/2 inch wide at the widest point. This shall be included in the 2.00 square inch limit. d. Damaged areas shall be separated by a minimum of 1.00 inch.	Any amount	Replace abradable per WP 488 00.

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Forward tongue diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
4. Rear tongue diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents and depressions	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
Surface body rust	0.010 inch depth	Not repairable	Replace shroud.
2. Tip shroud abradable material -			

NOTE

Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.

Abrasion rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00.
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Figure 3. Seventh Stage Compressor Duct Segments - Inspection

Legend for figure 3 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material - (continued)			
Scratches	1/16 inch wide	Any amount	Replace abradable per WP 488 00.
Nicks, dents, gouges and missing abradable	<p>a. Sum of all damaged areas of all six pieces shall not exceed 2.00 square inches.</p> <p>b. 1/16 square inch and 1/16 inch width along front and rear edges.</p> <p>c. Any condition that extends full width from front to rear of abradable shall not be more than 1/2 inch wide at the widest point. This shall be included in the 2.00 square inch limit.</p> <p>d. Damaged areas shall be separated by a minimum of 1.00 inch.</p>	Any amount	Replace abradable per WP 488 00.

Legend for figure 3 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
3. Forward tongue diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.
4. Rear lug diameter -			
Wear, rub erosion	0.005 inch depth. Remove raised material.	0.010 inch depth, 0.010 inch blending depth, 0.250 inch arc length. Multiple blends shall be separated 0.500 inch from each other.	Blend repair. Refer to T.O. 2-1-111. Touch up coat per WP 488 00.

SUBORDINATE WORK PACKAGE**TECHNICAL PROCEDURES****DUCT SEGMENT, COMPRESSOR, FOURTH, FIFTH,
SIXTH AND SEVENTH STAGE -****INSPECTION
AFTER VOLCANIC ASH INGESTION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE SWP PAGES**

Total Number of Pages in this SWP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	25	3 - 12	25	13	8
2	8			14 Blank	8

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

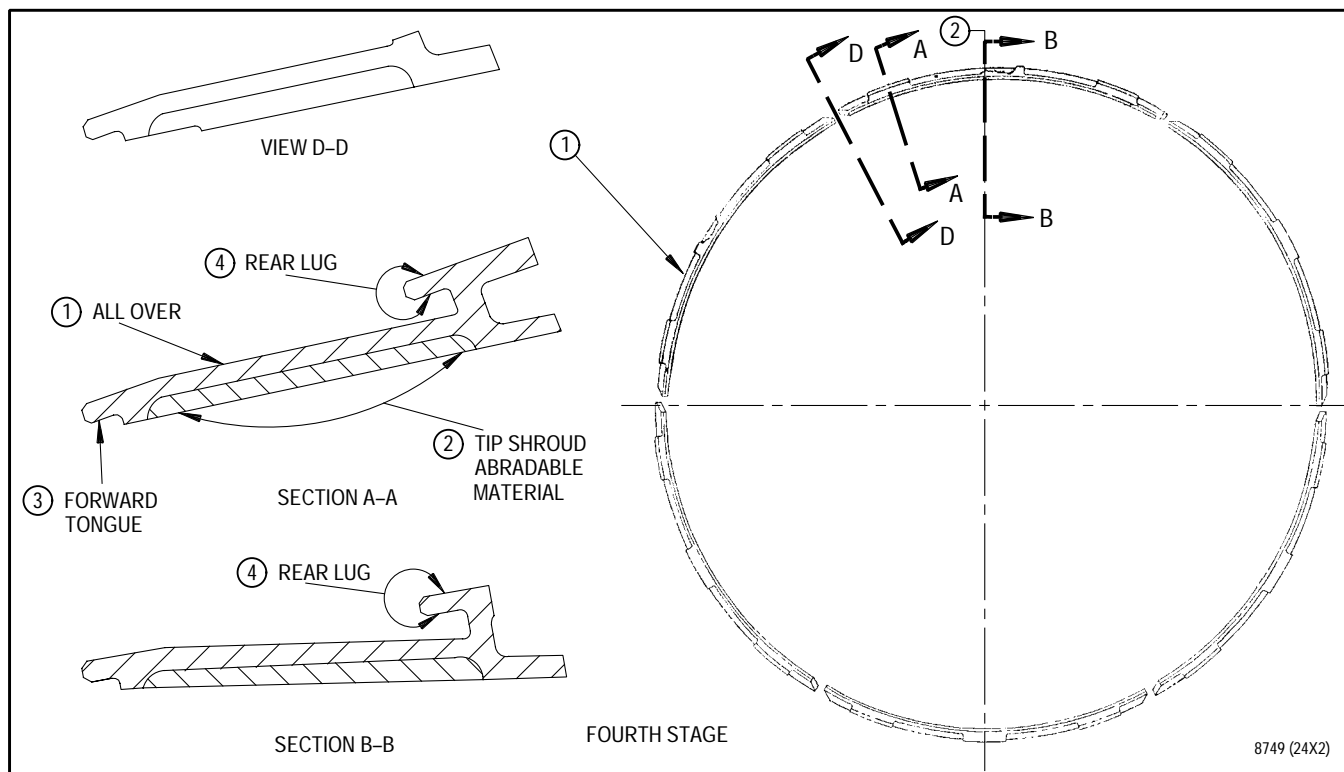
1. INTRODUCTION.

- a. This subordinate work package contains instructions for inspection of 4th, 5th, 6th and 7th stage compressor duct segments after volcanic ash ingestion.

2. FOURTH THROUGH SEVENTH STAGE COMPRESSOR DUCT SEGMENTS - INSPECTION.

(See Figures 1 through 4 and Table 1.)

- a. Inspect 4th stage duct segments per figure 1. All dimensions and limits are for individual duct segments.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents and depressions	0.010 inch depth. Remove raised material.	0.020 inch depth.	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Surface body rust	10% of each surface	Not repairable	Replace shroud.

Figure 1. Fourth Stage Compressor Duct Segments - Inspection

Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material -			
NOTE			
Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.			
Abrasion rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00.
Scratches	Up to 0.062 inch width by 0.020 inch depth by 3.000 inch total length	Any amount	Repair per WP 488 00.

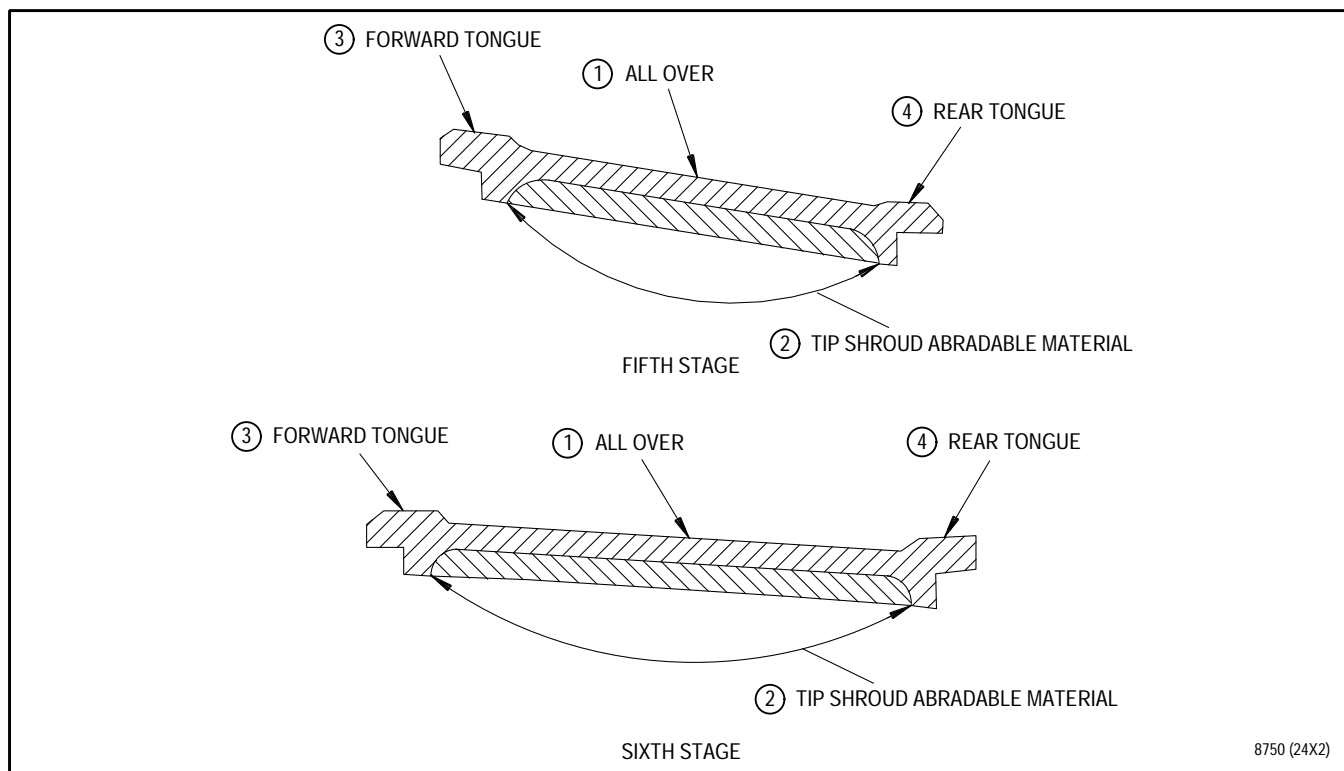
Legend for figure 1 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material (continued) -			
Nicks, dents, gouges and missing abradable	a. The sum of all damaged areas is not to exceed 0.300 square inches. b. Individual areas smaller than 0.062 by 0.062 shall not be included in the 0.300 square inch total. c. Missing abradable up to 0.125 inch width by full depth along all edges (front, rear, and split lines) shall not be included in 0.300 square inch total. d. Maximum surface dimension of any single damaged area shall not exceed 0.375 inch.	Any amount	Repair per WP 488 00
3. Forward tongue -			
Wear, rub, erosion	Minimum thickness of 0.085 inch. However, up to 10% of tongue arc may be 0.080 inch thick. Remove any raised material.	Not reparable	Replace shroud.
4. Rear lug -			
Wear, rub, erosion	Minimum thickness of 0.085 inch. However, up to 10% of tongue arc may be 0.080 inch thick. Remove any raised material.	Not reparable	Replace shroud.

Table 1. Allowable Tip Shroud Rub/Erosion Depths Limits

Stage	A (inch)	B (inch)
4	0.038	0.028
5	0.031	0.021
6	0.035	0.025
7	0.030	0.017

- b. Inspect 5th and 6th stage duct segments per figure 2. All dimensions and limits are for individual duct segments.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents, and depressions	0.010 inch depth. Remove raised material.	0.020 inch depth	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Surface body rust	10% of each surface	Not repairable	Replace shroud.

Figure 2. Fifth and Sixth Stage Compressor Duct Segments - Inspection

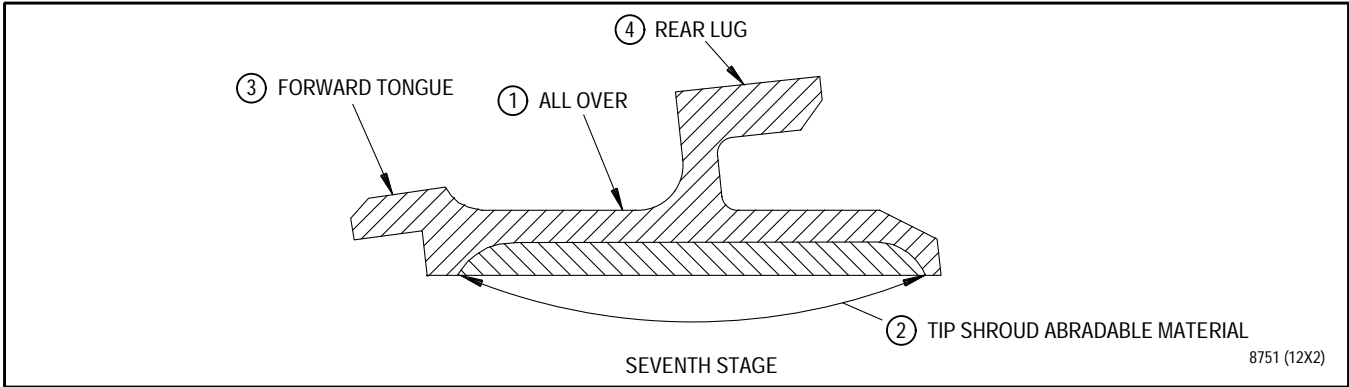
Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material -			
NOTE			
Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.			
Abrasion, rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00
Scratches	Up to 0.062 inch width by 0.020 inch depth by 3.000 inch total length	Any amount	Repair per WP 488 00

Legend for figure 2 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
2. Tip shroud abradable material (continued) -			
Nicks, dents, gouges and missing abradable	a. The sum of all damaged areas is not to exceed 0.300 square inches. b. Individual areas smaller than 0.062 by 0.062 shall not be included in the 0.300 square inch total. c. Missing abradable up to 0.125 inch width by full depth along all edges (front, rear, and split lines) shall not be included in 0.300 square inch total. d. Maximum surface dimension of any single damaged area shall not exceed 0.375 inch.	Any amount	Repair per WP 488 00
3. Forward tongue -			
Wear, rub, erosion	Minimum thickness of 0.110 inch. However, up to 10% of tongue arc may be 0.105 inch thick. Remove any raised material.	Not repairable	Replace shroud.
4. Rear tongue -			
Wear, rub, erosion	Minimum thickness of 0.085 inch. However, up to 10% of tongue arc may be 0.080 inch thick. Remove any raised material.	Not repairable	Replace shroud.

- c. Inspect 7th stage duct segments per figure 3. All dimensions and limits are for individual duct segments.



Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. All over -			
Cracks	Not serviceable	Not repairable	Replace shroud.
Nicks, scratches, dents and depressions	0.010 inch depth. Remove raised material.	0.020 inch depth	Blend repair. Refer to T.O. 2J-F100-53-1, WP 091 00.
Surface body rust	10% of each surface	Not repairable	Replace shroud.

Figure 3. Seventh Stage Compressor Duct Segments - Inspection

Legend for figure 3 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material -			
NOTE			
Abradable nicks, dents and gouges have a separate section in this WP and shall not be considered during rub, erosion inspection.			
Abrasion rub, erosion	Use PWA 57832 gage per WP 353 00. Take total of 6 measurements at 3 equally spaced circumferential locations on center and T.E. of rub groove. See rub, erosion limits from table 1. Limit from Column B applies to all 6 locations specified above. One of 6 location may exceed Limit B as long as: a) Limit B is not exceeded over arc larger than 8° (4° in both directions), and b) depth across 8° arc never exceeds Limit A (seal is unserviceable any time Limit A is exceeded).	Any amount	Repair per WP 488 00
Scratches	Up to 0.062 inch width by 0.020 inch depth by 3.000 inch total length	Any amount	Repair per WP 488 00

Legend for figure 3 (continued)

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Reparable Limits	Corrective Action
2. Tip shroud abradable material (continued) -			
Nicks, dents, gouges and missing abradable	<p>a. The sum of all damaged areas is not to exceed 0.300 square inches.</p> <p>b. Individual areas smaller than 0.062 by 0.062 shall not be included in the 0.300 square inch total.</p> <p>c. Missing abradable up to 0.125 inch width by full depth along all edges (front, rear, and split lines) shall not be included in 0.300 square inch total.</p> <p>d. Maximum surface dimension of any single damaged area shall not exceed 0.375 inch.</p>	Any amount	Repair per WP 488 00
3. Forward tongue -			
Wear, rub, erosion	Minimum thickness of 0.085 inch. However, up to 10% of tongue arc may be 0.080 inch thick. Remove any raised material.	Not reparable	Replace shroud.
4. Rear lug -			
Wear, rub, erosion	Minimum thickness of 0.1135 inch. However, up to 10% of tongue arc may be 0.1085 inch thick. Remove any raised material.	Not reparable	Replace shroud.

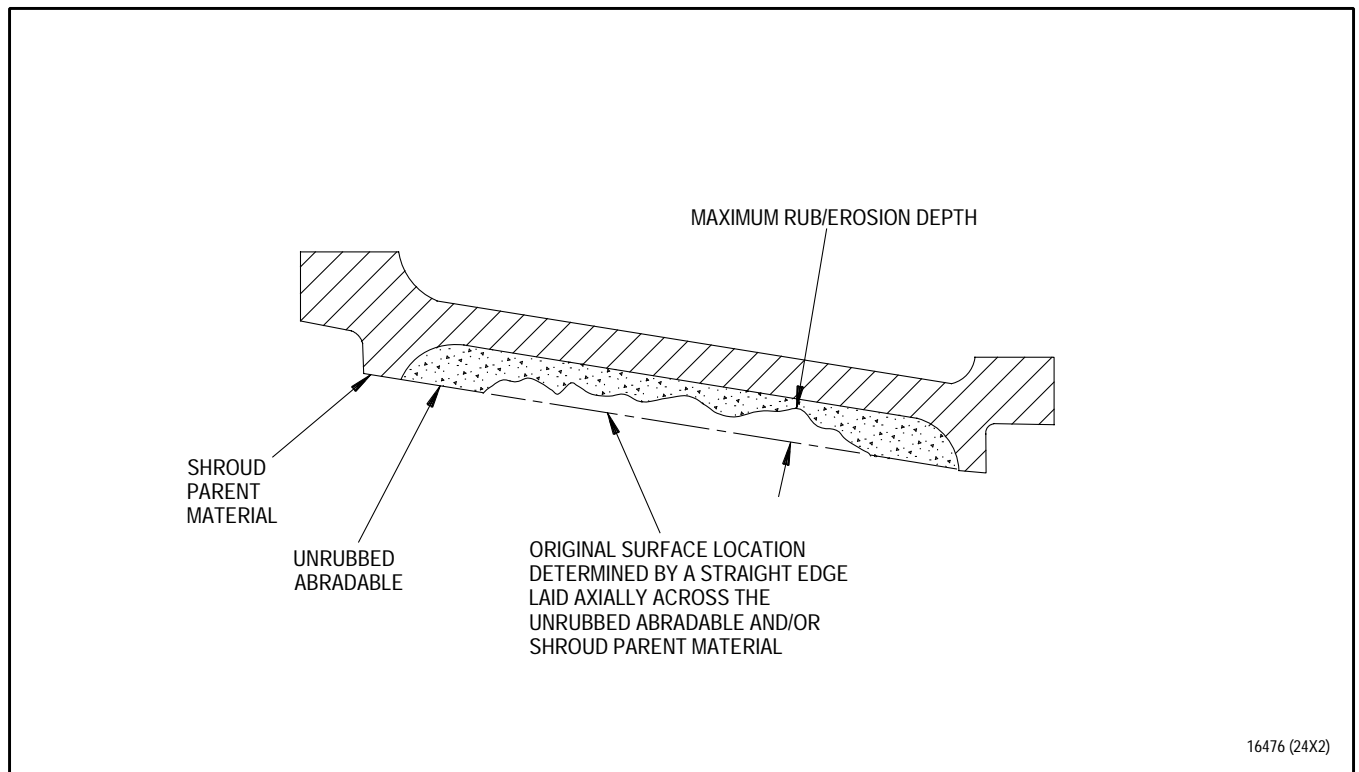


Figure 4. Rub/Erosion Depth Determination (Typical)

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

DUCT SEGMENTS, COMPRESSOR,
FOURTH THROUGH SEVENTH STAGE,
BOND OF PLASMA SPRAYED (PWA 279) ABRADABLE SEAL -

LASER HOLOGRAPHIC INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	19	6 Blank	19		

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for laser holographic inspection of bond of plasma sprayed PWA 279 abradable, 4th through 7th stage compressor duct segments.

2. FOURTH THROUGH SEVENTH STAGE COMPRESSOR DUCT SEGMENTS BOND OF ABRADABLE - LASER HOLOGRAPHIC INSPECTION.

(See Figures 1 and 2, and Table 1.)

- a. Laser holographic inspect bond of plasma sprayed abradable. Refer to T.O. 2J-F100-9.
- b. Following are terms specifically used for bond of plasma sprayed abradable:

- (1) Imperfection: Appears as dark red through black image on hologram which may be either disbond or delamination. See figure 1.

- (2) Racetracks: One pink line or two parallel pink lines running circumferentially around seal on hologram, caused by excitation of part. See figure 1.

- (3) Group: Imperfections separated by less than 0.060 inch shall be considered group and treated as single void.

- c. Acceptable Limits: Imperfections shall be acceptable only to the limits specified in this work package. See table 1 for acceptance limits.
- d. Nonconformances: Parts not meeting requirements of this standard shall be repaired per WP 488 00.

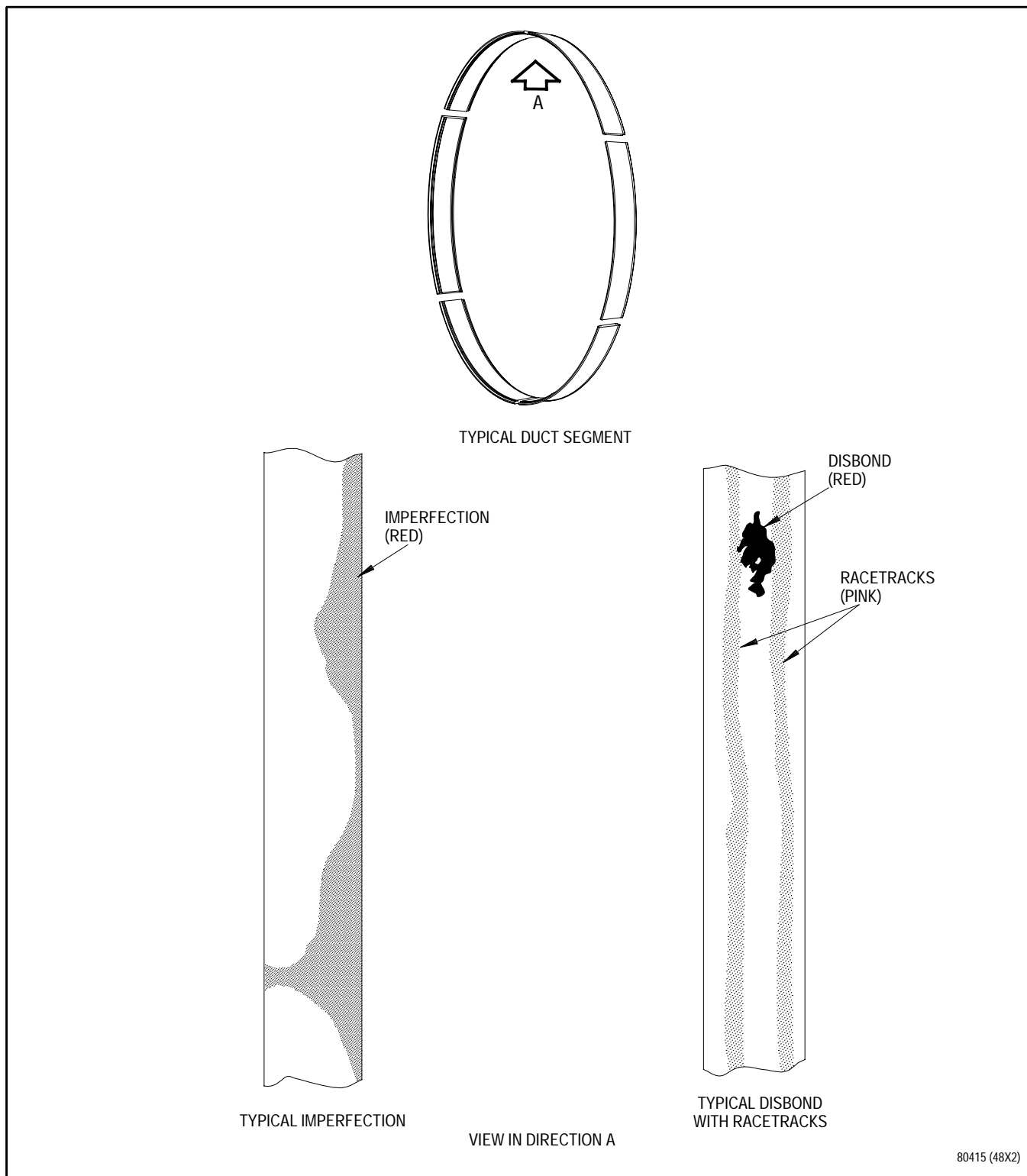
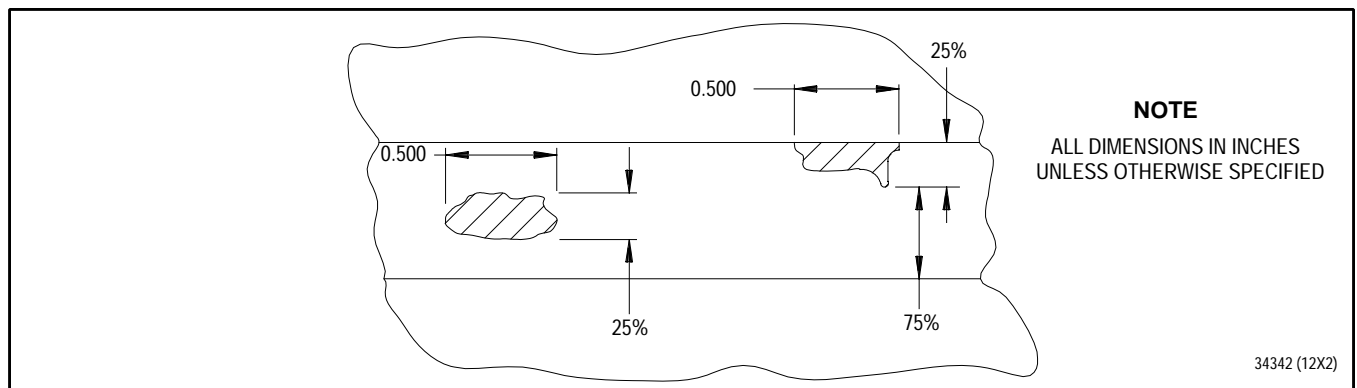


Figure 1. Fourth Through Seventh Stage Compressor Duct Segments - Disbond With Racetracks

Table 1. Fourth Through Seventh Stage Compressor Duct Segments - Imperfection Limits

Type Imperfection	Maximum Size	Maximum Number
Individual or group imperfections	0.500 inch by 25% of land width. See figure 2.	Five per shroud or one per segment
Racetracks	Not applicable	Unlimited

**Figure 2. Fourth Through Seventh Stage Compressor Duct Segments - Holographic Inspection Acceptance Limits**

WORK PACKAGE

TECHNICAL PROCEDURES

KEY, COMPRESSOR, DUCT, FIFTH, SIXTH
AND SEVENTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

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WORK PACKAGE

TECHNICAL PROCEDURES

RAIL, COMPRESSOR STATOR, SEVENTH STAGE AND EIGHTH-NINTH STAGE -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

WASHER, SPRING TENSION, NO. 2 FRONT SEAL -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

NOZZLE, NO. 2 BEARING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
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To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

KEY WASHER, NO. 2 BEARING COUPLING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

RETAINING RING, GEARBOX DRIVESHAFT COUPLING -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

RETAINING RING, GEARBOX DRIVE BEVEL GEARSHAFT -

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	0
2	Blank	.	.	.	0

To be supplied

WORK PACKAGE

TECHNICAL PROCEDURES

COMPRESSOR DISCHARGE MANIFOLD ASSEMBLY

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	18	3 - 4	18	5	3
2	1			6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of compressor discharge manifold assembly.

2. COMPRESSOR DISCHARGE MANIFOLD ASSEMBLY - INSPECTION.

(See Figure 1.)

- a. Ensure compressor discharge manifold assembly has been cleaned per WP 201 00.
- b. Fluorescent penetrant inspect manifold assembly for cracks on a system with capability defined in figure 1. Refer to T.O. 2J-F100-9. No cracks allowed. All crack indications observed are cause for rejection and require Material Review Board (MRB) evaluation.
- c. Visually inspect manifold assembly per figure 1.

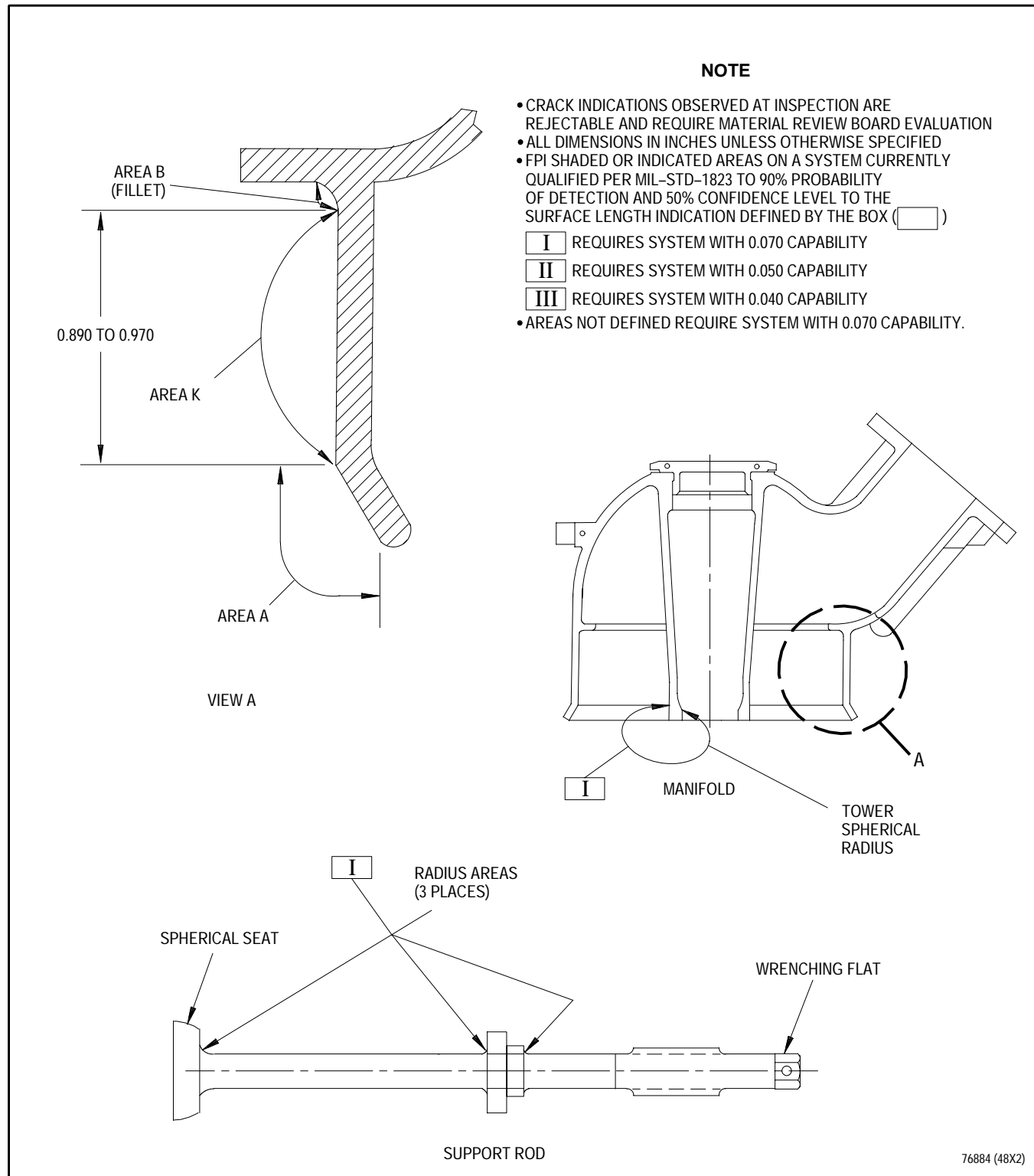


Figure 1. Compressor Discharge Manifold and Support Rod - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Compressor Discharge Manifold -			
Cracks	Not serviceable	Not repairable	Replace manifold.
Nicks, dents, scratches, depressions (Area A only)	0.017 inch deep. No sharp edges. No abrupt coating transition to area K	a. 0.040 inch depth and over	a. Blend or deburr. b. Replace manifold.
Coating, chipped, missing (Area A only)	Any amount. No sharp edges or steps allowed.	Any amount, provided blend does not extend into parent material.	Blend or deburr.
Wear (Area K only)	0.003 inch deep	Not repairable	Replace manifold.
Coating, cracked, chipped, missing (Area K only)	Not serviceable	Not repairable	Replace manifold.
Coating, chipped, cracked (Area B only)	Any amount, as long as it does not extend into Area K.	Not repairable	Replace manifold.
2. Support Rod -			
Threads, stripped, cross threaded	Not serviceable	Not repairable	Replace support rod.
Bent	Not serviceable	Not repairable	Replace support rod.
Wrenching flat, damage	Not serviceable	a. Minor nicks, and indications b. Major damage not repairable	a. Deburr. b. Replace support rod.
Spherical seat, hardface gouges, damage	Not serviceable	Not repairable	Replace support rod.
Seizing, binding in manifold seat	Not serviceable	Not repairable	Replace support rod.

WORK PACKAGE

TECHNICAL PROCEDURES

**RING, SEGMENT, COMPRESSOR STATOR SUPPORT,
TENTH THROUGH TWELFTH STAGE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4		9			

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for inspection of 10th through 12th stage compressor stator support ring segments.

2. TENTH THROUGH TWELFTH STAGE COMPRESSOR STATOR SUPPORT RING SEGMENTS -INSPECTION.

(See Figure 1.)

- a. Visually inspect ring segments.
(See figure 1.)

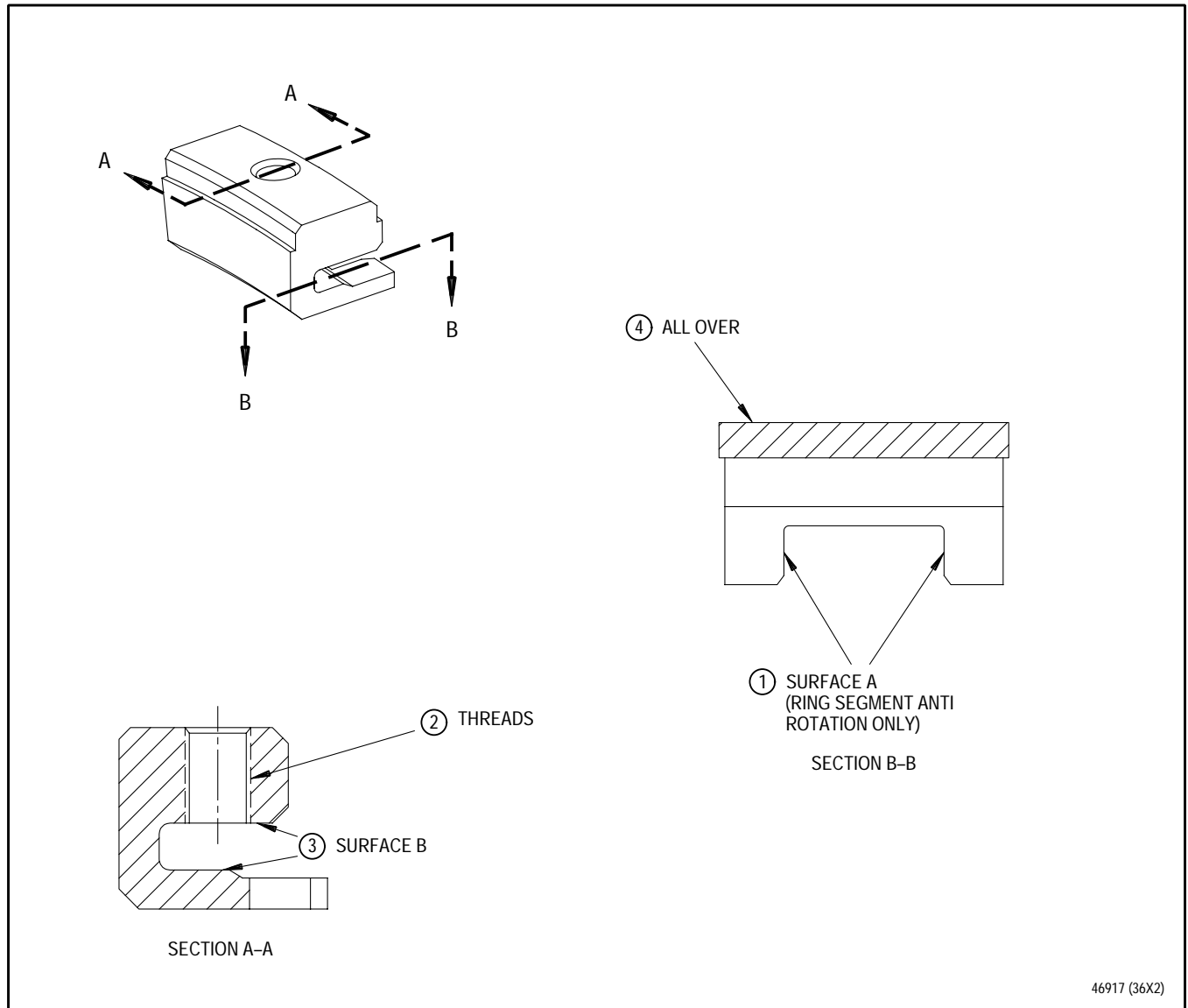


Figure 1. Tenth Through Twelfth Stage Compressor Stator Support Ring Segment - Inspection

Legend for figure 1

Inspection Area - Condition	Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1. Surface A - Wear	0.001 inch depth	Not reparable	Replace segment.
2. Threads - Pits, galling, deformation	Not serviceable	Not reparable	Replace segment.
3. Surface B - Wear	0.001 inch depth	Not reparable	Replace segment.
4. All Over - Nicks, dents and scratches	0.010 inch depth	Blend depth 0.015 inch	Blend per T.O.2J-F100-56-1, WP 091 00.

WORK PACKAGE

TECHNICAL PROCEDURES

**BELLCRANK ASSEMBLY, COMPRESSOR
STATOR LINKAGE -**

INSPECTION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7	25	8 Blank	25		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
High Sensitivity Fluorescent Penetrant Inspection - - - -	SPOP 82

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

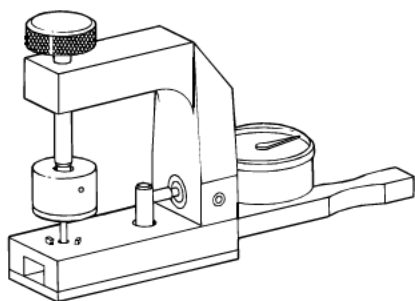
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

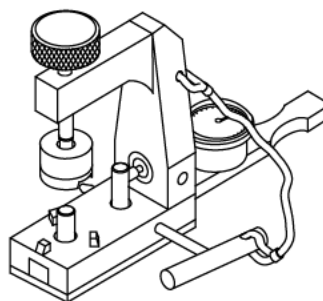
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMPRESSOR STATOR LINKAGE BELLCRANK ASSEMBLY - INSPECTION	
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669
	GAGE, UNIBALL RADIAL WEAR MEASURING (0.1875 BRG) - -	PWA 55642
	GAGE, UNIBALL RADIAL WEAR MEASURING (0.250 BRG) - - -	PWA 55644

ILLUSTRATED SUPPORT EQUIPMENT



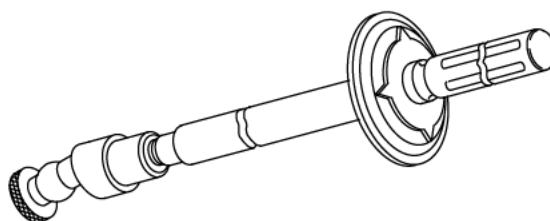
PWA 55642 -C

Figure T1. PWA 55642 GAGE



PWA 55644 -C

Figure T2. PWA 55644 GAGE



PWA 55669 -C

Figure T3. PWA 55669 GAGE

1. INTRODUCTION.

- a. This work package contains instructions for inspection of compressor stator linkage bellcrank assembly.

2. COMPRESSOR STATOR LINKAGE BELLCRANK ASSEMBLY - INSPECTION.

(See Figures 1 and 2.)

- a. Inspect linkage arm for cracks using fluorescent penetrant method. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- b. Visually and dimensionally inspect linkage bellcrank assembly. See figure 1.

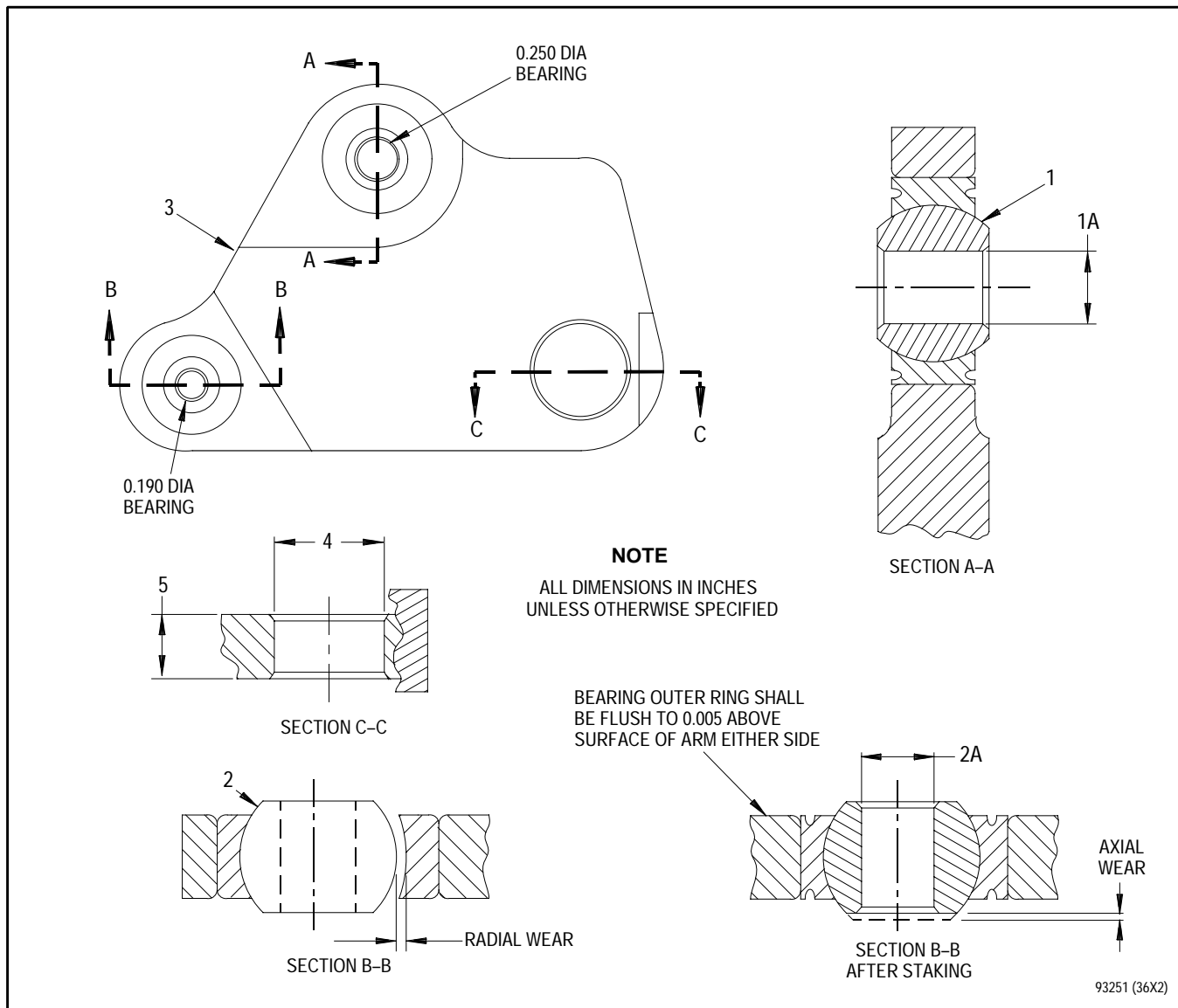


Figure 1. Compressor Stator Linkage Bellcrank Assembly - Inspection

- c. Check bearing for binding using PWA 55669 gage. Maximum allowable torque is 5 pound-inches.
- d. Check bearing radial wear as follows using PWA 55642 gage for 0.190 inch ID bearing and PWA 55644 gage for 0.250 inch ID bearing (see figure 2):
 - (1) Back off gage thumbscrew(2) to raise clamp(1).
 - (2) Place bearing(7) on locating pin(6). Secure in place with clamp.
 - (3) Remove T-pin(5). Pull slide handle(4) and adjust dial indicator(3) to zero.
 - (4) Release slide handle and apply slight pressure in opposite direction to remove radial play. Read movement on dial indicator for bearing radial wear.
 - (5) Insert T-pin. Back off thumbscrew and remove part.

Legend for figure 1

Inspection Area Condition		Maximum Serviceable Limits	Maximum Repairable Limits	Corrective Action
1.	Bearings -			
and				
2.				
	Binding	Bearings shall move through 9° minimum cone angle using finger pressure only	Not repairable	Replace bearing per WP 498 00.
	Radial wear	0.004 inch	Not repairable	Replace bearing per WP 498 00.
	Axial wear	0.005 inch	Not repairable	Replace bearing per WP 498 00.
	Staking	Snug fit at staking points	See corrective action	Re-stake per WP 498 00.
	Galling	Not serviceable	Not repairable	Replace bearing per WP 498 00.
	Bearing surface marks	0.005 inch depth	Not repairable	Replace bearing per WP 498 00.
1A.	Bearing bolt hole -	0.251 inch diameter	Not repairable	Replace bearing per WP 498 00.
2A.	Bearing bolt hole -	0.191 inch diameter	Not repairable	Replace bearing per WP 498 00.
3.	Arm -			
	Cracks	Not serviceable	Not repairable	Replace bellcrank assembly.
	Nicks, dents, or gouges	0.025 inch depth in a 0.100 inch by 0.200 inch area	See corrective action	Blend smoothly to adjacent surfaces, 0.030 inch maximum depth.
4.	Diameter -	0.545 to 0.5475 inch	Not repairable	Replace bellcrank assembly.
5.	Thickness -	0.326 to 0.329 inch	Not repairable	Replace bellcrank assembly.

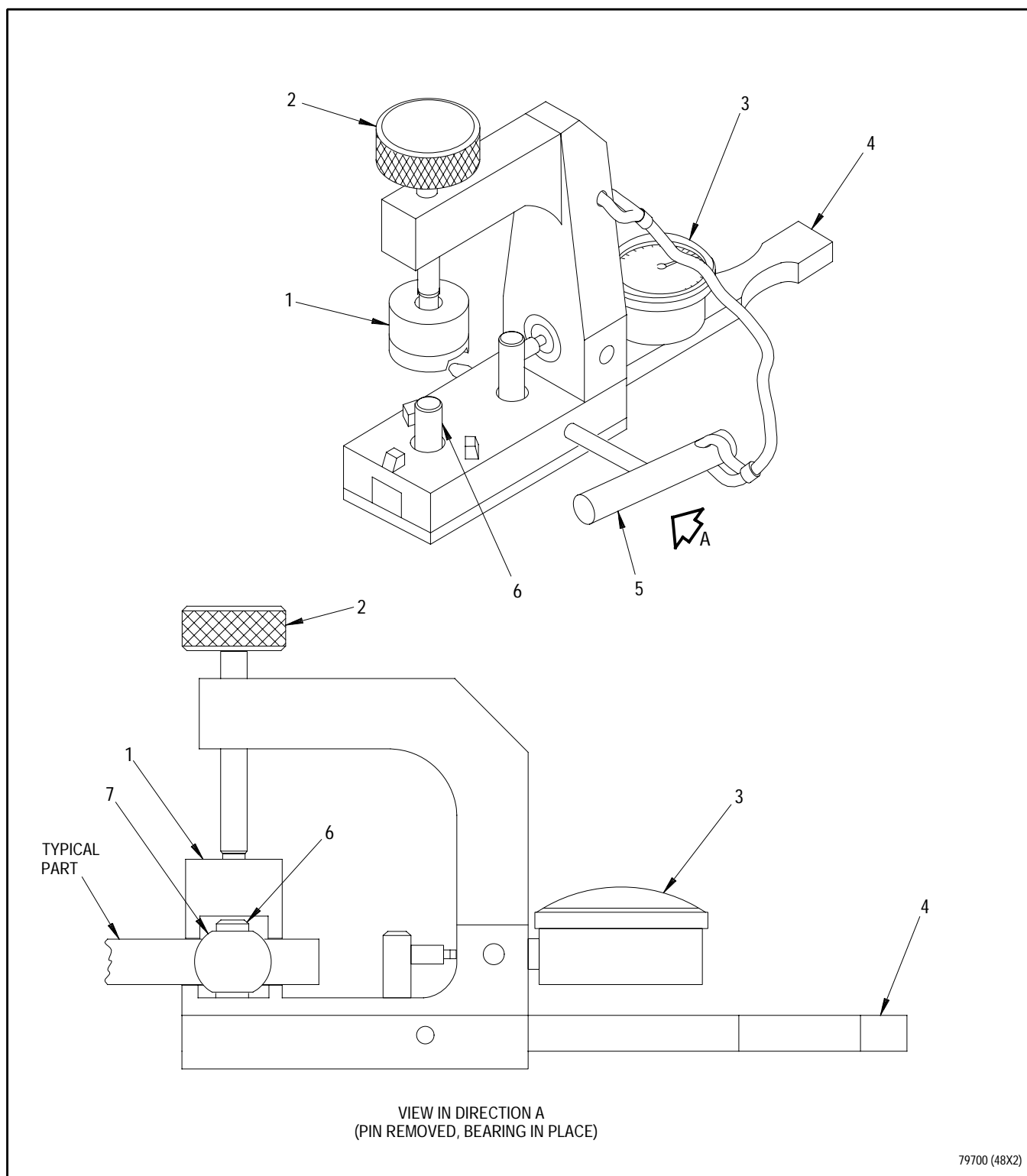


Figure 2. Uniball Radial Wear Measuring Gage - Typical

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	29	4	25
2	25				

1. INTRODUCTION.

This work package introduces the 400 00 through 499 00 series of work packages for repair of core module parts. The following work packages are included in this series.

WP/SWP No.	Title
401 00	Open
402 00	Disk, Drum Rotor, Rear Compressor, Front, Assembly (Fourth and Fifth Stage) - Repair
403 00	Nuts, Bearing Retaining - Repair
404 00	Lock, Rear Compressor Driveshaft Nut - Repair
405 00	Disk and Hub, Compressor, Sixth Stage, Assembly - Repair
406 00	Seats, No. 2, 3, and 4 Bearing Seal - Repair
407 00	Support Assembly, No. 3 Bearing Seal - Repair
408 00	Tube Assembly, No. 2 and 3 Bearing Outer, Internal Pressure - Repair
409 00	Support Assembly, No. 2 Bearing Seal - Repair
410 00	Housing, Gearbox Drive Bearing - Repair
411 00	Gear and Gearshaft, Bevel, Gearbox Drive - Repair
412 00	Coupling, Turbine Shaft - Repair
413 00	Scoop Assembly, No. 2 Bearing, Front - Repair
414 00	Scoop, No. 2 Bearing, Rear - Repair
415 00	Housing Assembly, No. 2 Bearing - Repair
416 00	Open
417 00	Seal Assemblies, Face, No. 2 Bearing, Front and Rear - Repair
418 00	Seal Assembly, Face, No. 3 Bearing, Front - Repair
419 00	Seal Assembly, Face, No. 3 Bearing, Rear - Repair
420 00	Seal Assembly, Face, No. 4 Bearing - Repair
421 00	Stator, Compressor, Third Stage - Repair
422 00	Open
423 00	Support Assembly, No. 3 Bearing - Repair
424 00	Open
425 00	Ring Assembly, Air Sealing, No. 4 Bearing, Rear - Repair
426 00	Support Assembly, No. 4 Bearing Rear Seal - Repair
427 00	Housing, No. 4 Bearing - Repair
428 00	Scoop, No. 4 Bearing - Repair

WP/SWP No.	Title
429 00	Open
430 00	Shroud, Compressor Stator, Third Stage - Repair
431 00	Shroud Set, Compressor Stator, Inlet - Repair
432 00	Support Assembly, No. 4 Bearing Front Seal - Repair
433 00	Ring Assembly, Air Sealing, No. 4 Bearing, Front (Single Land) - Repair
433 01	Flange - No. 4 Bearing Air Sealing Ring - Repair
434 00	Case Assembly, Diffuser - Repair
435 00	Synchronizing Arm, Rear Compressor Variable Stator Vanes - Repair
436 00	Seal, Air, No. 3 Bearing - Repair
437 00	Support Assembly, Compressor Stator - Repair
438 00	Seal, Air, No. 4 Bearing, Front - Repair
439 00	Bearings - Repair
440 00	Manifold Assemblies, Fuel Supply, Left and Right - Repair
441 00	
through	Open
447 00	
448 00	Stator, Fan Exit - Repair
449 00	Support Bracket, Strap and Actuating Linkage, Bumper and Carriage, Bleed Valve; Elbow and Sleeve, Air Supply Manifold - Repair
450 00	Nut, Rear Compressor Driveshaft - Repair
451 00	Case Set, Compressor, Fourth Through Ninth Stage - Repair
452 00	Stator Segment, Compressor, Tenth Through Twelfth Stage Assembly - Repair
453 00	Open
454 00	Shroud, Compressor Stator, Seventh Through Ninth Stage, Assembly Of - Repair
455 00	Stator Segment, Compressor, Seventh Through Ninth Stage Assembly - Repair
456 00	Open
457 00	Vanes, Rear Compressor, Variable Inlet - Repair
458 00	Chamber Assembly, Combustion - Repair
459 00	Support Assembly, First Stage Turbine Stator - Repair
460 00	Open
461 00	Disk-Drum Rotor, Rear Compressor, Rear Assembly (Seventh Through Thirteenth Stages) - Repair

WP/SWP No.	Title
462 00 through 463 00	Open
464 00	Case Assembly, Compressor, Fourth Stage - Repair
465 00	Shroud Segment Sets, Compressor Stator, Fourth, Fifth, and Sixth Stage - Repair
466 00	Open
467 00	Stator, Compressor Exit - Repair
468 00	Case Assembly, Compressor, Tenth through Twelfth Stage - Repair
469 00	Case Assembly, Compressor Intermediate - Repair
470 00 through 471 00	Open
472 00	Tubing, Diffuser Case - Repair
473 00	Open
474 00	Blades, Compressor Rotor, Fourth Through Thirteenth Stage - Repair
474 01	Blades, Compressor Rotor, Fourth Through Thirteenth Stage - Repair After Volcanic Ash Ingestion
475 00	Vanes, Compressor Stator, Fourth, Fifth and Sixth Stage - Repair
476 00 through 477 00	Open
478 00	Insert, Screw Thread (Igniter Plug Boss Insert) - Repair
479 00	Baffle, Gearbox - Repair
480 00 through 481 00	Open
482 00	Tube Assembly, Compressor Bleed - Repair
483 00 through 487 00	Open
488 00	Duct Segments, Compressor, Fourth, Fifth, Sixth and Seventh Stage - Repair
489 00 through 497 00	Open
498 00	Bellcrank Assembly, Compressor Stator Linkage - Repair
499 00	Open

WORK PACKAGE**TECHNICAL PROCEDURES****DISK-DRUM ROTOR, REAR COMPRESSOR,
FRONT, ASSEMBLY (FOURTH AND FIFTH STAGE)****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 24

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	3 - 4	0	9 - 18 Added	26
2A - 2C Added	26	5 - 6	26	19	29
2D Blank Added	26	7 - 8	29	20 Blank	26

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
General Repair Procedures - Peening, Steel Shot (SPOP 501) - - - - -	SWP 091 08
Qualified Repair Source List (QRSL) Core Engine Module -	WP 603 00
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Application of Adhesive Sealant PWA 36056 - - - -	WP 627 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE, ALUMINUM OXIDE	180 TO 360 GRIT
CLOTH, ABRASIVE, CROCUS	P-C-458
CLOTH, ABRASIVE, SILICON CARBIDE	180 TO 360 GRIT
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
GRIT, ALUMINUM OXIDE, 60 TO 80 MESH	NO. 60 ARROWBLAST OR NO. 60 FASTBLAST
GRIT, SILICON CARBIDE, 60 TO 80 MESH	SILICON CARBIDE 60 OR 60A
SHOT, STEEL, CAST (SIZE 170)	MIL-S-13165/SAE 170
STONE, ABRASIVE	-
TAPE, HEAT REFLECTIVE (PMC 4235)	NO. 363 OR 2925-7 OR 390
TAPE, HIGH TEMPERATURE, GLASS CLOTH (PMC 4273)	NO. 361

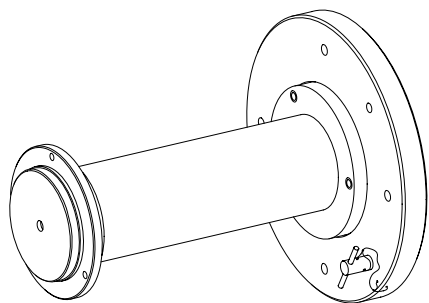
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

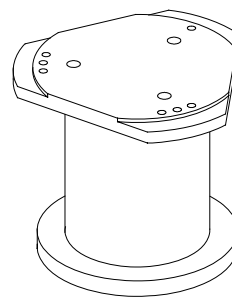
Paragraph	Function - Tool Nomenclature	Tool Number
5	REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - SNAP DIAMETER PLASMA COAT REPAIR	
	FIXTURE, MACHINING, 4TH AND 5TH STAGE DRUM ROTOR - -	PWA 71056
	FIXTURE, SHOTPEEN, 4TH AND 5TH STAGE DRUM ROTOR - - -	PWA 71058
	PEDESTAL, AUTOMATED SHOTPEEN INSTALLATION - - - - -	PWA 70449
	MASK, SHOTPEEN INNER, 4TH AND 5TH STAGE DRUM ROTOR -	PWA 71059
	MASK, SHOTPEEN OUTER, 4TH AND 5TH STAGE DRUM ROTOR -	PWA 71097
	HOLDER, SHOTPEEN TEST PIECE, 4TH AND 5TH STAGE DRUM ROTOR - - - - -	PWA 71060
	FIXTURE, PLASMA SPRAY AND GRIT BLAST, 4TH AND 5TH STAGE DRUM ROTOR - - - - -	PWA 71054
	MASK, PLASMA SPRAY INNER, 4TH AND 5TH STAGE DRUM ROTOR - - - - -	PWA 71055
	MASK, PLASMA SPRAY OUTER, 4TH AND 5TH STAGE DRUM ROTOR - - - - -	PWA 71151
	HOLDER, TEST PIECE, PLASMA SPRAY, 4TH AND 5TH STAGE DRUM ROTOR - - - - -	PWA 71057

ILLUSTRATED SUPPORT EQUIPMENT



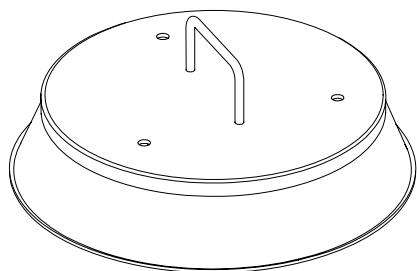
PWA 70449 -C

Figure T1. PWA 70449 PEDESTAL



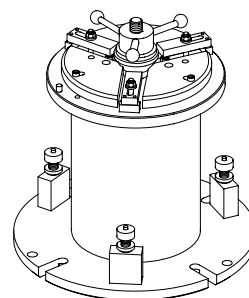
PWA 71054 -C

Figure T2. PWA 71054 FIXTURE



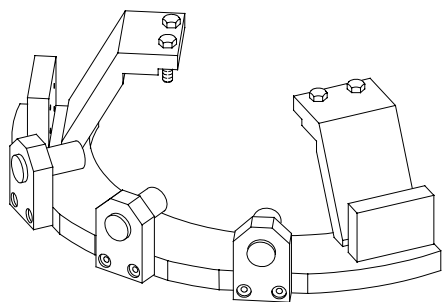
PWA 71055 -C

Figure T3. PWA 71055 MASK



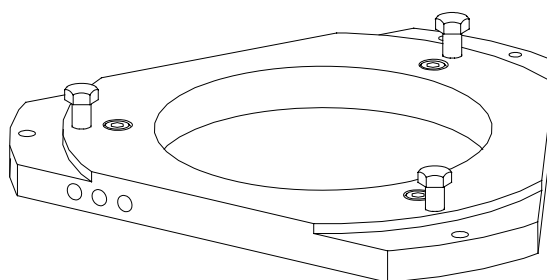
PWA 71056 -C

Figure T4. PWA 71056 FIXTURE



PWA 71057 -C

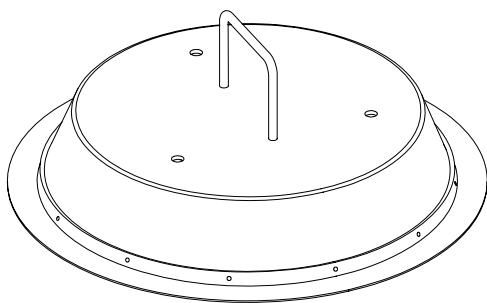
Figure T5. PWA 71057 HOLDER



PWA 71058 -C

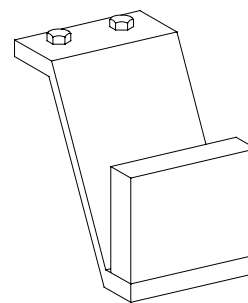
Figure T6. PWA 71058 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



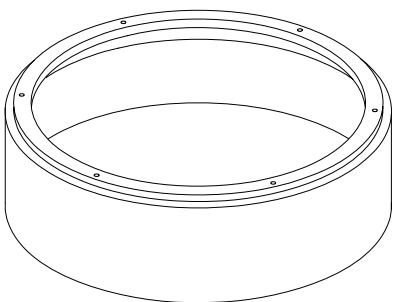
PWA 71059 -C

Figure T7. PWA 71059 MASK



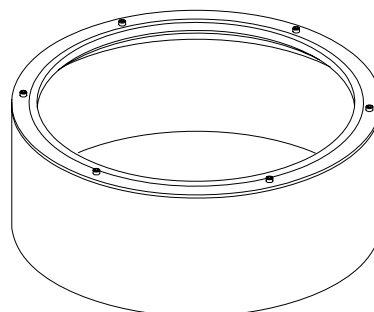
PWA 71060 -C

Figure T8. PWA 71060 HOLDER



PWA 71097 -C

Figure T9. PWA 71097 MASK



PWA 71151 -C

Figure T10. PWA 71151 MASK

1. INTRODUCTION.

- a. This work package contains instructions for repair of rear compressor rotor assembly - front (disk drum).

**2. DISK, DRUM ROTOR, REAR COMPRESSOR,
FRONT - BLEND REPAIR.**

(See Figure 1.)



This paragraph does not apply to tierod holes, area around tierod holes, blade slots, and knife-edge seals.

a. Blend pits, nicks, and dents as follows:

- (1) Scratches - blend depth shall not exceed 0.003 inch after polishing.
- (2) Pits, nicks, and dents - blend depth shall not exceed 0.003 inch after polishing.
- (3) Minimum wall thickness shall be maintained. (See figure 1.) Surface finish shall be as smooth as or smoother than surrounding parent material.

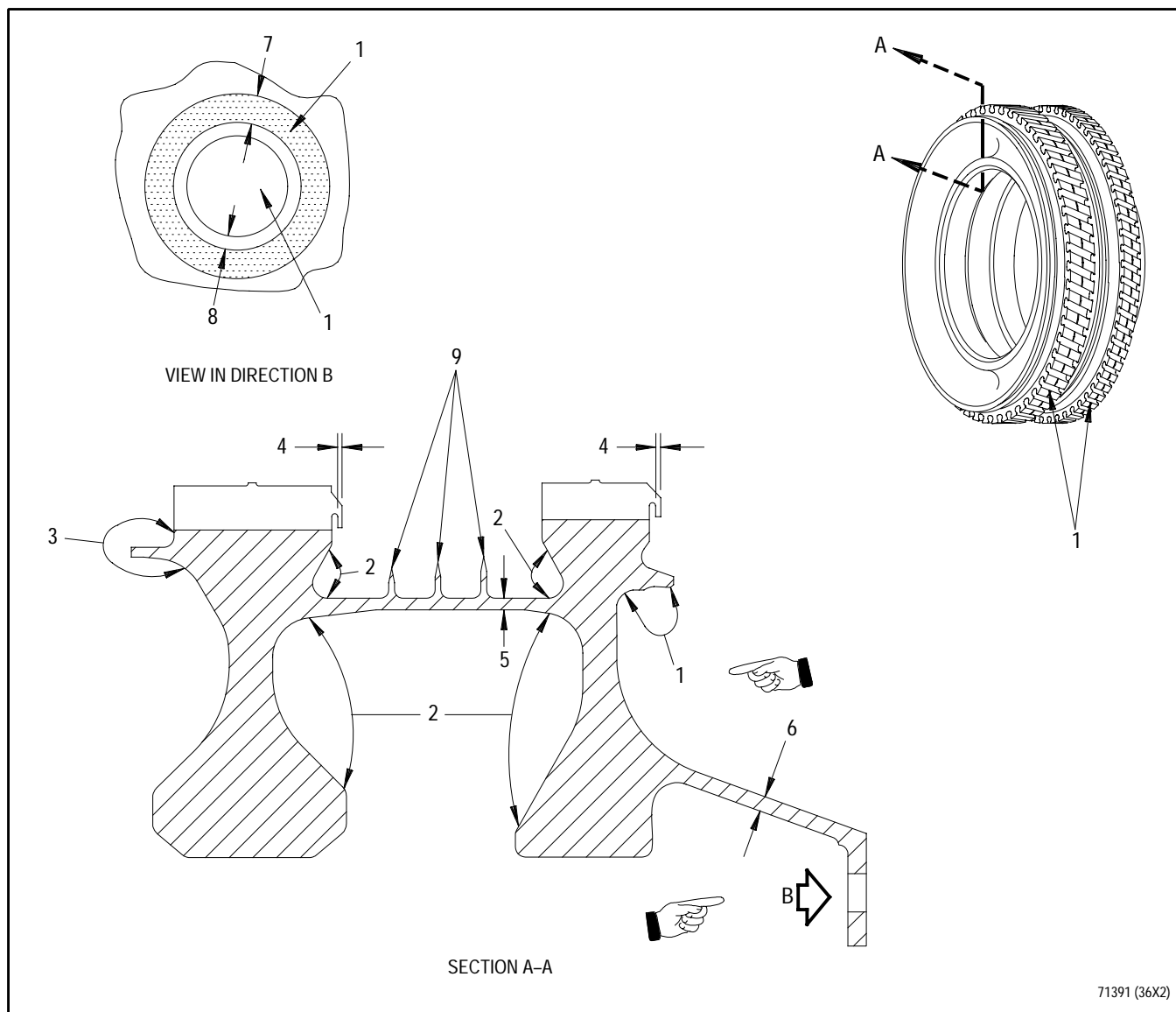
(4) Blend shall not exceed 1 inch in diameter.

(5) Blends shall be separated by at least 2 inches of unblended wall (this also applies to blends on opposite sides of web).

(6) Locking tang wall thickness after removal of 0.003 inch maximum material shall be 0.053 inch minimum.

b. Blend as follows, observing limitations in step a:

- (1) Use fine stones, files, or abrasive cloth of silicon carbide or aluminum oxide. Remove all trace of damage while removing as little material as possible.
- (2) Minimum width of blend shall be at least 15 times depth of damage.



1. No blending or shotpeening allowed
2. Peen per step d. except minimum intensity waived but complete coverage required
3. To radius runout (typical). Peen per 2.
4. 0.053 inch minimum
5. 0.120 inch minimum
6. 0.145 inch minimum
7. 0.200 inch
8. 0.030 inch
9. Blend per paragraph 3.

Figure 1. Rear Compressor Front Disk-Drum Rotor Assembly - Blend Repair



If disks are to be nondestructive inspected while still containing blades, it shall be accomplished by careful local application of penetrant. If any penetrant contacts the blade root, affected blades must be removed and resealed after thorough cleaning of disk and disk details. Refer to WP 201 00 and WP 627 00.

- c. Locally fluorescent penetrant inspect all blends per SPOP 70 to SFPS M. Refer to T.O. 2-1-111. No cracks allowed.



Do not shotpeen tierod holes, around tierod holes, blade slots, or knife-edge seals.

- d. Shotpeen blended areas using SAE 170 max steel shot with hardness of Rockwell C45-55 to dimensions of figure 1. Refer to T.O. 2J-F100-53-1, SWP 091 08 (SPOP 501). No lines of demarcation allowed.
- e. Apply antigalling compound per paragraph 6.

3. REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - KNIFE-EDGE BLENDING.

(See Figure 2.)

NOTE

- Do not attempt to straighten knife-edges.
 - Knife-edge blending repairs are to be completed after aluminum oxide coating is removed. Aluminum oxide coating must be reapplied once blend repair is complete.
- a. All damage shall be blended using fine files and stones. Refer to T.O. 2J-F100-53-1, WP 091 00. Remove all pickup and raised metal. Observe following limits:
- (1) Blending shall be limited to two continuous inches on any one knife-edge or four total inches of noncontinuous blends per knife-edge.
 - (2) Noncontinuous blends shall be separated by minimum of two inches of unblended knife-edge. One inch separation required for blends adjacent to bend with displacement from radial center plane greater than 0.010 inch but less than 0.050 inch.
- (3) Maximum blend depth shall be 0.075 inch.
 - (4) Each blended area shall have 0.500 inch minimum radius at each end of blend and 0.500 inch minimum transition radius into unblended material.
 - (5) Blended areas on two or more knife-edges shall be separated by minimum of two inches of unblended area.
- b. Blend shall be smooth and continuous with aspect ratio (length to depth) equal to 14 to 1 or greater.
- c. Surface finish of all blends shall be smooth as, or smoother than adjacent non-grit blasted surfaces.
- d. Fluorescent penetrant inspect per SPOP 84. Refer to T.O. 2-1-111. Examine indications under white light at 10X magnification. No cracks allowed.

Legend for figure 2

1. Example of blended area (all knife-edges)
2. 2.000 inches minimum between blends on same or adjacent knife-edges
3. 0.500 inch radius minimum, all locations
4. 2.000 inches maximum blend length
5. Any amount of bending is reparable provided final blend meets maximum allowable blend depth (6) and length (4) limits.
6. 0.075 inch maximum blend depth. Blends requiring blend depth greater than this are not serviceable and not reparable.

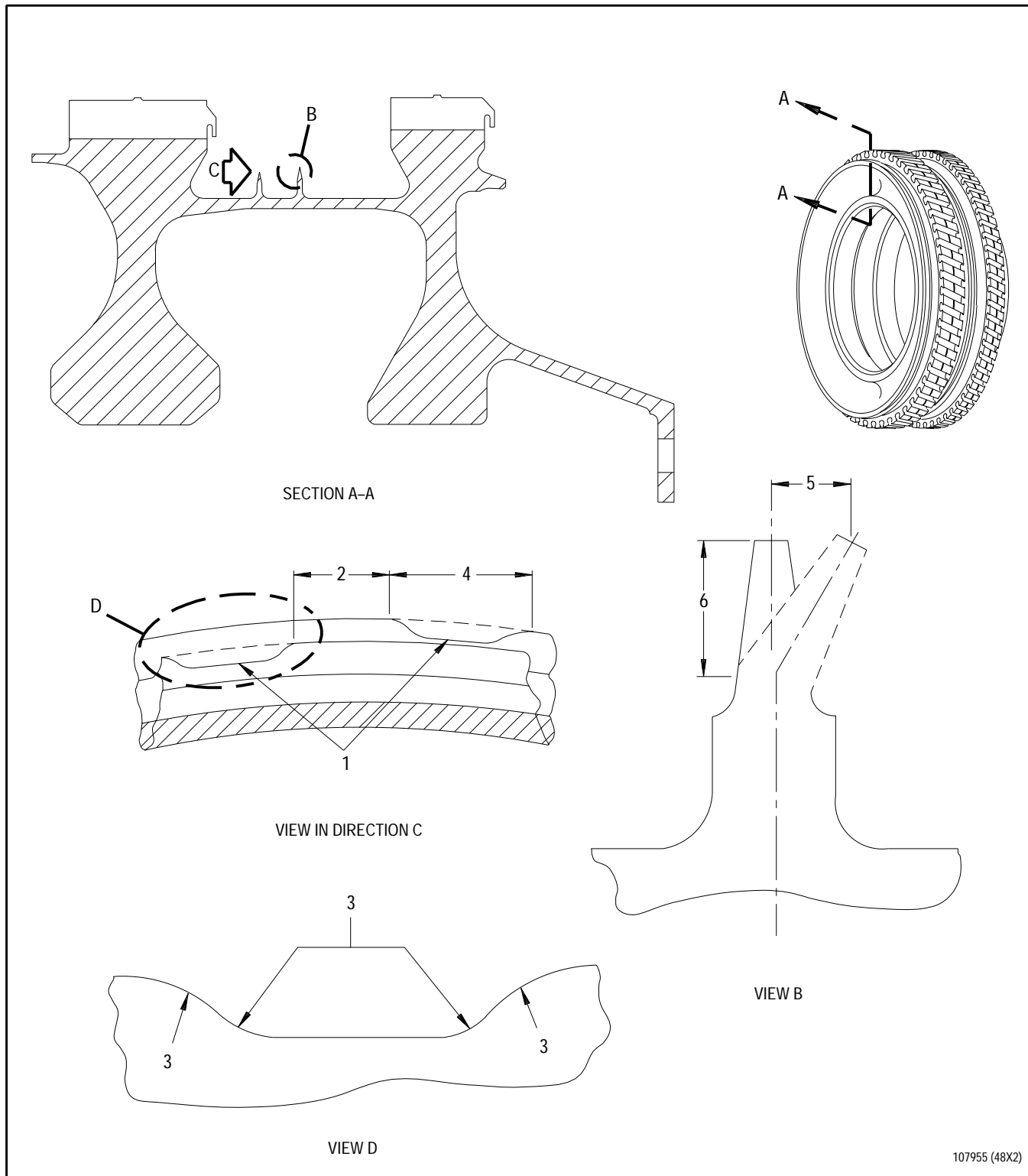


Figure 2. Rear Compressor Front Disk-Drum Rotor Assembly - Knife-Edge Blending

4. REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - FLANGE REPAIR, TIEROD NUT BEARING AREA.

(See Figure 3.)

NOTE

This repair applies to area immediately adjacent to tierod holes only.

- a. Remove raised material in bearing area(1, figure 3) as follows:
 - (1) Hand blend using fine stones or abrasive cloth of silicon carbide or aluminum oxide, 180 to 360 grit. Do not blend outside bearing area.
 - (2) Remove all raised material.
- b. Blend scratches in bearing area as follows:
 - (1) Hand blend using fine stones or abrasive cloth of silicon carbide or aluminum oxide, 180 to 360 grit. Remove all traces of scratches while removing as little material as possible. Do not blend outside bearing area.
 - (2) Minimum width of blend shall be at least 15 times depth of scratch. Remove as little material as possible. Do not exceed repairable depth limits per WP 302 00.
- c. Locally fluorescent penetrant inspect all blends per SPOP 70 to SFPS M. Refer to T.O. 2-1-111. No cracks allowed.

5. REAR COMPRESSOR FRONT DISK-DRUM ROTOR ASSEMBLY - SNAP DIAMETER PLASMA COAT REPAIR.

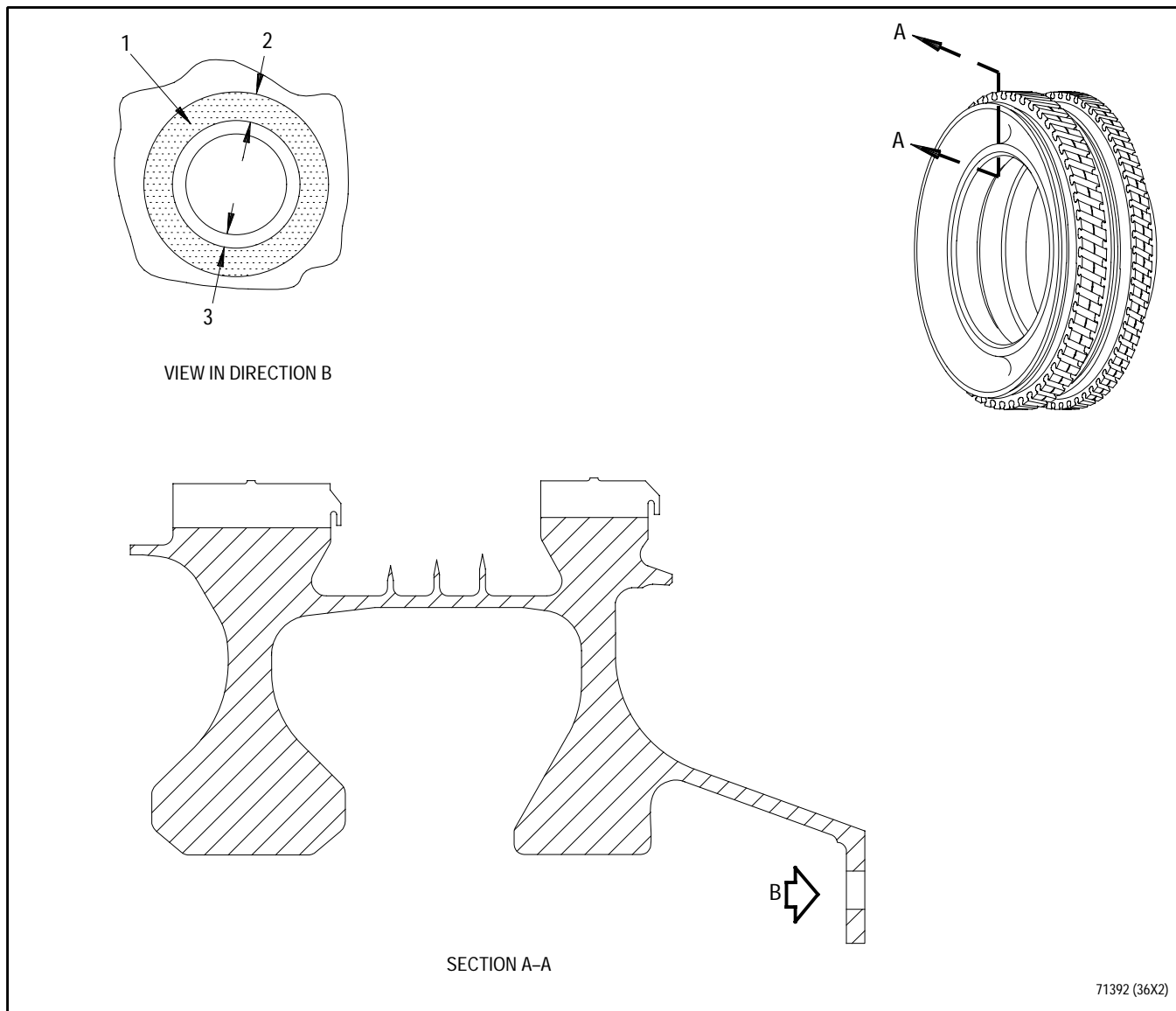
(See Figures 4 through 7.)

- a. Mask area(1, figure 4) per SPOP 36. Strip existing antigalling compound (PWA 550-3 or PWA 36545-3) from snap diameter area(2) per SPOP 16. Refer to T.O. 2-1-111.

NOTE

Disk-drum rotor assembly material is PWA 1227 titanium base alloy.

- b. Using PWA 71056 fixture, machine snap diameter to minimum dimensions required prior to coating per figure 5. Refer to T.O. 2-1-111 for feature control symbol definition. A snap diameter which has been plasma coat repaired one time shall have all coating removed and meet machining requirements per figure 5.
- c. Locally fluorescent penetrant inspect machined area per SPOP 70 to SFPS M. Refer to T.O. 2-1-111. No cracks allowed.
- d. Shotpeen, grit blast and plasma coat a test specimen per the following procedures before continuing with disk-drum rotor assembly repair. Spray angles for test specimen shall be same as for rotor assembly repair.
- e. Shotpeen snap diameter as follows:
 - (1) Install PWA 71058 fixture(4, figure 6) on PWA 70449 pedestal(5). Install disk-drum rotor assembly(3) on fixture(4) and install PWA 71059 mask(2) and PWA 71097 mask(1). Use PWA 71060 holder(6) on PWA 71058 fixture(4) when shotpeening test specimen.



1. Bearing area
2. 0.200 inch
3. 0.030 inch

Figure 3. Rear Compressor Front Disk-Drum Rotor Assembly - Flange Repair, Tierod Nut Bearing Area

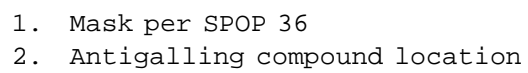


Figure 4. Rear Compressor Front Disk-Drum Rotor Assembly - Antigalling Compound Removal

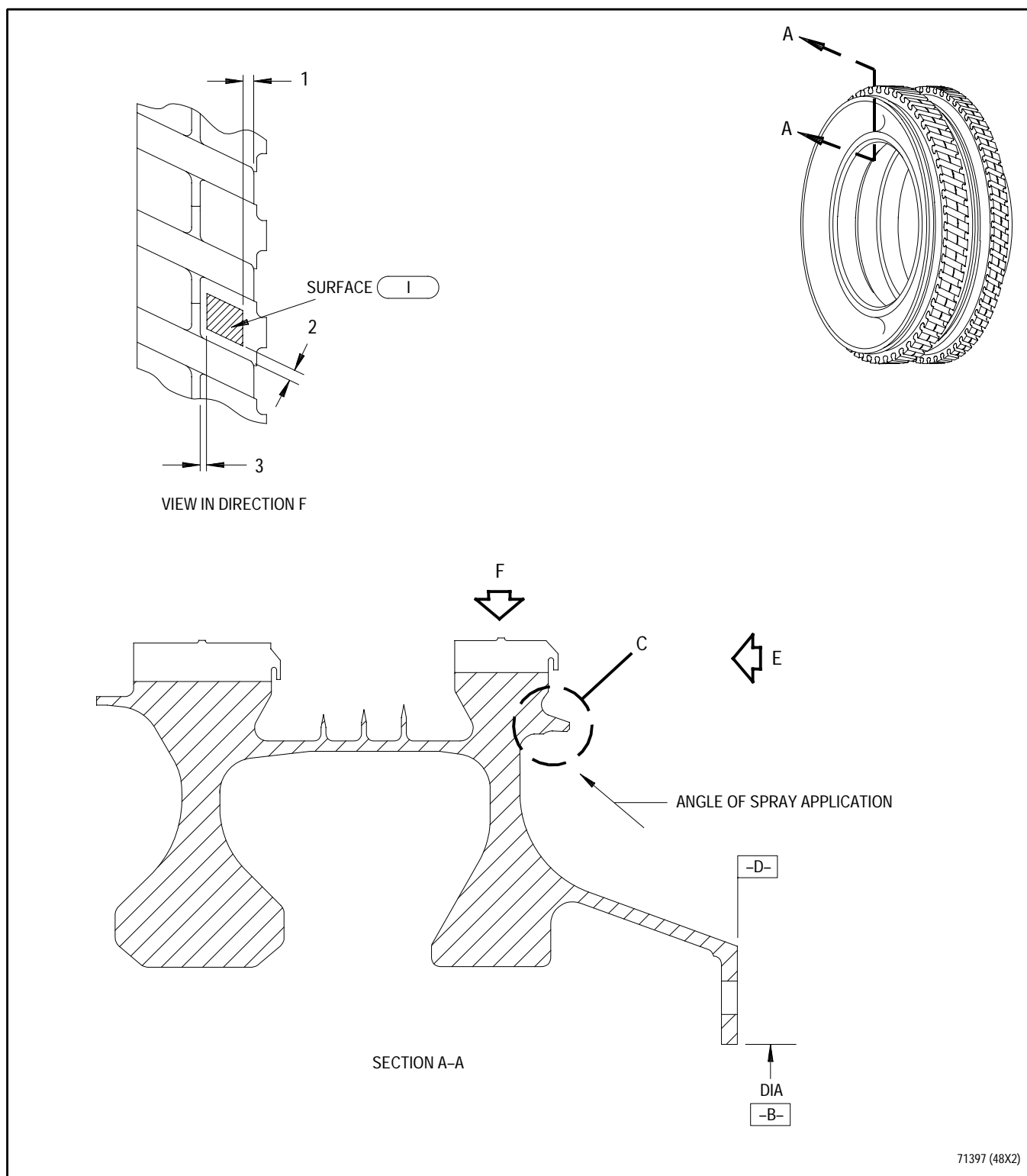


Figure 5. Rear Compressor Front Disk-Drum Rotor Assembly - Snap Diameter Plasma Coat Repair
(Sheet 1 of 3)

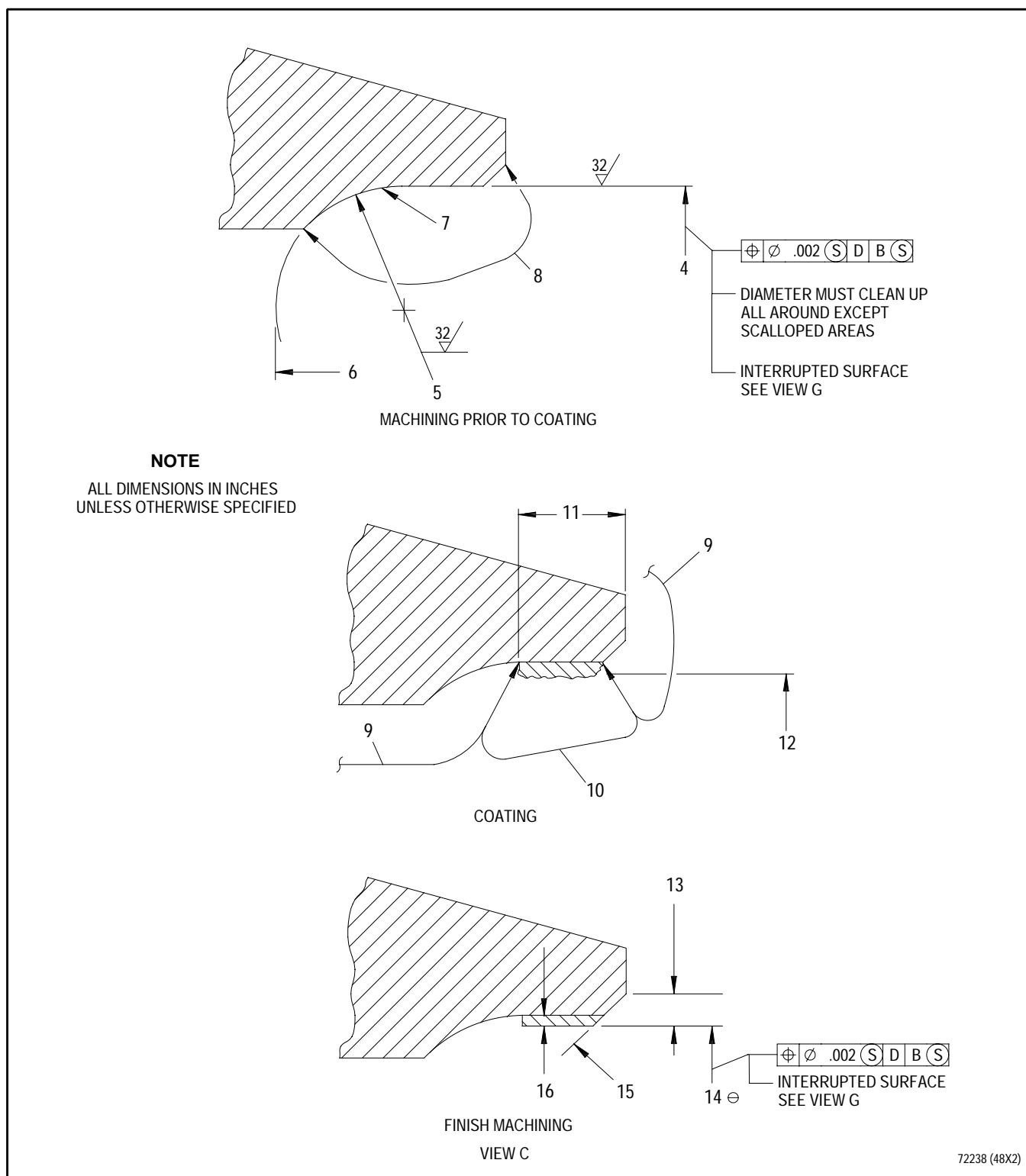


Figure 5. Rear Compressor Front Disk-Drum Rotor Assembly - Snap Diameter Plasma Coat Repair
(Sheet 2 of 3)

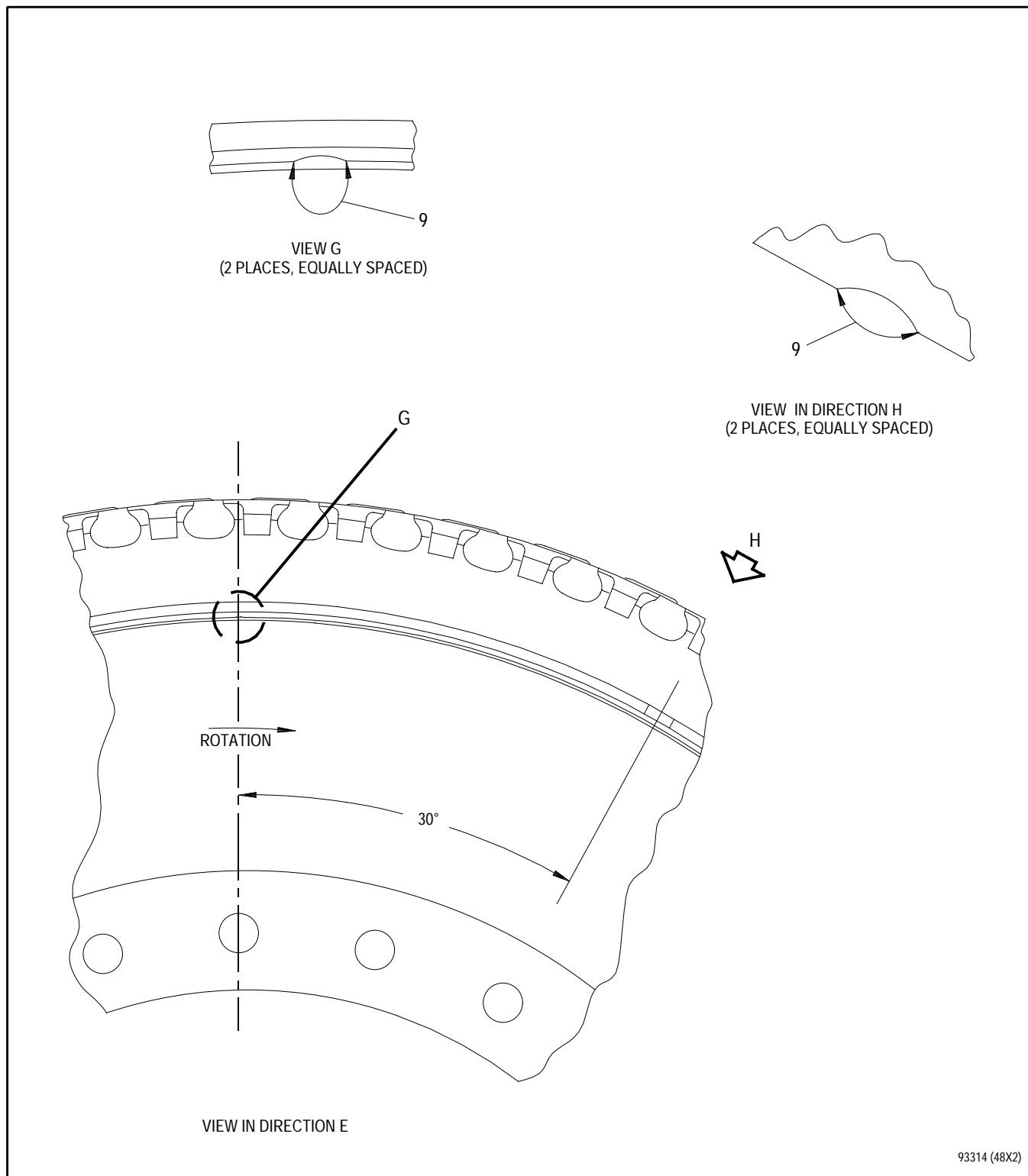


Figure 5. Rear Compressor Front Disk-Drum Rotor Assembly - Snap Diameter Plasma Coat Repair
(Sheet 3 of 3)

Legend for figure 5

1. 0.100 inch minimum
2. 0.120 inch minimum two places
3. 0.068 inch minimum
4. 16.638 to 16.640 inches diameter
5. 0.234 to 0.266 inch radius
6. 2.430 to 2.440 inches to Surface D
7. Cusp/interrupted surface may result from machining.
Blend any sharp edge.
8. Shotpeen per text
9. Grit blast and plasma coat prohibited
10. Grit blast and plasma coat per text
11. 0.165 to 0.175 inch
12. 16.605 inch diameter maximum
13. Chamfer 0.040 to 0.060 inch x $45^{\circ} \pm 2^{\circ}$ reference
14. 16.625 to 16.628 inches diameter
15. Blend within dimensional limits to obtain smooth
continuous surface.
16. 0.003 to 0.010 inch reference

Legend for figure 6

1. PWA 71097 mask
2. PWA 71059 mask
3. Disk-drum rotor assembly
4. PWA 71058 fixture
5. PWA 70449 pedestal
6. PWA 71060 holder
(for use with test specimen only)

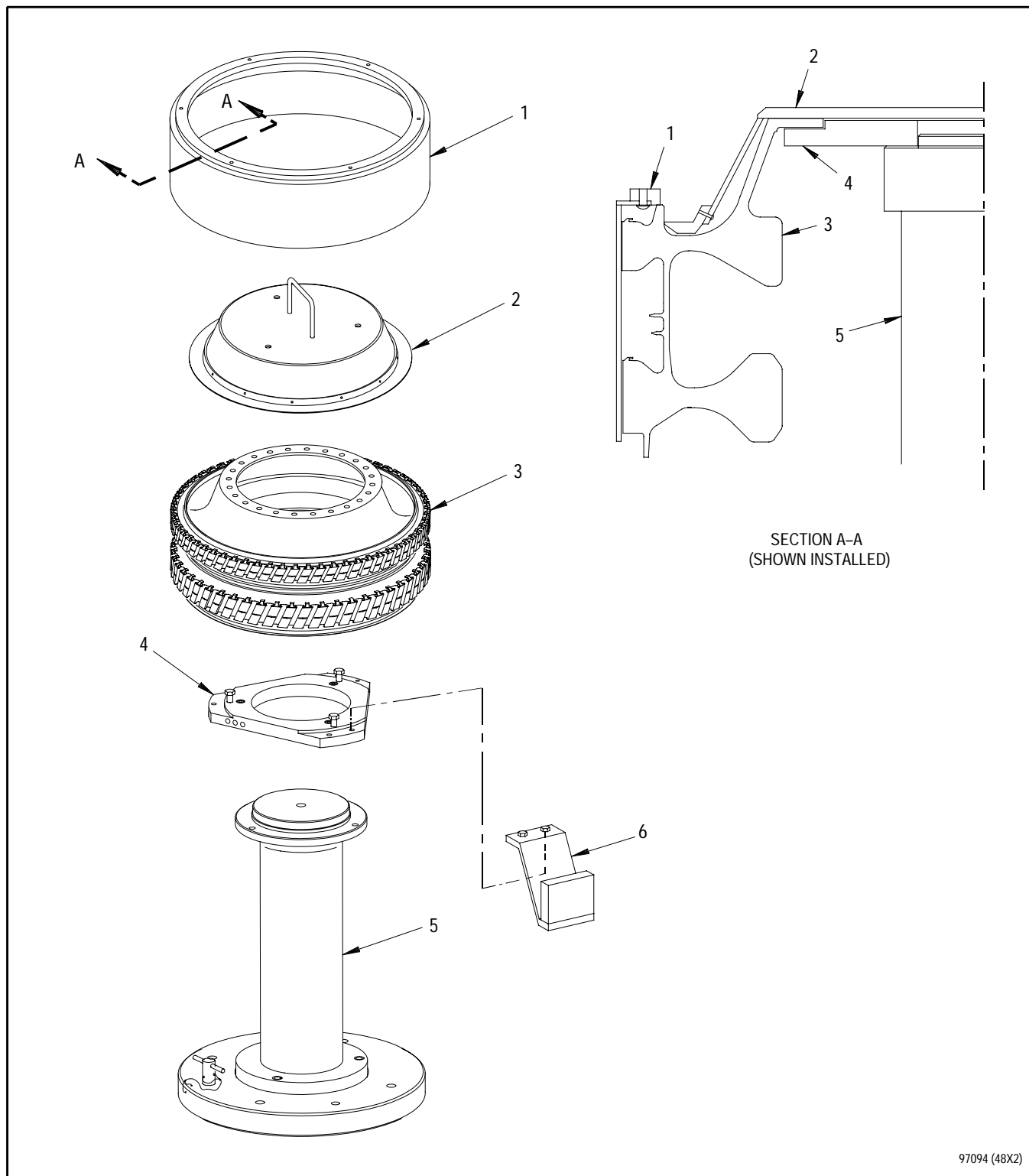
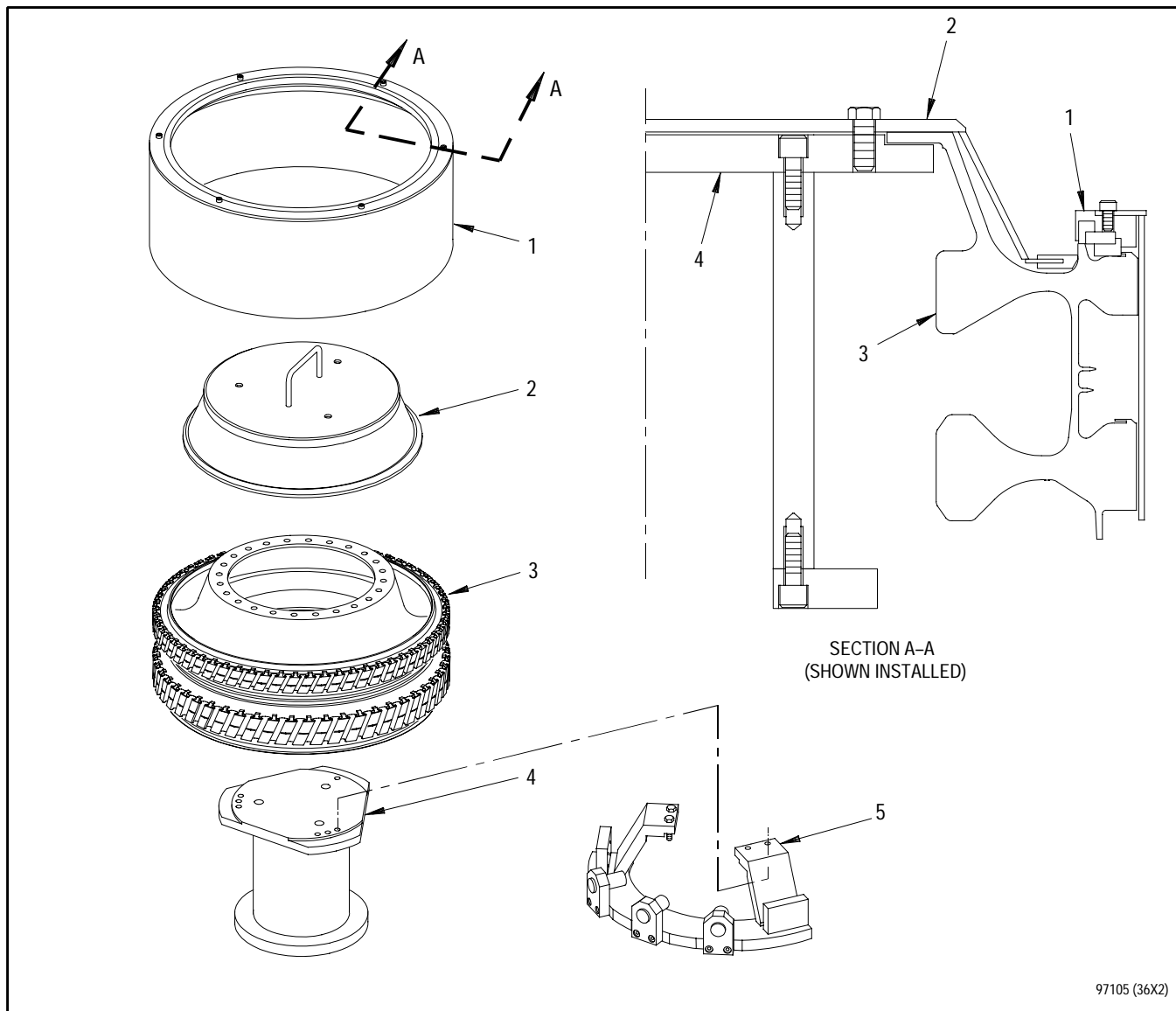


Figure 6. Rear Compressor Front Disk-Drum Rotor Assembly - Shotpeen Tooling Installation

- (2) Shotpeen snap diameter(8, figure 5, sheet 2) per AMS 2430 using SAE 170 maximum cast steel shot of hardness 45 HRC minimum or equivalent beads with intensity of 6A. Refer to T.O. 2-1-111, SPOP 501. Angle of shotpeen application shall be same as angle of plasma coat application.
- (3) Remove masks and remove disk-drum rotor assembly from shotpeen fixture.
- f. Clean snap diameter area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- g. Grit blast snap diameter(10) as follows:
 - (1) Install disk-drum rotor assembly(3, figure 7) on PWA 71054 fixture(4). Install PWA 71055 mask(2) and PWA 71151 mask(1) on rotor assembly. Mask scallops and slots (View G and View in direction H, figure 5, sheet 3) and any other unprotected areas using PMC 4235 and PMC 4273 masking tape or equivalent. Refer to T.O. 2-1-111. Protect cleaned snap diameter area during masking. Use PWA 71057 holder(5, figure 7) on PWA 71054 fixture(4) when grit blasting test specimen.
 - (2) Grit blast using No. 60 to 80 silicon carbide or aluminum oxide grit at 45 psi maximum. Refer to T.O. 2-1-111. Angle of grit blast application shall be same as angle of plasma coat application.
 - (3) Remove masking.
- h. Clean snap diameter per SPOP 208, Method A. Refer to T.O. 2-1-111.
- i. Plasma coat snap diameter(10, figure 5) within two hours after grit blast as follows:
 - (1) Install masking per step g.(1).
 - (2) Apply plasma coat PWA 53-37. No coating allowed outside of enclosed area. Refer to T.O. 2-1-111. All coating quality requirements apply.
 - (3) Remove masking.
- j. Clean snap diameter per SPOP 208, Method A. Refer to T.O. 2-1-111.
- k. Using PWA 71056 fixture, finish machine snap diameter and chamfer per figure 5. Refer to T.O. 2-1-111 for feature control symbol definition.
- l. Permanently identify disk with beehive symbol on Surface I per SPOP 401. Use shallow electrolytic etch. Refer to T.O. 2-1-111.
- m. Apply antigalling compound per paragraph 6.



1. PWA 71151 mask
2. PWA 71055 mask
3. Disk-drum rotor assembly
4. PWA 71054 fixture
5. PWA 71057 holder
(for use with test specimen only)

Figure 7. Rear Compressor Front Disk-Drum Rotor Assembly - Grit Blast and Plasma Coat Tooling Installation

**6. REAR COMPRESSOR FRONT DISK-DRUM
ROTOR ASSEMBLY - ANTIGALLING COMPOUND
APPLICATION.**

(See figures 4 and 5.)

- a. Ensure all repairs have been completed before this operation.
- b. Ensure disk-drum rotor assembly snap diameter surface is dry. No surface preparation is required.
- c. Apply PWA 36545-3 antigalling compound to snap diameter area(2, figure 4) per SPOP 748, except masking not required. Refer to T.O. 2-1-111. Compound application optional and may be incomplete in scallops and slots, four places (View G and View in direction H, figure 5).

**7. REAR COMPRESSOR FRONT DISK-DRUM
ROTOR ASSEMBLY - KNIFE-EDGE COATING
REPAIR.****NOTE**

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor desires to revise procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. Perform proprietary repair as follows:

(1) Proprietary repairs for following distress mode may be performed only by qualified repair sources identified in QRSL. Refer to T.O. 2J-F100-53-1, WP 603 00.

- JGDFGZB Worn knife-edge coating

WORK PACKAGE

TECHNICAL PROCEDURES

NUTS, BEARING RETAINING - REPAIR

EFFECTIVITY: ENGINE MODELS F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 9		7			
10 Blank		7			

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Plating, Silver on Steel (Not Stainless) (SPOP 23) - - -	SWP 092 07
Plating, Silver on Stainless Steel or Nickel (SPOP 24) - - - - -	SWP 092 08
Plating, Nickel Cadmium (SPOP 25) - - - - -	SWP 092 09
Compound, Antigalling (PWA 36545) Application (SPOP 748) - - - - -	SWP 098 07

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Cloth, abrasive crocus	P-C-458
Compound, antigalling (PWA 36545)	Everlube Esnalube 382

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of bearing retaining nuts (PN 4001860, 4001863, 4001874, 4001878, 4001883, 4001885, 4002513, 4007568 and 4010237).

2. BEARING RETAINING NUT - BLEND REPAIR.

(See Figures 1 through 10.)

- a. Mount nut on surface plate. Blend burred, galled, scored, and tool damaged areas with crocus cloth or fine sandpaper.
- b. Remove wrenching slot damage with file or fine stone.

3. BEARING RETAINING NUTS (PN 4001860 and 4010237) - NICKEL-CADMIUM PLATE REPLACEMENT.

(See figures 1 and 9.)

- a. Strip and replate retaining nut. Refer to T.O. 2J-F100-53-1, SWP 092 09.

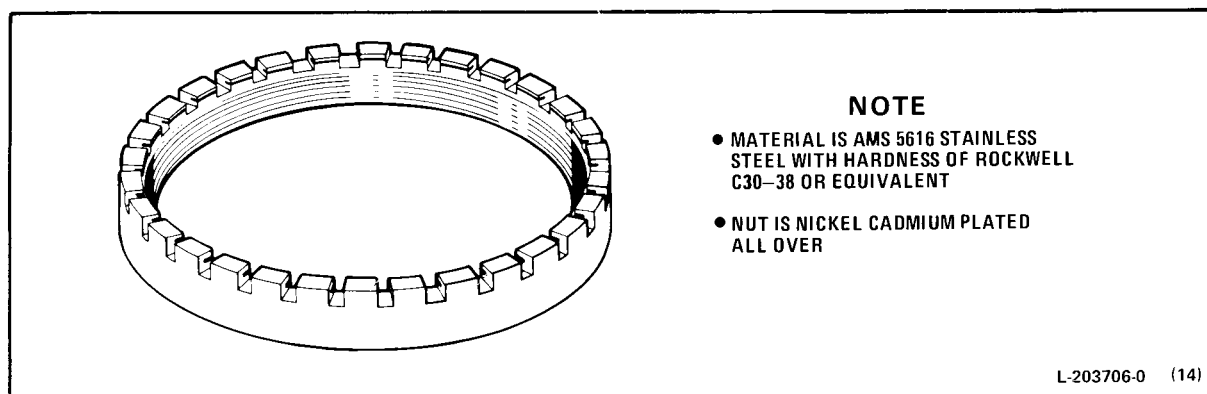


Figure 1. Bearing Retaining Nut (PN 4001860) - Nickel-Cadmium Plate Replacement

4. BEARING RETAINING NUTS (PN 4001863, 4001874, 4001878, 4001885, and 4010237) - ANTIGALLING COMPOUND APPLICATION.

(See figures 2, 3, 4, 6 and 10.)

- a. Apply Everlube Esnalube 382 antigalling compound to specified area. Refer to T.O. 2J-F100-53-1, SWP 098 07.

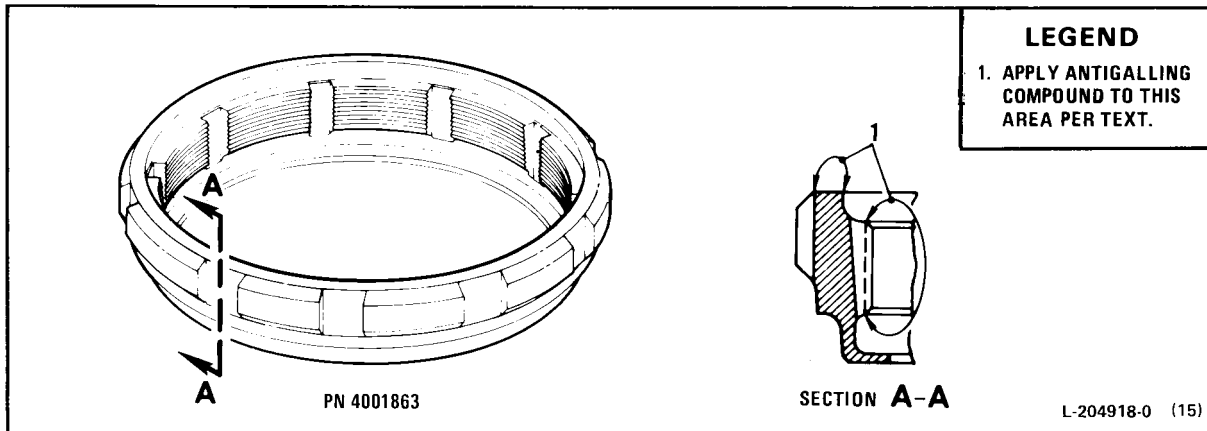


Figure 2. Bearing Retaining Nut (PN 4001863) - Antigalling Compound Application

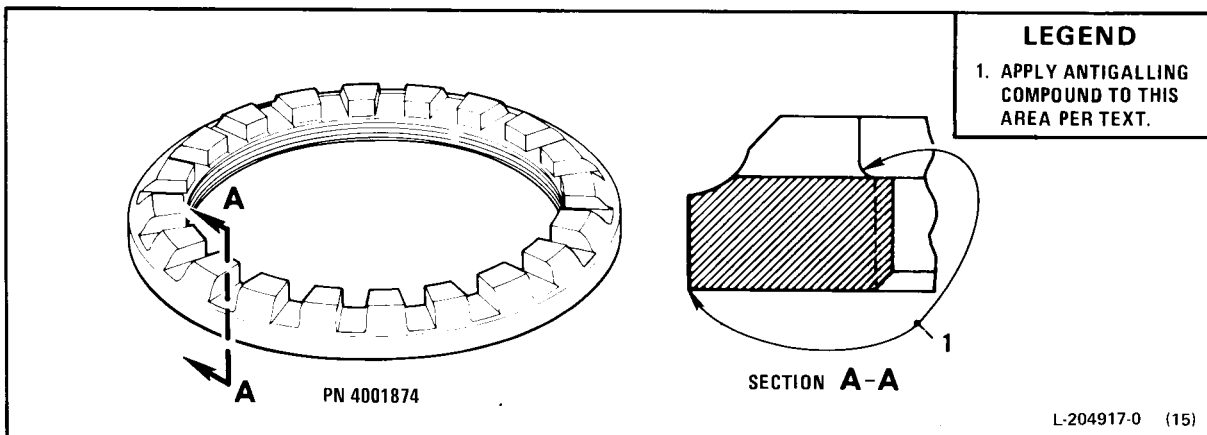


Figure 3. Bearing Retaining Nut (PN 4001874) - Antigalling Compound Application

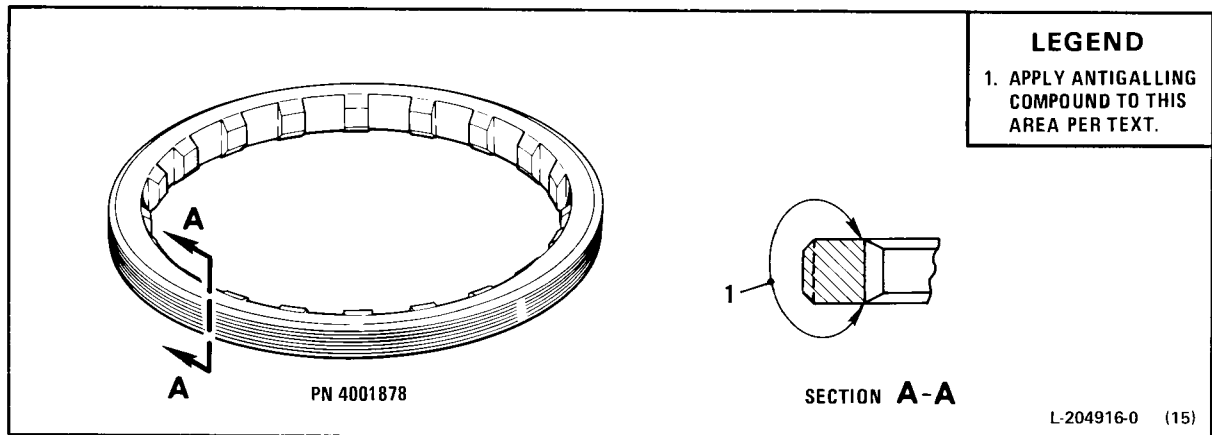


Figure 4. Inverted Spanner Nut (PN 4001878) - Antigalling Compound Application

**5. PLAIN ROUND NUT (PN 4001883) - SILVER
PLATE REPLACEMENT.**

(See figure 5.)

- a. Strip and silver plate nut.
Refer to T.O. 2J-F100-53-1,
SWP 092 07.

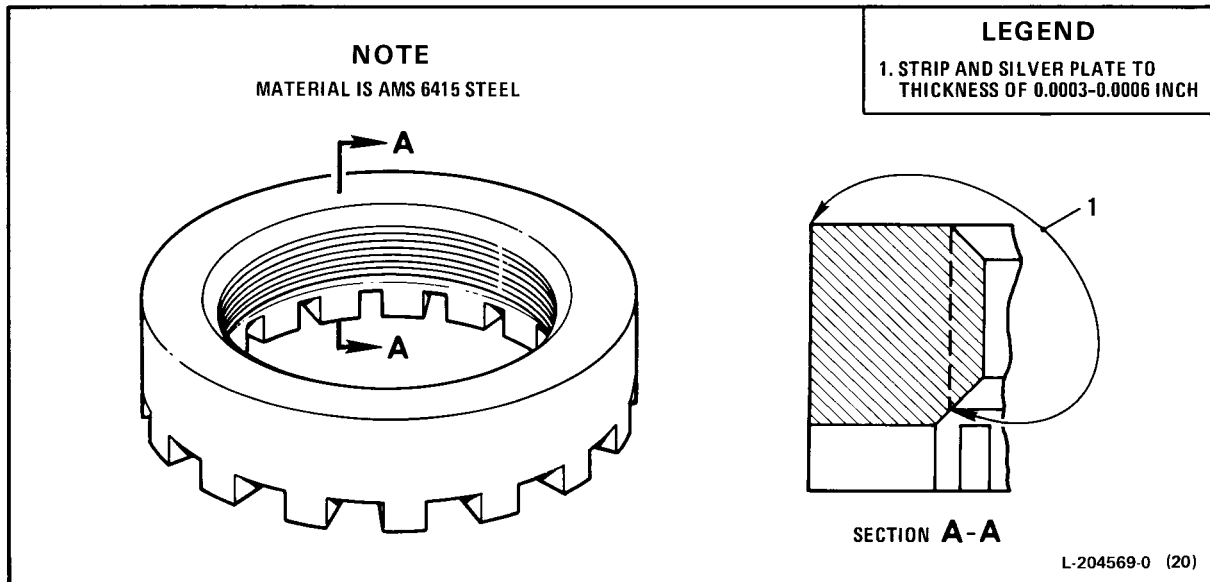


Figure 5. Plain Round Nut (Typical PN 4001883) - Silver Plate Replacement

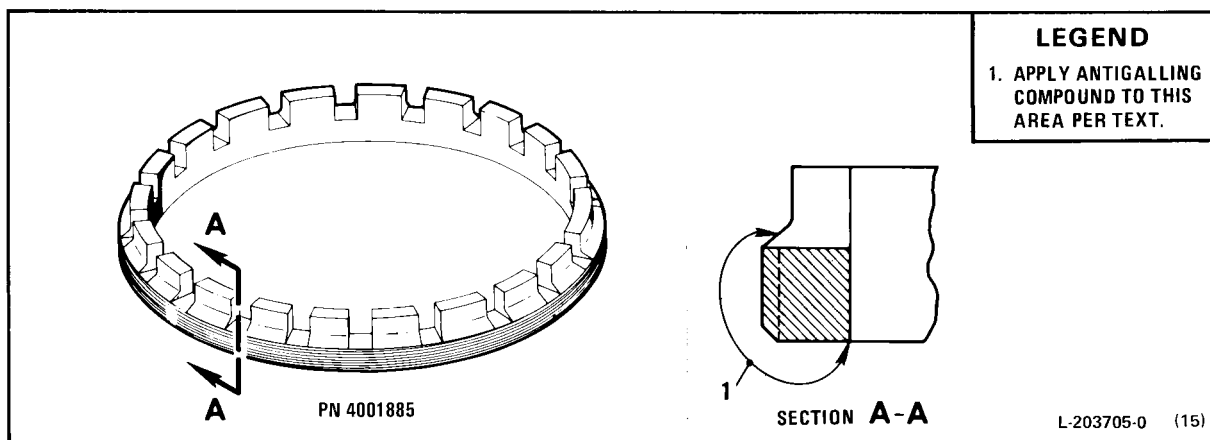


Figure 6. Bearing Retaining Nut (PN 4001885) - Antigalling Compound Application

6. BEARING RETAINING NUT (PN 4002513 and PN 4007568) - SILVER PLATE REPLACEMENT.

(See figures 7 and 8.)

- a. Strip and silver plate nut.
Refer to T.O. 2J-F100-53-1,
SWP 092 08.

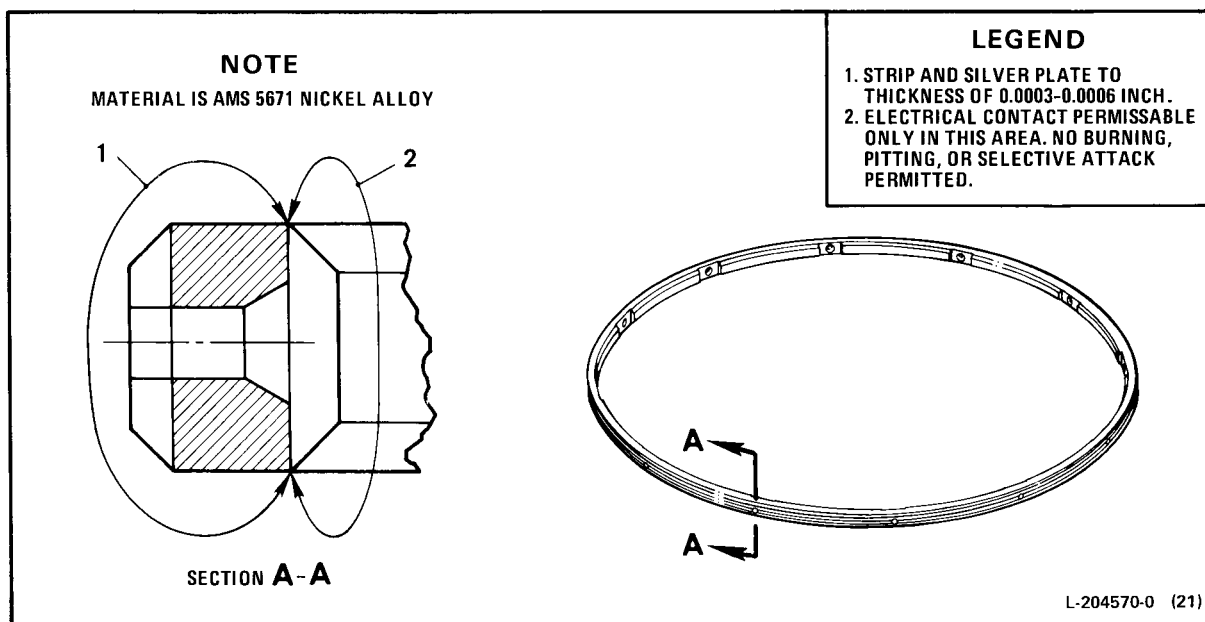


Figure 7. Bearing Retaining Nut (PN 4002513) - Silver Plate Replacement

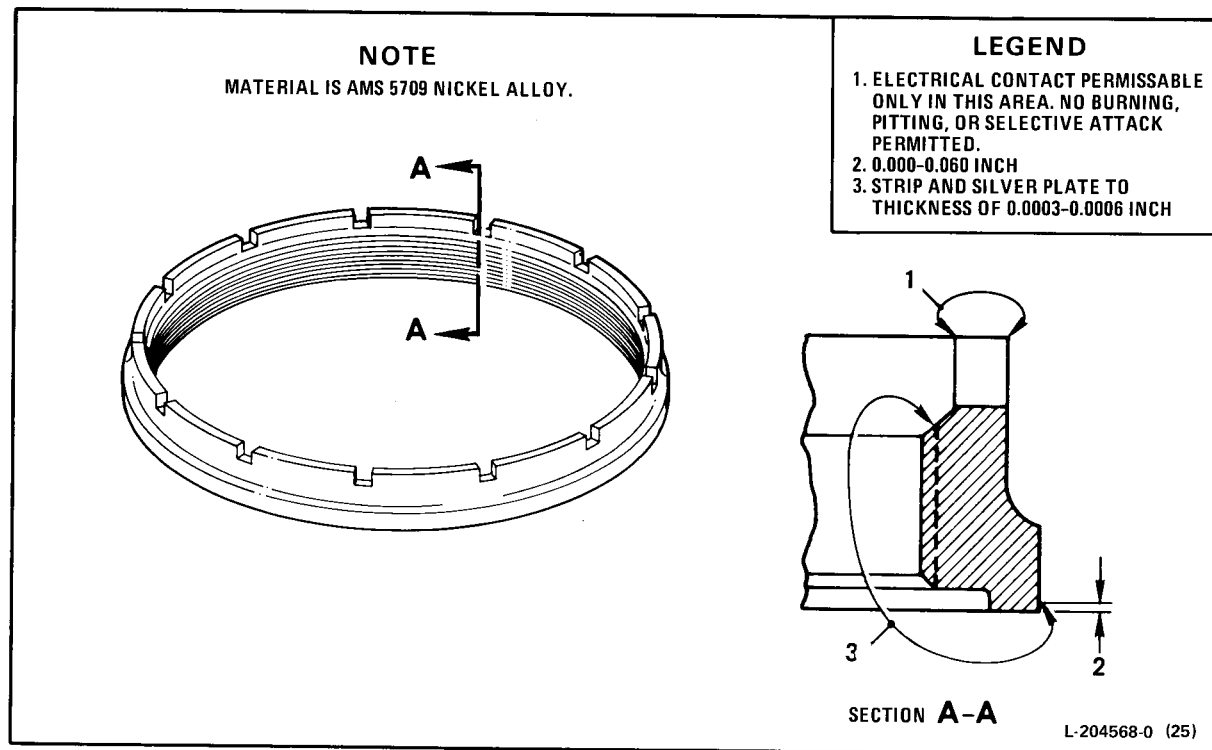


Figure 8. Bearing Retaining Nut (PN 4007568) - Silver Plate Replacement

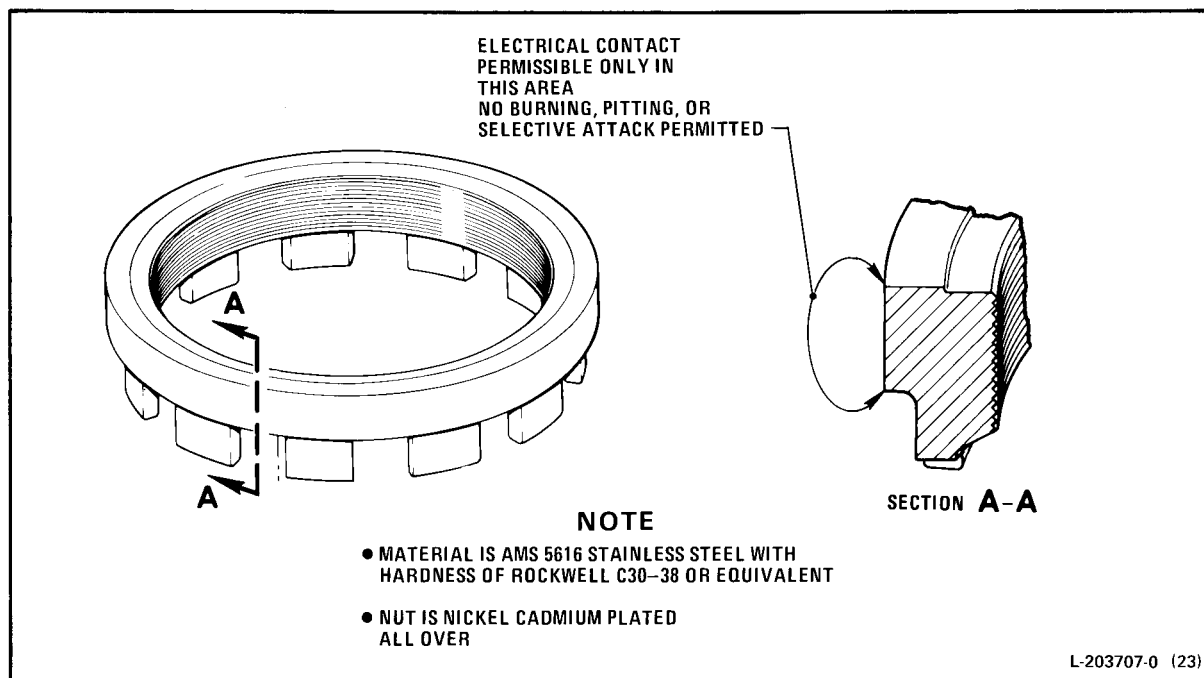


Figure 9. Bearing Retaining Nut (PN 4010237) - Nickel-Cadmium Plate Replacement

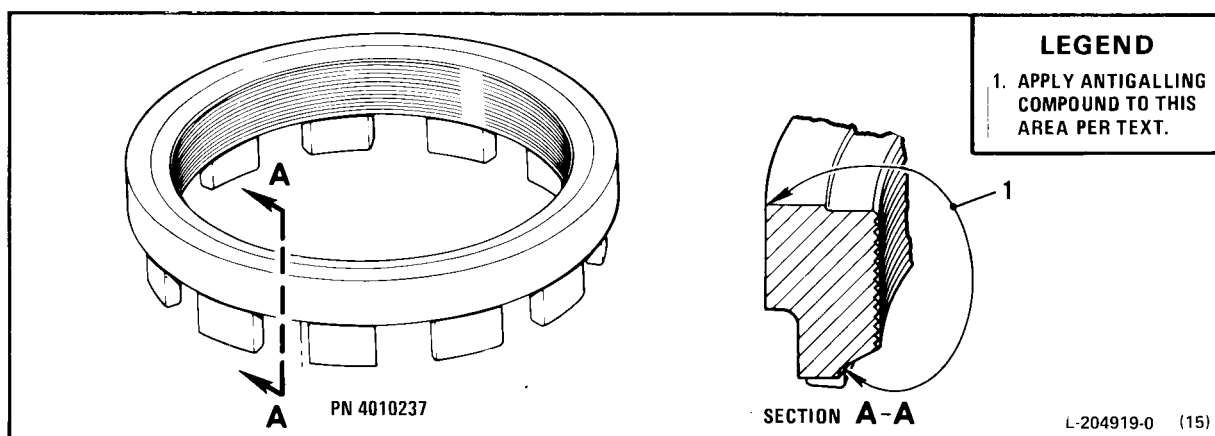


Figure 10. Bearing Retaining Nut (PN 4010237) - Antigalling Compound Application

WORK PACKAGE**TECHNICAL PROCEDURES****LOCK, REAR COMPRESSOR DRIVESHAFT NUT -
REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	0				
4 Blank	0				

T.O. 2J-F100-53-7

WP 404 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of rear compressor driveshaft nut lock.

2. REAR COMPRESSOR DRIVESHAFT NUT LOCK - REPAIR.

(See Figure 1.)

- a. Remove all pickup and high metal from nicks and dents in Area A by blending with fine stone.
(See figure 1.)
- b. Cracks are not reparable.
Replace cracked nut locks.

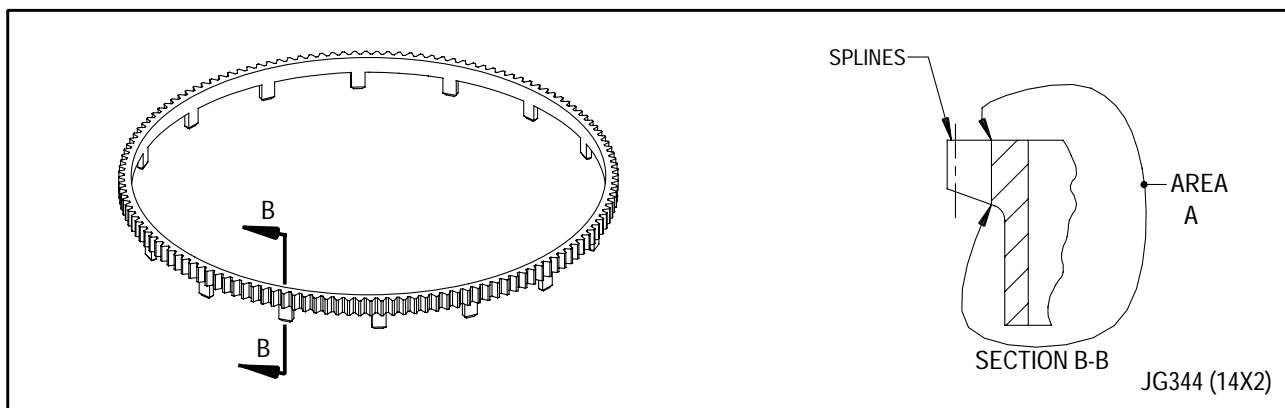


Figure 1. Rear Compressor Driveshaft Nut Lock - Repair

WORK PACKAGE**TECHNICAL PROCEDURES****DISK AND HUB, COMPRESSOR, SIXTH STAGE, ASSEMBLY -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 34

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	6A - 6B	29	9 - 10	21
2A - 2D Added	21	7	9	11 - 26 Added	21
3	0	8	0	27	29
4 - 6	9			28 Added	21

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
Peening, Steel Shot (SPOP 501) - - - - -	SWP 091 08
Qualified Repair Source List (QRSI) Core Engine Module -	WP 603 00
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stages - Application of Adhesive Sealant PWA 36056 - - -	WP 627 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Alcohol, isopropyl	TT-I-735
Cloth, abrasive, crocus	P-C-458
Compound, antigalling (PWA 36545)	EsnaLube 382
Gloves, cotton, lint-free	-
Grit, silicon carbide	60 grit
Maskant, strippable coating (PMC 1835)	Turco 5580-G
Shot, steel, cast size 170	MIL-S-13165/SAE 170
Stone, abrasive	-

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Rivet, oversize	AN123357	8
Rivet, standard	AN123341	8

APPLICABLE SUPPORT EQUIPMENT

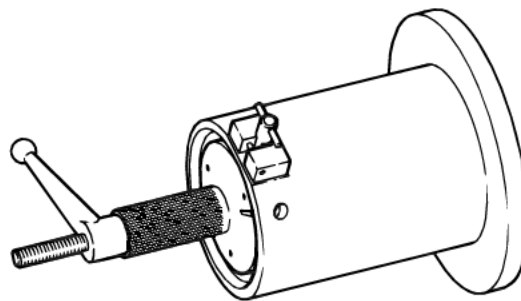
Paragraph	Function - Tool Nomenclature	Tool Number
6	SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - HEAT SHIELD REPLACEMENT	
	FIXTURE, HOLDING, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71121
	PULLER, REAR COMPRESSOR FRONT HUB HEATSHIELD - - - -	PWA 51974
	FIXTURE, REAR COMPRESSOR FRONT HUB HEATSHIELD - - -	PWA 51970
	FIXTURE, INSTALLER, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71122
7	SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - COPPER/NICKEL COATING REPAIR	
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71304
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71305
	MASK, COVER ASSEMBLY - - - - -	PWA 71306
	HOLDER, BASKET, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71307
	FIXTURE, SHOTPEEN, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71116
	PEDESTAL, AUTOMATED SHOTPEEN INSTALLATION - - - - -	PWA 70449
	HOLDER, TEST STRIP, DISK AND HUB, COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71117
	STRIP, ALMEN TEST, 6TH STAGE COMPRESSOR BLADE, SHOT PEEN - - - - -	PWA 32704
	MASK ASSY, SHOTPEEN, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71118
	MASK ASSY, SHOTPEEN, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71120
	MASKS, PLASMA SPRAY - - - - -	PWA 71110
	FIXTURE, PLASMA SPRAY - - - - -	PWA 71111
8	SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - HARDFACE REPAIR	
	FIXTURE, MACHINING, DISK AND HUB COMPRESSOR, 6TH STAGE, ASSY OF - - - - -	PWA 71115
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71304
	MASK PLUG, DISK AND HUB COMPRESSOR, 6TH STAGE, SUBASSY OF - - - - -	PWA 71305
	MASK, COVER ASSEMBLY - - - - -	PWA 71306

ILLUSTRATED SUPPORT EQUIPMENT



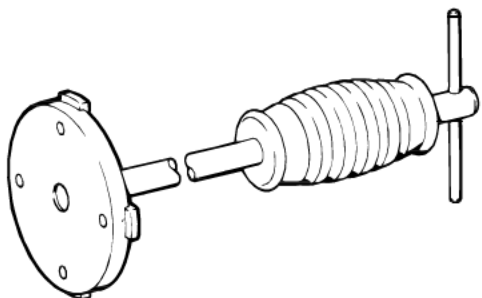
PWA 32704 -C

Figure T1. PWA 32704 STRIP



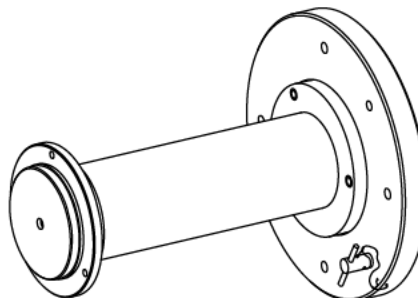
PWA 51970 -C

Figure T2. PWA 51970 FIXTURE



PWA 51974 -C

Figure T3. PWA 51974 PULLER



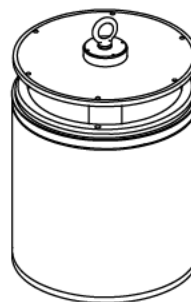
PWA 70449 -C

Figure T4. PWA 70449 PEDESTAL



PWA 71110 -C

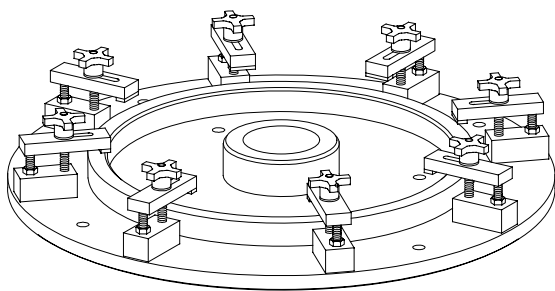
Figure T5. PWA 71110 MASKS



PWA 71111 -C

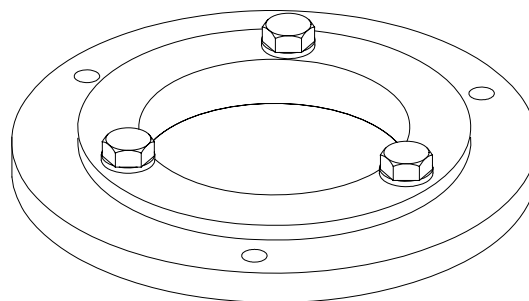
Figure T6. PWA 71111 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



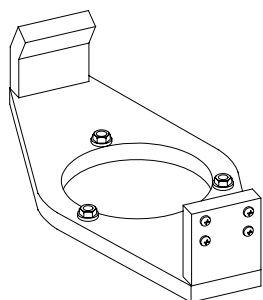
PWA 71115 -C

Figure T7. PWA 71115 FIXTURE



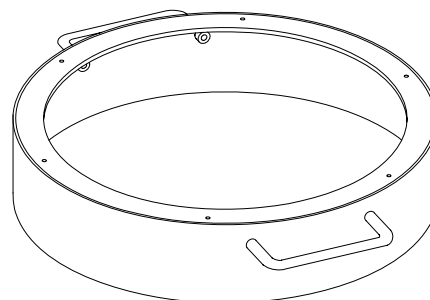
PWA 71116 -C

Figure T8. PWA 71116 FIXTURE



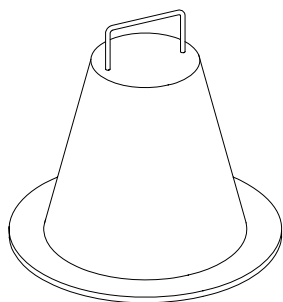
PWA 71117 -C

Figure T9. PWA 71117 HOLDER



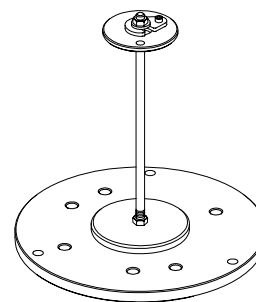
PWA 71118 -C

Figure T10. PWA 71118 MASK ASSY



PWA 71120 -C

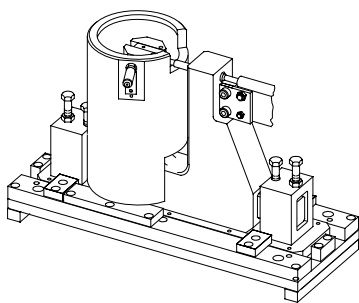
Figure T11. PWA 71120 MASK ASSY



PWA 71121 -C

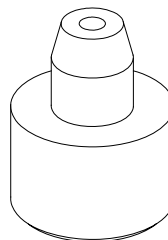
Figure T12. PWA 71121 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



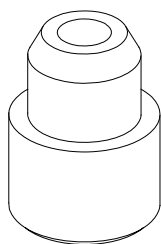
PWA 71122 -C

Figure T13. PWA 71122 FIXTURE



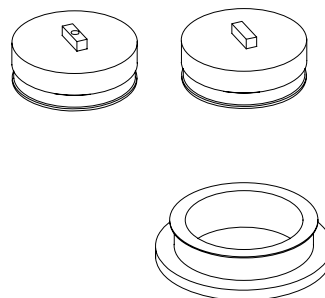
PWA 71304 -C

Figure T14. PWA 71304 MASK PLUG



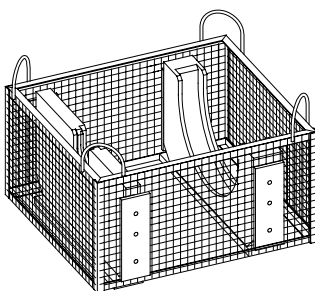
PWA 71305 -C

Figure T15. PWA 71305 MASK PLUG



PWA 71306 -C

Figure T16. PWA 71306 MASK



PWA 71307 -C

Figure T17. PWA 71307 HOLDER

1. INTRODUCTION.

- a. This work package contains instructions for repair of sixth stage compressor disk and hub.

2. SIXTH STAGE COMPRESSOR DISK AND HUB - BLEND REPAIR.

(See Figure 1.)



This paragraph does not apply to tierod holes, 0.125 inch area around tierod holes, blade slots, and knife-edge seals.

a. Blend limitations.

- (1) Scratches - blend depth shall not exceed 0.003 inch after polishing.
- (2) Pits, nicks, and dents - blend depth shall not exceed 0.003 inch after polishing.
- (3) Minimum wall thickness shall be maintained. Surface finish shall be as smooth as or smoother than surrounding parent material.
(See figure 1.)

(4) Blend shall not exceed 1 inch in diameter.

(5) Blends shall be separated by at least 2 inches of unblended wall (this also applies to blends on opposite sides of web).

(6) Locking tang wall thickness shall be 0.053 inch minimum after removal of 0.003 inch maximum material.

b. Blend as follows, observing limitations in step a:

- (1) Use fine stones, files, or abrasive cloth of silicon carbide or aluminum oxide. Remove all trace of damage while removing minimum material.
- (2) Minimum width of blend shall be 15 times depth of damage.

Legend for figure 1

1. No blending or shotpeen allowed
2. No shotpeening allowed
3. 0.250 inch minimum
4. 0.368 inch minimum
5. 0.030 inch
6. 0.200 inch
7. 0.053 inch minimum
8. Blend per paragraph 2A

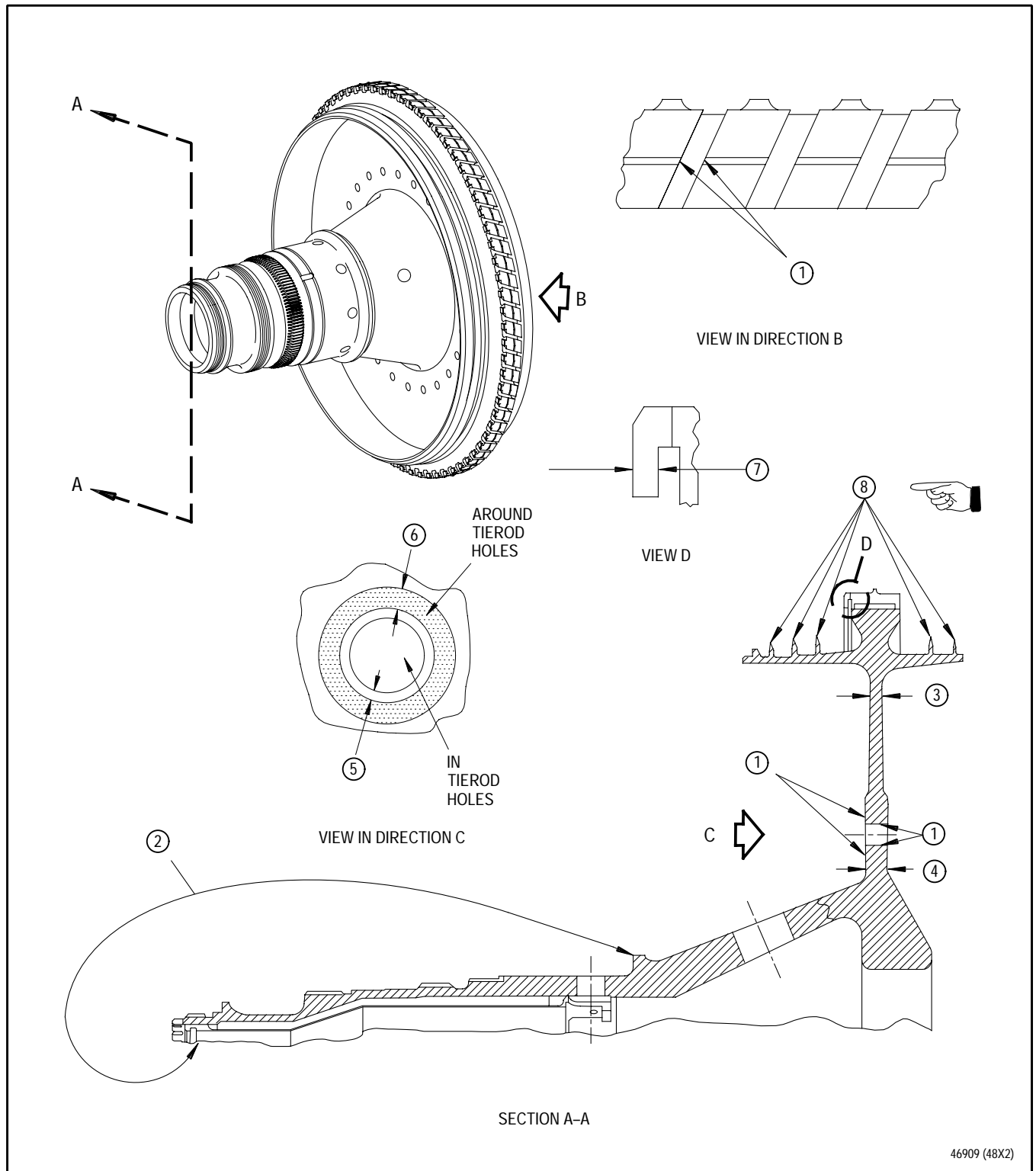


Figure 1. Sixth Stage Compressor Disk and Hub - Blend Repair



If disks are to be nondestructive inspected while still containing blades, it shall be accomplished by careful local application of the penetrant. If any penetrant contacts the blade root sealant, affected blades must be removed and resealed after thorough cleaning of disk and disk details. Refer to T.O. 2J-F100-53-7, WP 201 00 and WP 627 00.

- c. Fluorescent penetrant inspect all blends. Refer to T.O. 2J-F100-9. No cracks allowed.



Do not shotpeen tierod holes, around tierod holes, blade slots, and knife-edge seals.

- d. Shotpeen blended areas use SAE 170 max steel shot with hardness of Rockwell C45-55. Refer to T.O. 2J-F100-53-1, SWP 091 08 (SPOP 501). No lines of demarcation allowed.

2A. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - KNIFE-EDGE BLENDING.

(See Figure 1A.)

NOTE

- Do not attempt to straighten knife-edges of air seals.
 - Knife-edge blending repairs are to be completed after aluminum oxide coating is removed. Aluminum oxide coating must be reapplied once blend repair is complete.
- a. All damage must be blended using fine files and stones. Refer to T.O. 2J-F100-53-1, WP 091 00. Remove all pickup and raised metal. Observe following limits:
- (1) Blending shall be limited to two continuous inches on any one knife-edge or four total inches of noncontinuous blends per knife-edge.
 - (2) Noncontinuous blends shall be separated by minimum of two inches of unblended knife-edge. One inch separation required for blends adjacent to bend with displacement from radial center plane greater than 0.010 inch but less than 0.050 inch.
 - (3) Maximum blend depth shall be 0.075 inch.
 - (4) Each blended area shall have 0.500 inch minimum radius at each end of blend and 0.500 inch minimum transition radius into unblended material.
 - (5) Blended areas on two or more knife-edges shall be separated by minimum of two inches of unblended area.
- b. Blend shall be smooth and continuous with aspect ratio (length to depth) equal to 14 to 1 or greater.
- c. Surface finish of all blends shall be smooth as, or smoother than adjacent non-grit blasted surfaces.
- d. Fluorescent penetrant inspect per SPOP 84. Refer to T.O. 2-1-111. Examine indications under white light at 10X magnification. No cracks allowed.

Legend for figure 1A

1. Example of blended area (all knife-edges)
2. 2.000 inches minimum between blends on same or adjacent knife-edges
3. 0.500 inch radius minimum, all locations
4. 2.000 inches maximum blend length
5. Any amount of bending is reparable provided final blend meets maximum allowable blend depth (6) and length (4) limits.
6. 0.075 inch maximum blend depth. Blends requiring blend depth greater than this are not serviceable and not reparable.

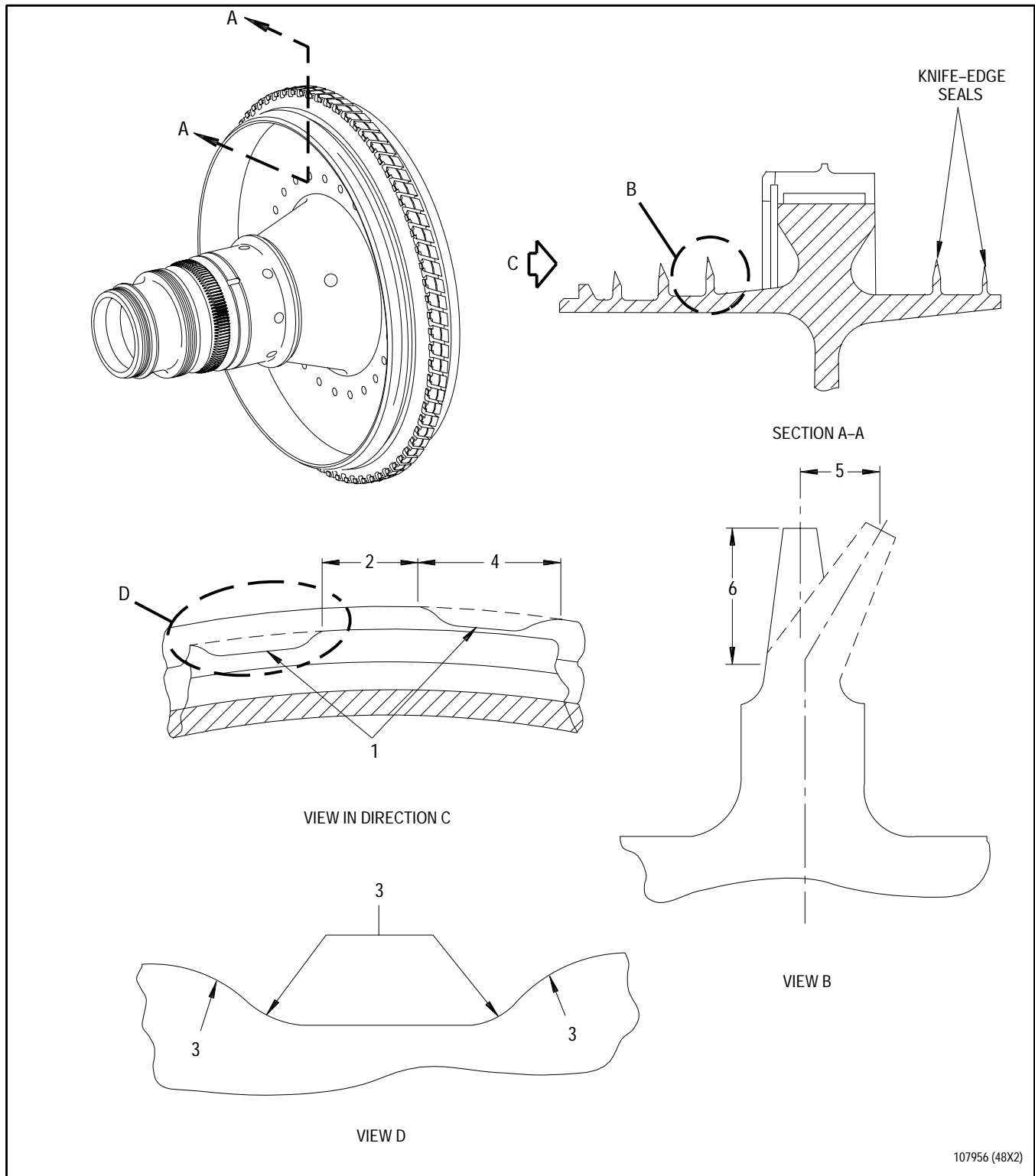
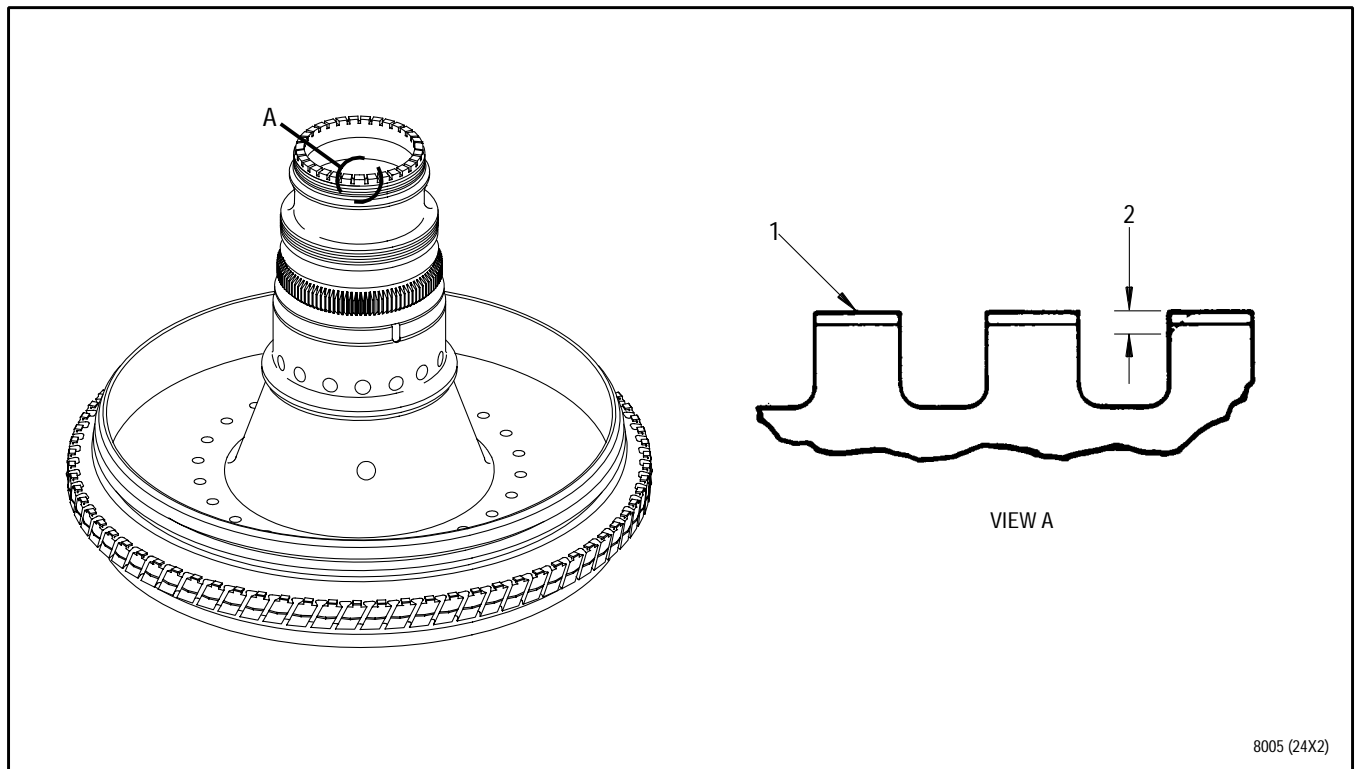


Figure 1A. Sixth Stage Compressor Disk and Hub Assembly - Knife-Edge Blending

3. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - IMMOBILIZATION TEETH REPAIR.

(See Figure 2.)

- a. Front edges of damaged teeth shall be repaired by removing up to 0.040 inch across teeth. If necessary, all teeth may be repaired.
- b. Break sharp edges with 0.001 to 0.006 inch radii.



1. 31 teeth
2. 0.040 inch maximum material removal. Break sharp edges with 0.001 to 0.006 inch radii.

Figure 2. Sixth Stage Compressor Disk and Hub Assembly - Immobilization Teeth Blend Repair

4. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - IMMOBILIZATION TEETH REMOVAL.

(See Figure 3.)

NOTE

- Number of teeth that may be removed by this procedure is limited to two.
- No two adjacent teeth may be removed.
- a. Machine to remove damaged teeth to dimensions shown.
- b. Fluorescent penetrant inspect machined areas per T.O. 2J-F100-9. No cracks allowed.

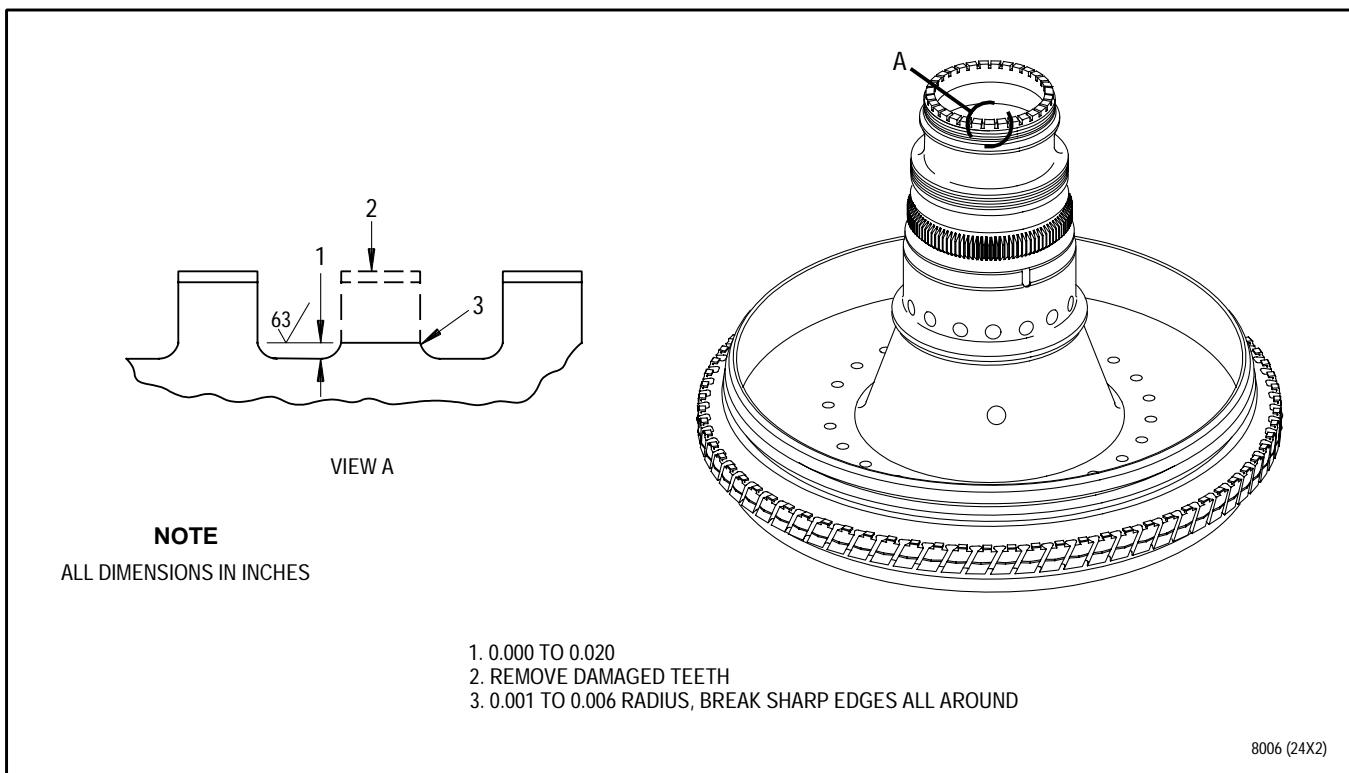


Figure 3. Sixth Stage Compressor Disk and Hub Assembly - Immobilization Teeth Removal

5. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - NO. 3 BEARING AND GEAR ASSEMBLY RETAINING NUT THREAD REPAIR.

(See Figure 4.)

- a. Remove damage using a fine file or abrasive stone, as follows:



Use care not to remove protective finish during removal of damaged portion of entrance thread.

- (1) If entrance thread is removed, lead-in radii shall be contoured same as original. Total removal of entrance thread permissible.
 - (2) Remove all thread pick up and high metal.
 - (3) Cumulative length of damage on other threads shall not exceed one half of one complete thread.
- b. Install nut after blending and before installation on stack-up to ensure that threads do not pick up and gall.

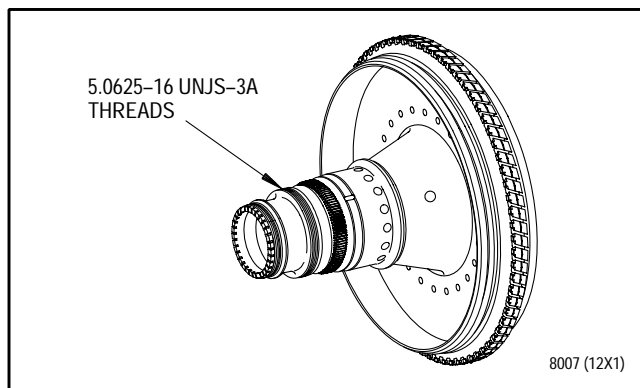


Figure 4. Sixth Stage Compressor Disk and Hub Assembly - No. 3 Bearing and Gear Assembly Retaining Nut Thread Repair

6. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - HEAT SHIELD REPLACEMENT.

(See Figures 5 and 6.)

- a. Load disk and hub assembly onto PWA 71121 fixture as follows:

- (1) Install part rear end down locating inner bore on base plate.
- (2) Install detail-4 cover over front bore.
- (3) Swing C-washer and tighten nut to secure cover.



Failure to exercise care when drilling formed rivet heads may remove material from hub and damage hub.

- b. Use standard tools to drill out formed rivet heads and remove rivets. (See figure 5.)
- c. Position disk and hub on work bench with disk end up.
- d. Position arms of PWA 51974 puller into slots of heat shield. Rotate puller until arms are under tooling lugs. Use knocker action to remove heat shield.
- e. Inspect eight 0.128 to 0.132 inch diameter rivet holes in hub for size and damage.
- (1) If part has been repaired previously by oversizing rivet holes, holes shall be 0.159 to 0.163 inch diameter.
 - (2) If rivet holes are within limits, go to step 1.
 - (3) If rivet holes are elongated or damaged, go to step f.
- f. Load disk and hub assembly onto PWA 71121 fixture per step a.

NOTE

Parent material of hub is PWA 1224.

- g. Machine rivet holes in hub to dimensions in Section C-C. Ensure the following conditions are met:
- (1) All eight rivet holes must be oversized.
 - (2) All evidence of existing rivet hole must be removed.
 - (3) If damage is not completely removed by oversizing holes 0.159 to 0.163 inch diameter, discontinue repair.
- h. Fluorescent penetrant inspect machined holes in hub per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- i. Remove disk and hub from PWA 71121 fixture.

NOTE

Parent material of heat shield is AMS 4911.

- j. Machine rivet holes in heat shield to dimensions in Section B-B. Ensure the following conditions are met:
- (1) All eight rivet holes must be oversized.
 - (2) All evidence of existing rivet hole must be removed.
- k. Fluorescent penetrant inspect machined holes in heat shield per SPOP 62 or 70. Refer to T.O. 2-1-111. No cracks allowed.
- l. Clean ID of disk and hub with isopropyl alcohol.

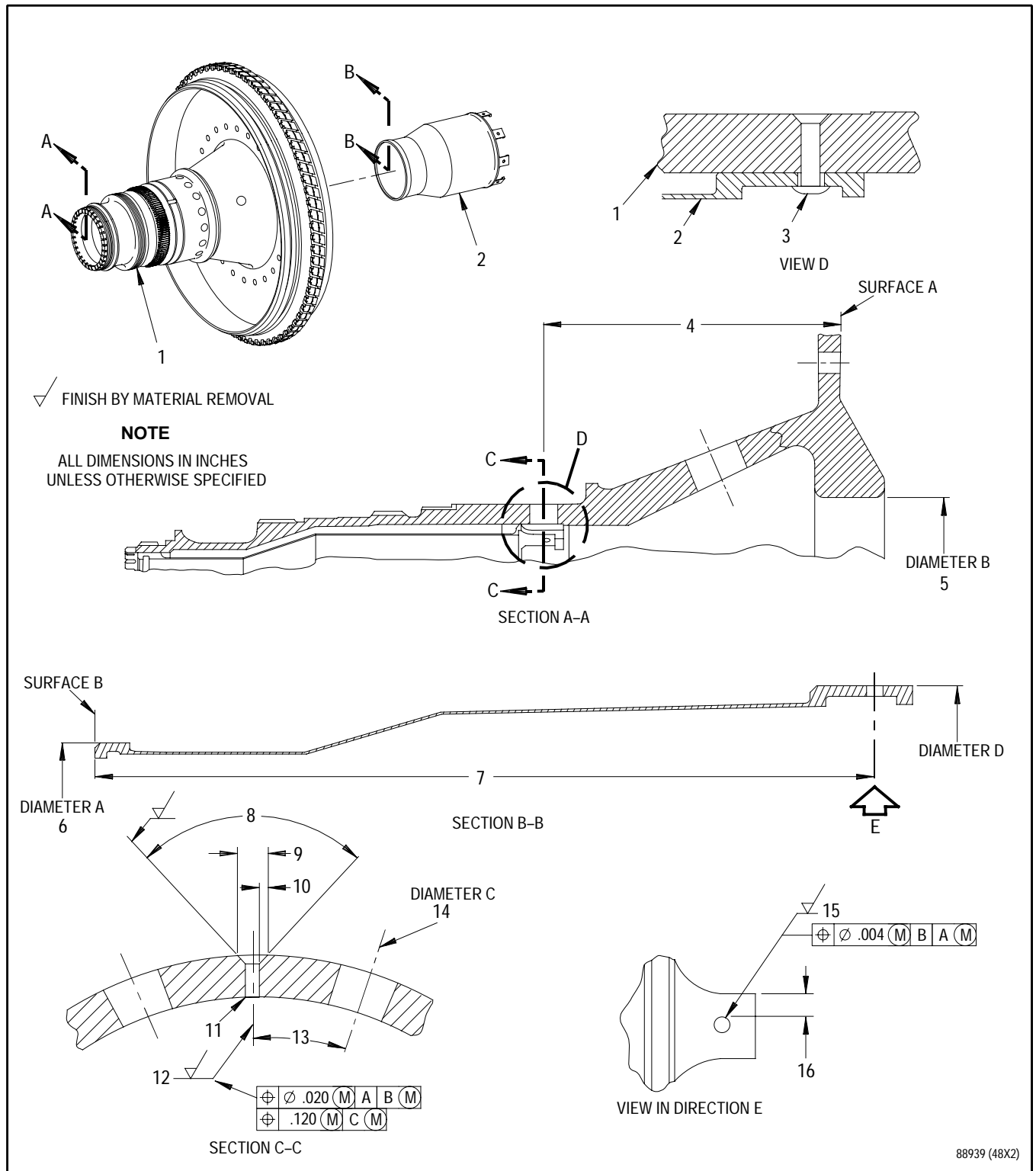


Figure 5. Sixth Stage Compressor Disk and Hub Assembly - Removal and Rivet Hole Machining

Legend for figure 5

NOTE

Unless otherwise specified, all dimensions apply when Diameters A and D are round within 0.002 inch in free state or constrained. Constraint contact allowed only on Diameters A and D.

1. Disk and hub assembly
2. Heat shield
3. Existing rivet, 8 places
4. 5.096 inches
5. 5.898 inch diameter at Maximum Material Condition
6. 3.902 inch average diameter at Maximum Material Condition, reference
7. 7.114 inches
8. $102^{\circ} \pm 3^{\circ}$
9. 0.308 to 0.328 inch diameter
10. 0.060 inch minimum
11. Break edge 0.005 to 0.015 inch at both ends.
12. 0.159 to 0.163 inch diameter, 8 holes equally spaced located within 0.020 inch diameter of true position from its basic position in hole pattern in relation to datum Surface A and datum Diameter B. Tolerance applies when this diameter and Diameter B are at Maximum Material Condition. Circumferential location of hole is established by angular location related to Diameter C. The axis of this hole is located within 0.060 inch either side of true position in relation to Diameter C at Maximum Material Condition.
13. $22^{\circ} 30'$
14. 0.495 inch datum Diameter C at Maximum Material Condition
15. 0.193 to 0.197 inch diameter, 8 holes equally spaced located within 0.004 inch diameter of true position in relation to datum Surface A and datum Diameter B. Tolerance applies when this diameter and Diameter B are at Maximum Material Condition.
16. 0.185 inch minimum, both sides, 8 places



If hubs have oversized holes, then heat shields are required to have oversized holes to prevent engine damage.

- m. Measure rivet holes in hub and heat shield.
- n. Apply PWA 36545 antigalling compound to heat shield per paragraph 9.
- o. Place disk and hub into oven and heat for 10 minutes at 250°F (121°C).

- p. Wipe OD of heat shield with isopropyl alcohol.

NOTE

Detail-4 pin of PWA 51970 engages into standard size rivet hole; detail-19 pin engages into oversize rivet hole.

- q. Assemble heat shield to detail-6 cap of PWA 51970 fixture, engaging detail-4 or -19 pin into rivet hole.

NOTE

Steps r. through t. shall be performed in rapid succession before parts temperatures normalize.

- r. Remove disk and hub from oven and install into detail-1 base of PWA 51970 fixture with disk end up. Engage detail-11 pin into any rivet hole in hub.
- s. Install cap with heat shield into hub, aligning rivet holes in heat shield with rivet holes in hub.
- t. Run down detail-9 lever until either detail-4 or -19 pin engages rivet hole in hub. Stop running down detail-9 lever.
- u. Cool assembly to room temperature before removing detail-6 cap.

NOTE

Standard size rivets are installed per step w.

- v. Install oversized rivets as follows:
 - (1) To check proper fit, insert rivets, with manufactured head against heat shield and check clearance(7) of each rivet. Adjust heat shield position axially or locally break edges on manufactured rivet heads as necessary to obtain clearance(7).
 - (2) Insert rivets, with manufactured head against heat shield, as shown in figure 6.

- (3) Upset rivets. Refer to T.O. 2-1-111.

- (4) Remove disk and hub assembly from PWA 51970 fixture base.

- w. Install standard size rivets as follows:

- (1) Waive hole size for shank requirement and gap upset head requirement.

- (2) Install disk and hub assembly into PWA 71122 fixture as follows:

- (a) Loosen detail-18 half turn knobs and swing detail-15 leaf upward.

- (b) Load part with disk end up.

- (c) Turn part until detail-35 alignment pin locates on one 0.495 to 0.505 inch diameter hole.

- (d) Adjust height, if necessary, by loosening detail-10 bolts and adjusting detail-9 bolts.

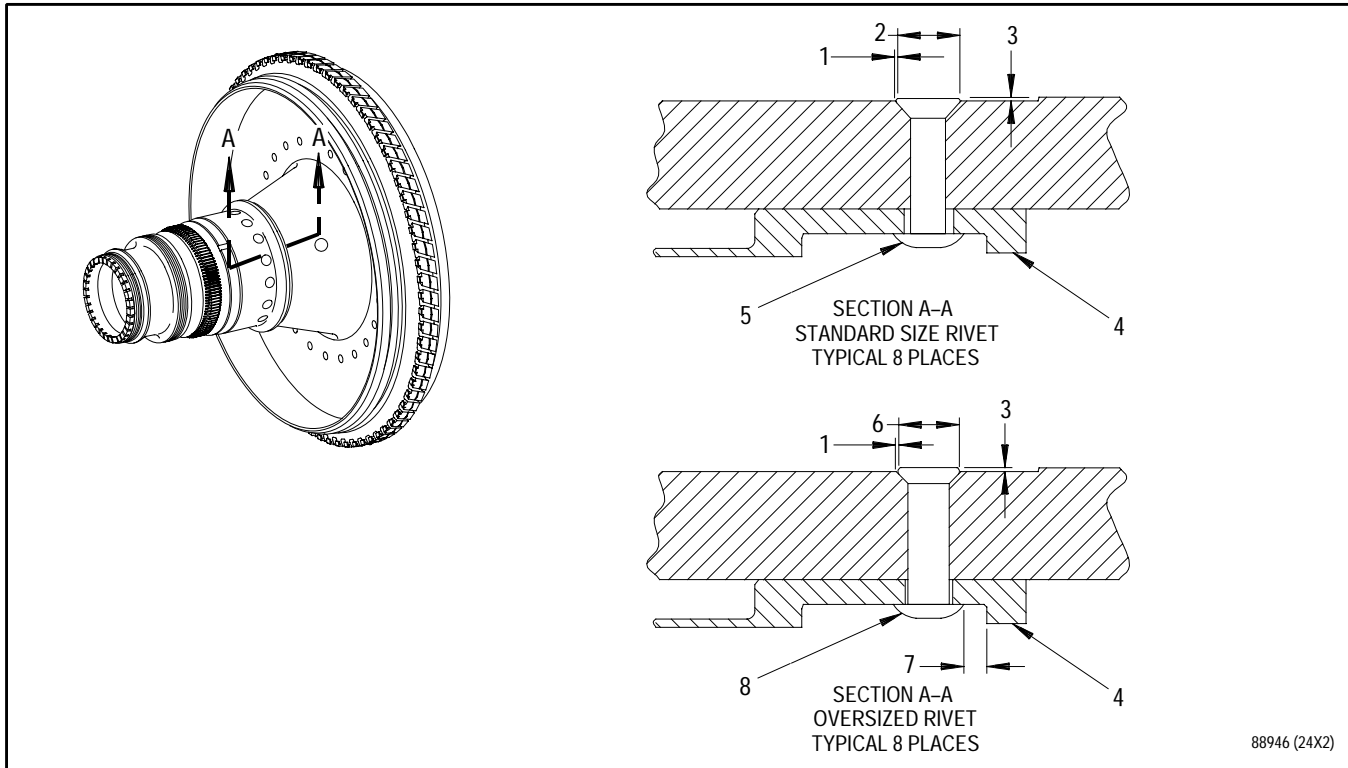
- (3) Place rivet into first hole.

(4) Push down detail-15 leaf and lock in place with detail-18 half turn knobs. To obtain acceptable upset height(3), ensure manufactured rivet head is seated in detail-19 rivet.

(5) Upset rivet. Refer to T.O. 2-1-111.

(6) Loosen detail-18 half turn knobs, swing detail-15 leaf upward and repeat procedure until all 8 rivets are installed.

x. Remove disk and hub assembly from PWA 71122 fixture.



1. Gap
2. 0.160 inch minimum diameter
3. Upset may be 0.010 inch above to 0.015 inch below surface.
4. Heat shield lug
5. PN AN123341 standard rivet
6. 0.200 inch minimum diameter
7. 0.040 inch minimum clearance
8. PN AN123357 oversize rivet

Figure 6. Sixth Stage Compressor Disk and Hub Assembly - Rivet Installation

7. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - COPPER/NICKEL COATING REPAIR.

(See Figures 7 and 8.)

- a. Mask hub assembly for cleaning as follows:

- (1) Insert PWA 71304 plugs into two 0.352 to 0.362 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.
- (2) Insert PWA 71305 plugs into eight 0.495 to 0.505 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.
- (3) Mask hub rear bore with detail-1 plug of PWA 71306 cover, and front bore with detail-3 plug.
- (4) Mask rivet holes and bearing journals (Areas 1, 2 and 3) with PMC 1835 maskant per SPOP 36. Refer to T.O. 2-1-111. Do not mask Areas 4 and 5.



To prevent fatigue debit on titanium hub caused by trapped solution in internal cavities, part shall not be completely submerged.

NOTE

PWA 71306 detail-3 plug has a bleed hole.

- b. Place masked assembly rear end down in basket and clean by submerging up to plug detail-3 per SPOP 18, except do not vapor degrease. Refer to T.O. 2-1-111.

- c. Remove antigalling coating from Areas 1, 2 and 3 per SPOP 16. See figure 7. Refer to T.O. 2-1-111.



Stripping solution will damage rivets not adequately masked.

NOTE

Blade slots (Area 4) remain unmasked so any copper/nickel residue transferred from blade roots may be removed during stripping procedure.

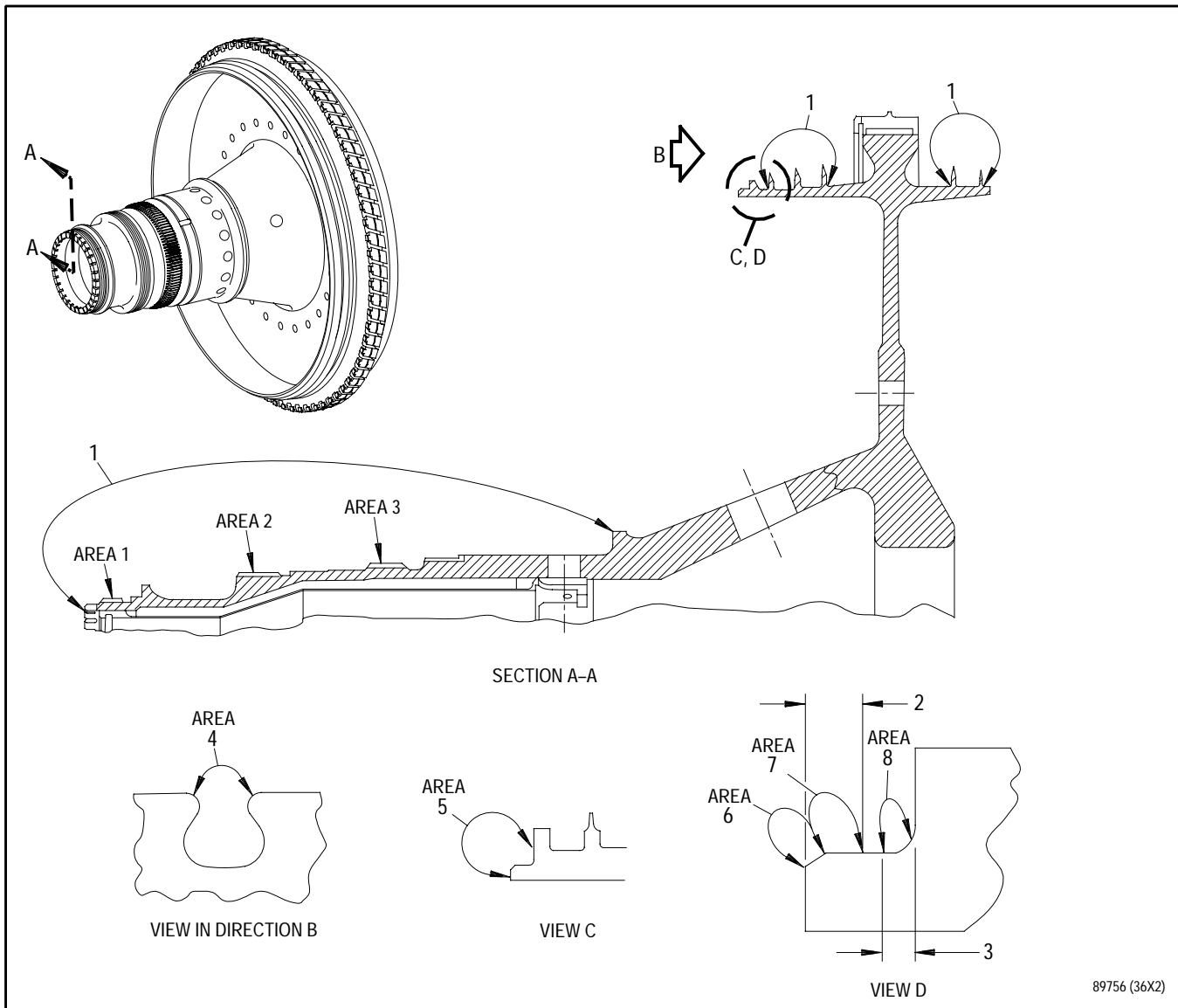
- d. Mask hub assembly for stripping per step a. except use plug detail-2 of PWA 71306 to mask front bore.
- e. Place masked assembly into PWA 71307 basket
- f. Strip copper/nickel coating from Area 5 per SPOP 710, except omit steps 1, 2, 4 and 5. Refer to T.O. 2-1-111.



Failure to exercise care during maskant removal may scratch and damage hub assembly.

- g. Carefully cut and peel maskant from hub assembly. Remove maskant residue with isopropyl alcohol.
- h. Visually inspect using 10X magnification and white light. No cracks allowed.
- i. Clean disk and hub per SPOP 18, except do not vapor degrease. Refer to T.O. 2-1-111.
- j. Install PWA 71116 fixture on PWA 70449 pedestal and secure with 3 bolts.

- k. Attach PWA 71117 holder to PWA 71116 fixture and secure with 3 bolts.
- l. Load 2 PWA 32704 almen test strips to PWA 71117 holder and secure with screws.
- m. Shot peen test strips per SPOP 501 using SAE 170 maximum cast steel shot, 45 HRC minimum hardness or equivalent, or ceramic beads with intensity of 6A.
- n. Remove test strips and PWA 71117 holder.



1. No peening allowed
2. 0.100 inch minimum
3. 0.040 to 0.060 inch

Figure 7. Sixth Stage Compressor Disk and Hub Assembly - Copper/Nickel Coating Repair

NOTE

Figure 8 shows hub and disk assembly with all masks in place.

o. Mask hub and disk assembly for shotpeening as follows: (See figure 8.)

- (1) Load part, rear end down, locating inner bore on PWA 71116 fixture.
- (2) Using handles, place PWA 71118 mask on front snap diameter.
- (3) Using center handle place PWA 71120 mask over entire hub and disk assembly.

p. Shot peen Area 5, figure 7, per SPOP 501 using SAE 170 maximum cast steel shot, 45 HRC minimum hardness or equivalent, or ceramic beads with intensity of 6A. Refer to T.O. 2-1-111.

q. Remove tooling and hub assembly.

NOTE

PWA 71110 rubber masks have different colors. Detail-4 is red, detail-9 is green.

r. Install PWA 71110 detail-4 rubber mask over blade slots and detail-9 rubber mask on front snap diameter as follows:

- (1) Wrap masks around part and cut allowing extra material for finishing.
- (2) Press around masks with finger or tongue depressor to ensure a tight fit.

(3) Finish cut butt ends of masks and use stainless steel staples to affix butt ends.

(4) If necessary, tape butt ends.

s. Apply tape to mask knife edges.

t. Load assembly, front end down onto PWA 71111 plasma spray fixture. Install cover plate and tighten securely.

u. Grit blast Areas 6 and 7 with 60 grit or finer silicon carbide per SPOP 218. Refer to T.O. 2-1-111. Ensure the following conditions are met:

(1) No grit blast permitted in Area 8.

(2) Maximum gun pressure shall be 45 psi and 45 to 90 degree angle of blast from horizontal.

(3) Pressure shall be 20 to 23 psi for pressure machine, or 40 to 45 psi for suction machine.

v. Plasma spray Area 7 per PWA 53-69, 0.002 to 0.004 inch thick. No coating allowed in Area 8. Coating is optional and may be incomplete in Area 6. Refer to T.O. 2-1-111.

w. Apply antigalling compound to Areas 1, 2 and 3 per paragraph 9.

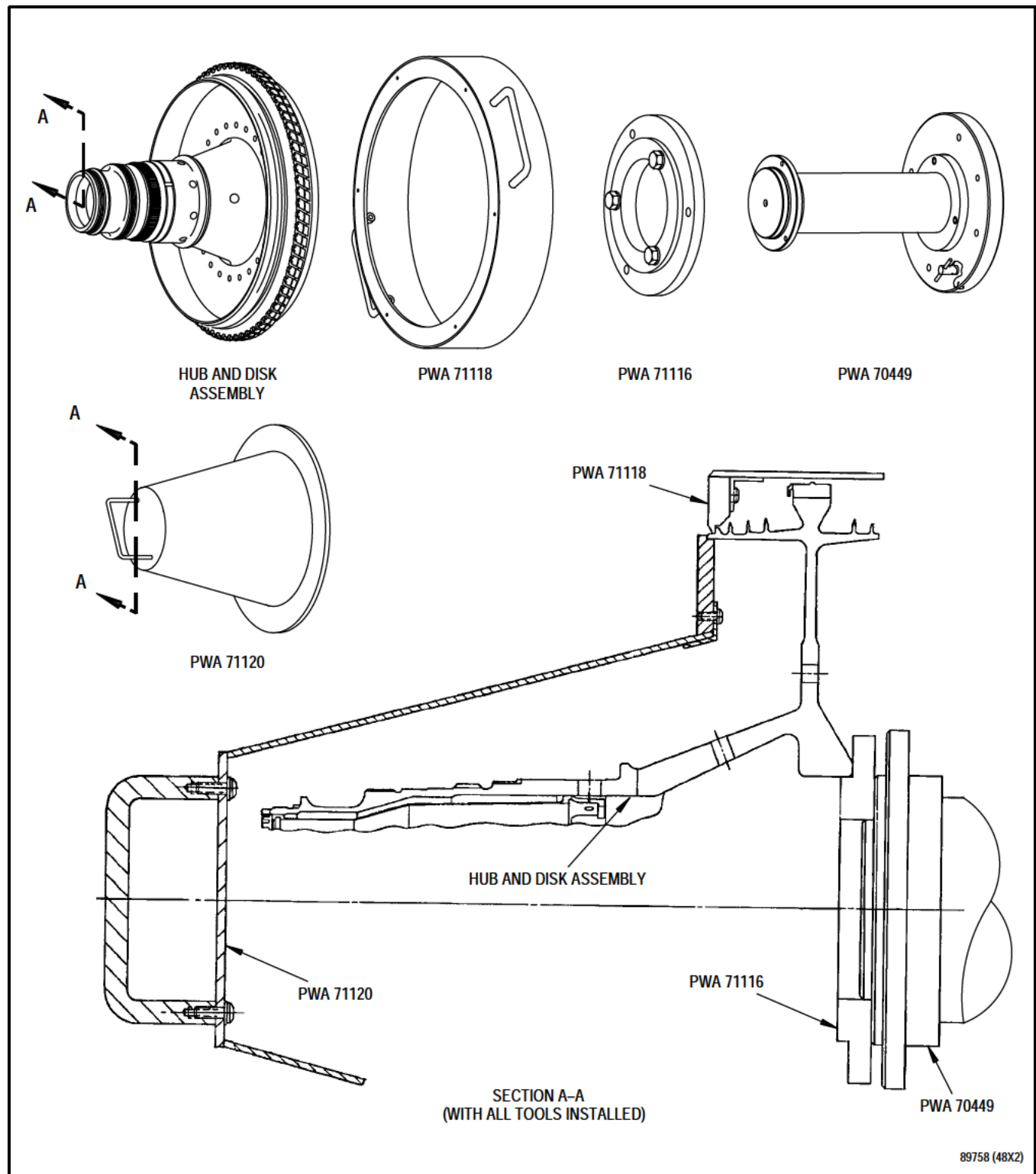


Figure 8. Sixth Stage Compressor Disk and Hub Assembly - Masking for Shotpeening

8. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - HARDFACE REPAIR.

(See Figure 9.)

- a. Remove PWA 46 or PWA 256-4 hardface from areas shown in figure 9 by grinding, or send parts to vendor without coating removal. Refer to T.O. 2-1-111 for vendor and part location.
- b. Install disk and hub assembly into PWA 71115 machining fixture as follows:
 - (1) Load part, rear end down.
 - (2) Dial indicate hard coat Diameter BH(16) to ± 0.0003 inch, or tighter, if possible.
 - (3) Secure part by hand tightening 8 knobs.
- c. Machine diameters to minimum dimension necessary to remove worn hardface but do not exceed machine clean up dimensions shown in Views B, C, D and E.
- d. Inspect disk, attach tag indicating machined dimensions and remove part from fixture.
- e. If heat shield is not installed go to step g.
- f. Mask internal cavities as follows:
 - (1) Insert PWA 71304 plugs into two 0.352 to 0.362 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.
 - (2) Insert PWA 71305 plugs into eight 0.495 to 0.505 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.
 - (3) Mask hub rear bore with detail-1 of PWA 71306 cover, and front bore with detail-2.
- g. Fluorescent penetrant inspect per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- h. If used, remove masks and clean.
- i. Clean disk thoroughly of dirt, grit, oil and grease per SPOP 18, except do not vapor degrease. Refer to T.O. 2-1-111. After cleaning, handle part using clean lint free cotton gloves to prevent contaminating cleaned surfaces.
- j. Mask journal except hardface area, and mask 2 slots Area A per SPOP 36. Refer to T.O. 2-1-111.
- k. Grit blast repair area using No. 60 silicon carbide per SPOP 218. Refer to T.O. 2-1-111.



Failure to mask part if heat shield is installed will trap fluorescent penetrant solution in internal cavities and cause fatigue debit on titanium hub.

- f. Mask internal cavities as follows:
 - (1) Insert PWA 71304 plugs into two 0.352 to 0.362 inch diameter holes located on conical surface of hub assembly. If fit is too tight, moisten plug with water and insert with twisting motion.

- l. Remove masks and clean part with isopropyl alcohol.
- m. Coat specified areas per PWA 46 or PWA 256-4 to plasma spray dimensions shown in Views B, C, D and E. Refer to T.O. 2-1-111 for vendor information.
- n. Install disk and hub assembly into PWA 71115 machining fixture per step b.
- o. Machine coated areas to finish machine dimensions shown in Views B, C, D and E.
- p. Inspect part and remove from fixture.
- q. If heat shield is not installed, go to step s.



Failure to mask part if heat shield is installed will trap fluorescent penetrant solution in internal cavities and cause fatigue debit on titanium hub.

- r. Mask internal cavities per step f.
- s. Fluorescent penetrant inspect per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- t. If used, remove masks and clean part with isopropyl alcohol.

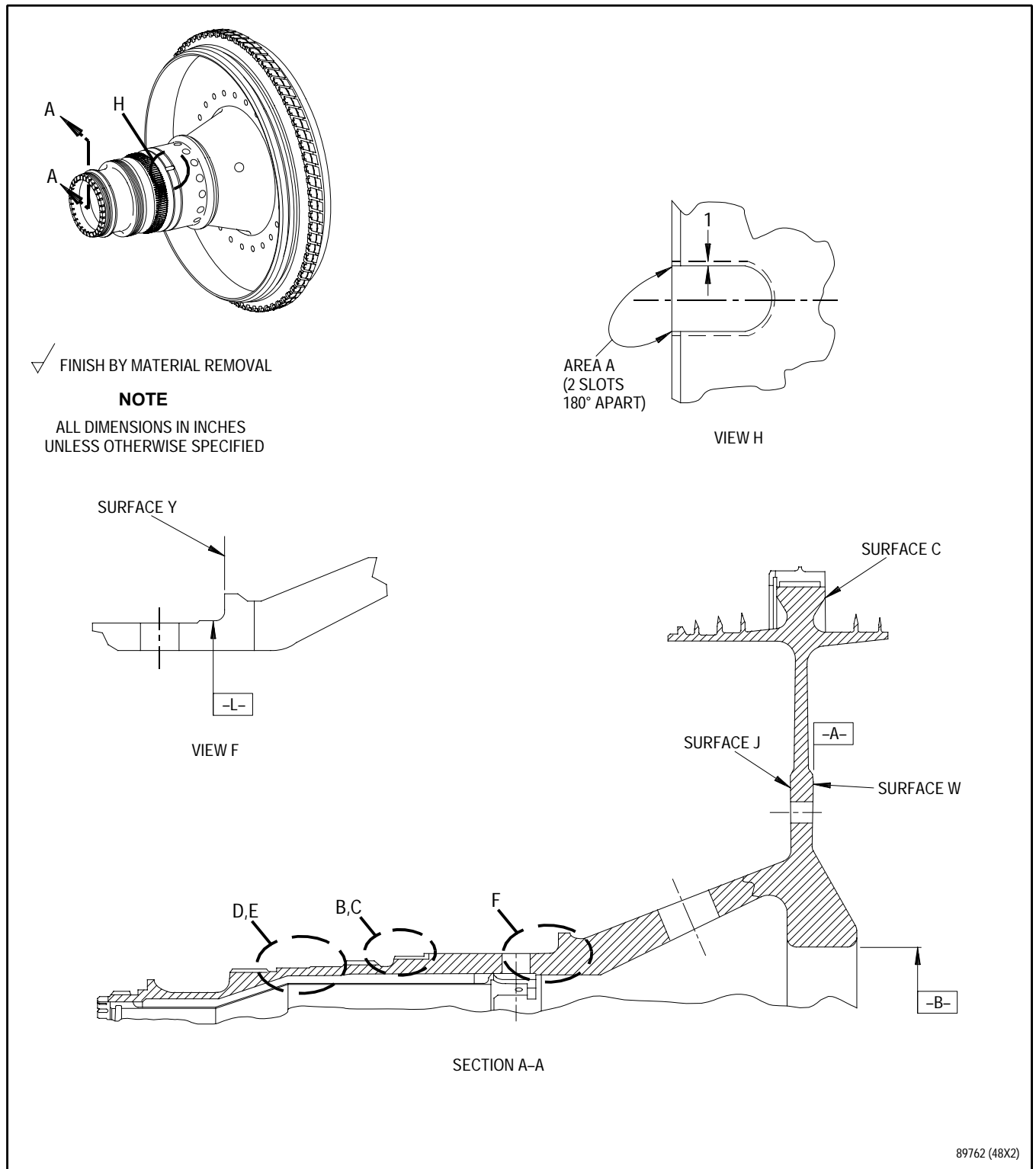
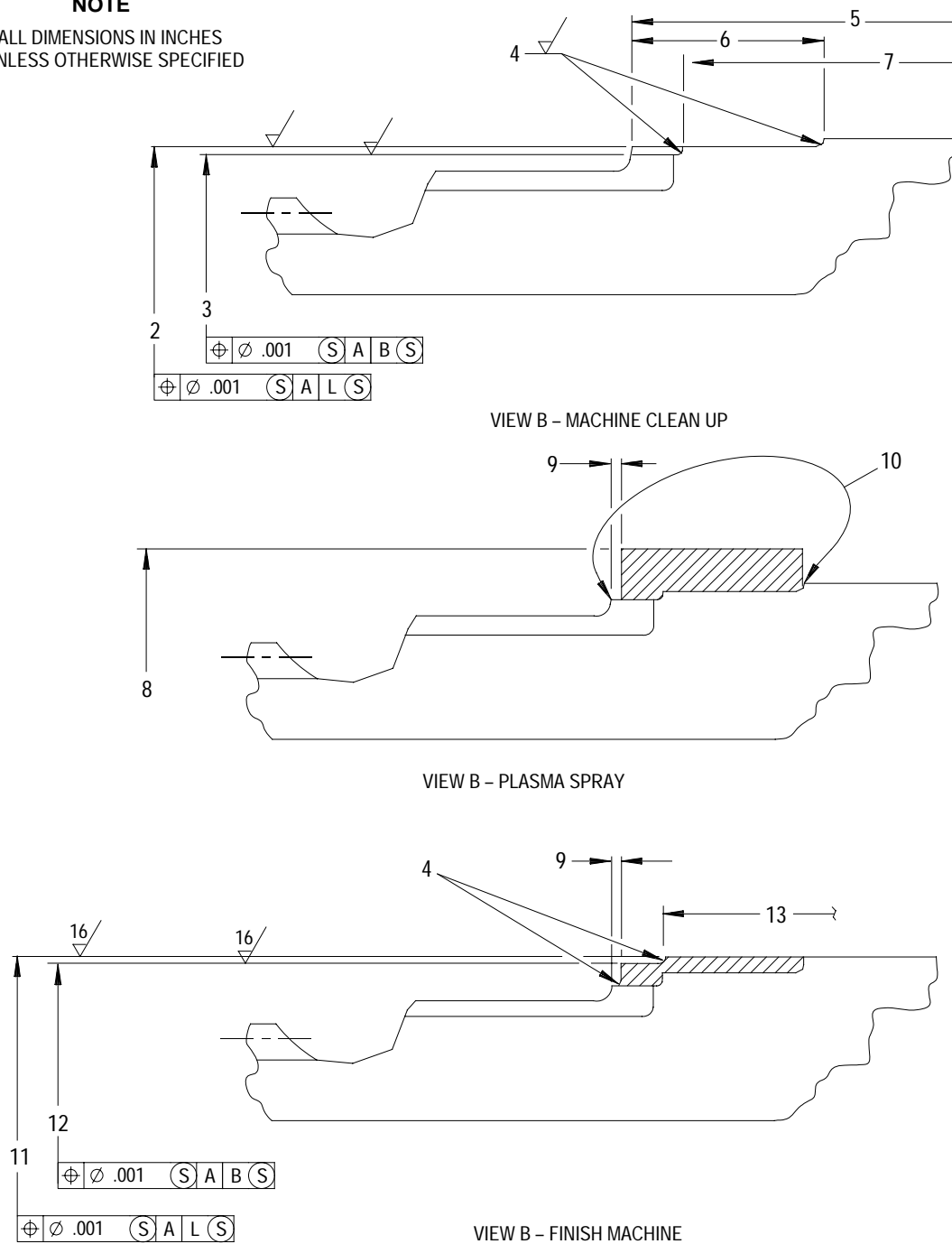


Figure 9. Sixth Stage Compressor Disk and Hub Assembly - Hardface Repair (Sheet 1 of 5)

✓ FINISH BY MATERIAL REMOVAL

NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



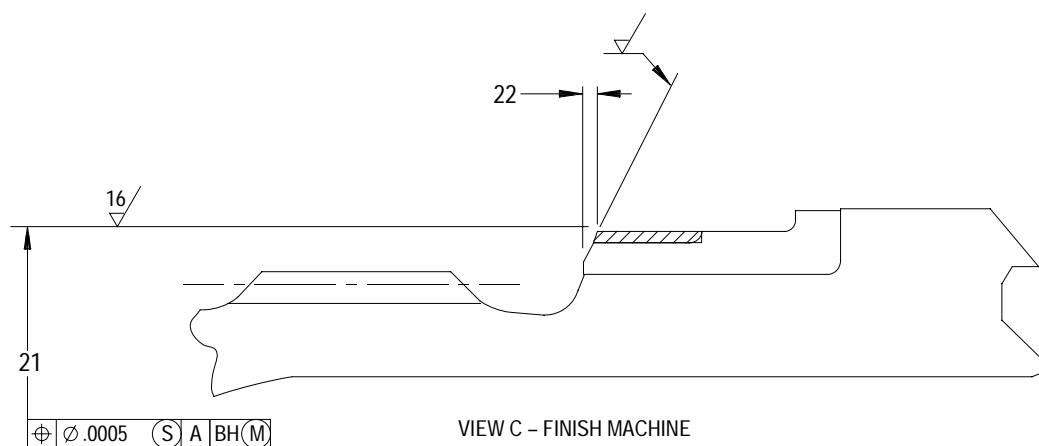
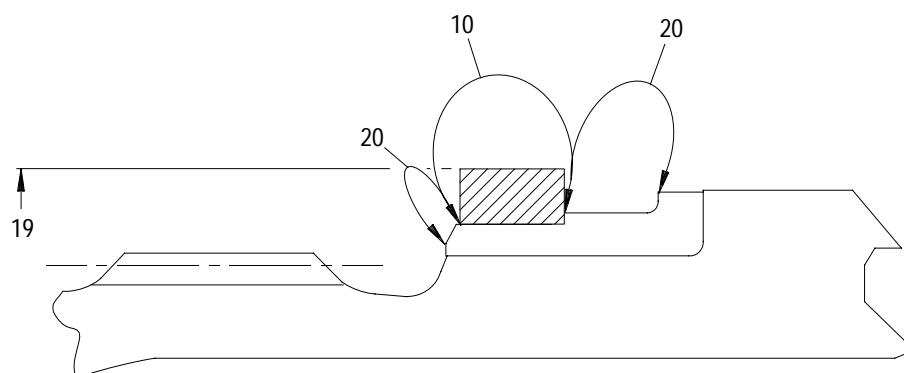
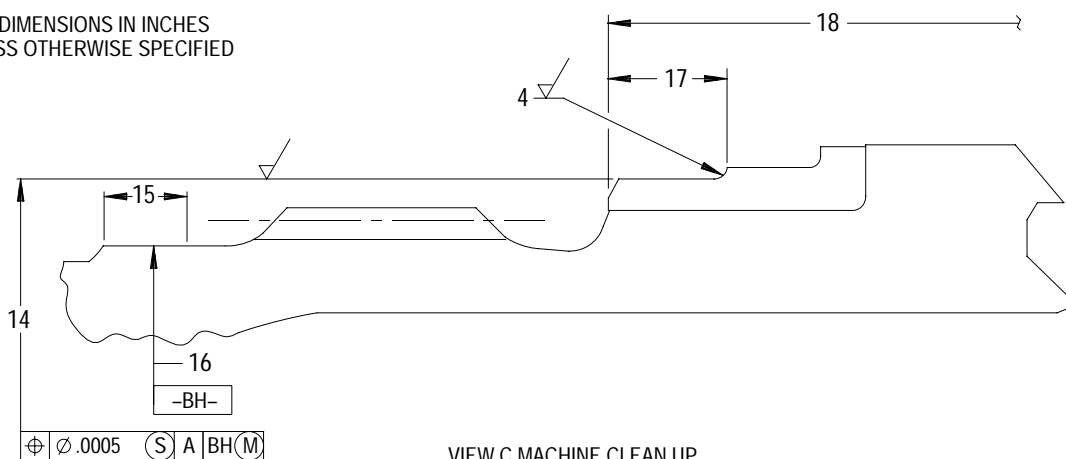
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Figure 9. Sixth Stage Compressor Disk and Hub Assembly - Hardface Repair (Sheet 2 of 5)

✓ FINISH BY MATERIAL REMOVAL

NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



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Figure 9. Sixth Stage Compressor Disk and Hub Assembly - Hardface Repair (Sheet 3 of 5)

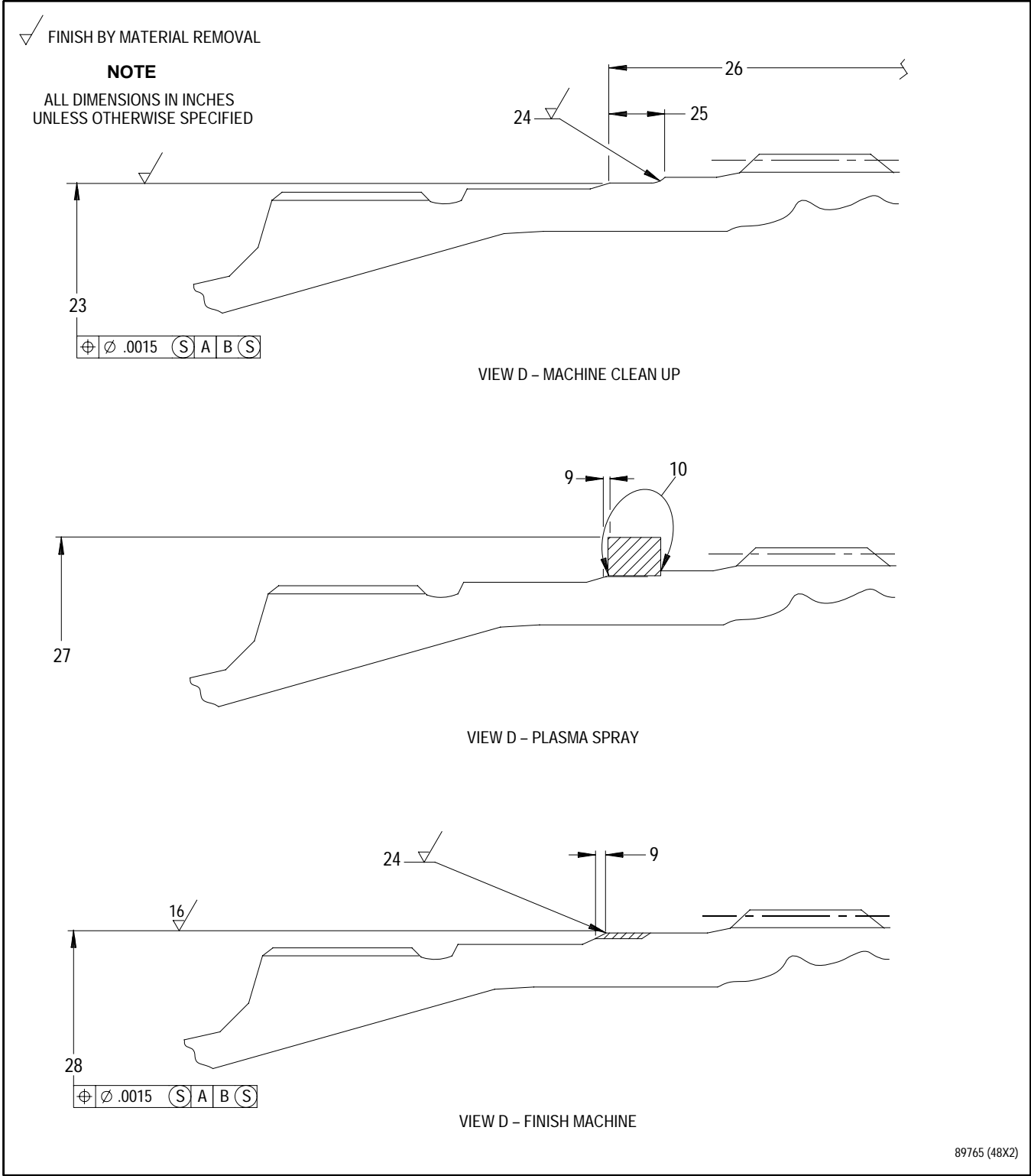
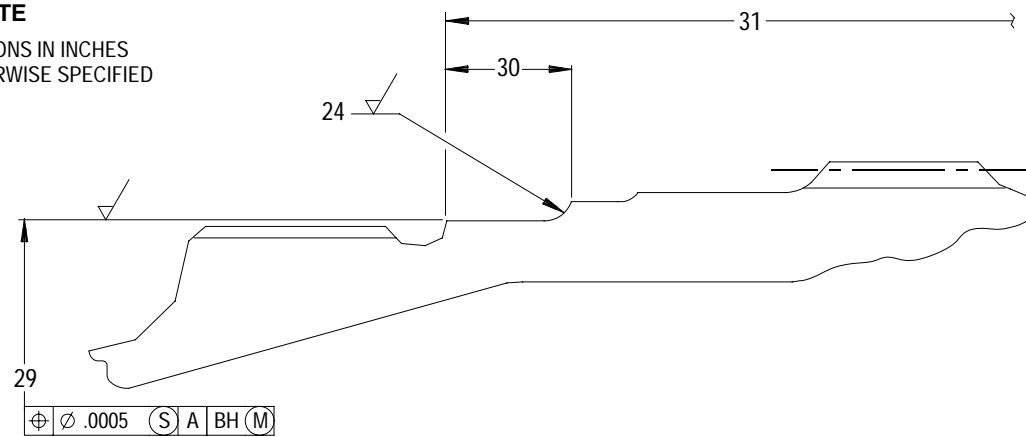


Figure 9. Sixth Stage Compressor Disk and Hub Assembly - Hardface Repair (Sheet 4 of 5)

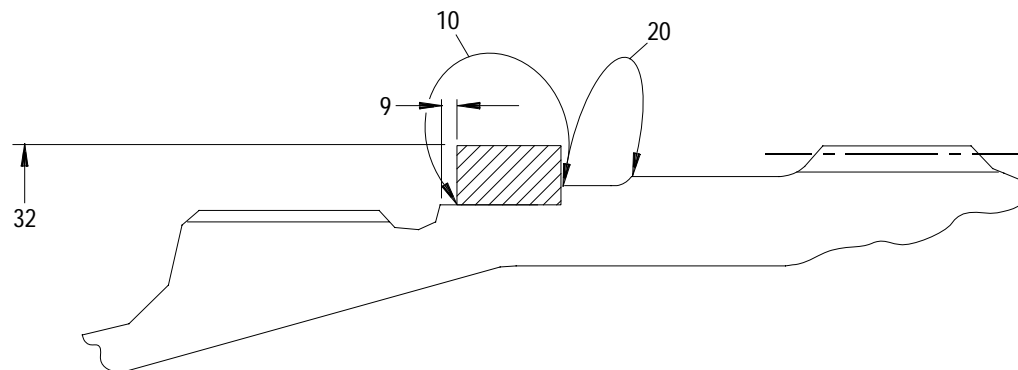
✓ FINISH BY MATERIAL REMOVAL

NOTE

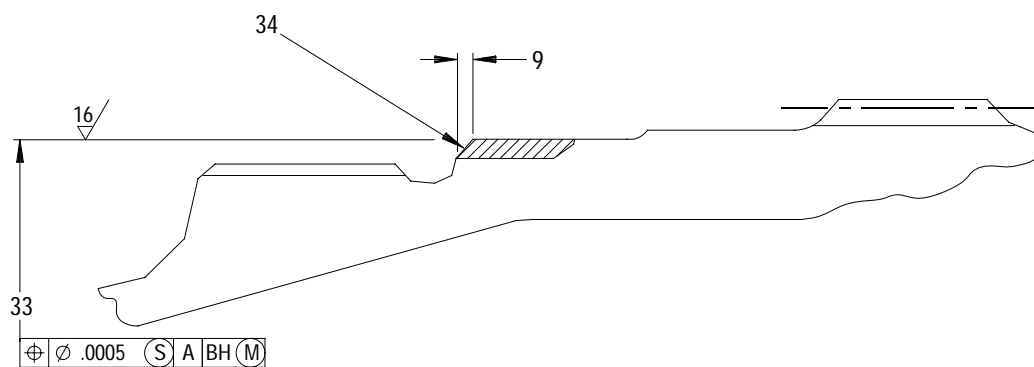
ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



VIEW E - MACHINE CLEAN UP



VIEW E - PLASMA SPRAY



VIEW E - FINISH MACHINE

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Figure 9. Sixth Stage Compressor Disk and Hub Assembly - Hardface Repair (Sheet 5 of 5)

Legend for figure 9

NOTE

- (a) This diameter shall be located within 0.001 inch diameter of true position Regardless of Feature Size in relation to Datum A and Datum L, Regardless of Feature Size when constrained per Note (b).
- (b) Applies when Surface W is constrained flat within 0.001 inch total. Apply constraint only to Surface W and Surface J.
- (c) This diameter shall be located within 0.001 inch diameter of true position Regardless of Feature Size in relation to Datum A and Datum B, Regardless of Feature Size when constrained per Note (b).
- (d) During machine clean up, machine to dimension necessary to ensure removal of all existing coating.
- (e) This diameter shall be located within 0.0005 inch diameter of true position Regardless of Feature Size in relation to Datum A and Datum Diameter BH at Maximum Material Condition when constrained per Note (b).
- (f) This diameter shall be located within 0.0015 inch diameter of true position Regardless of Feature Size in relation to Datum A and Datum B, Regardless of Feature Size when constrained per Note (b).
- (g) Unless otherwise specified, break edge 0.003 to 0.015 inch.

- 1. 0.060 inch maximum. Coating is optional and may be incomplete.
- 2. 5.5885 to 5.5920 inch diameter. See note (a).
- 3. 5.5834 to 5.5854 inch diameter. See note (c).
- 4. 0.010 to 0.030 inch radius
- 5. 2.344 to 2.354 inches to Surface Y, reference
- 6. 0.400 inch minimum. See note (d).
- 7. 2.205 to 2.215 inches from Surface Y. See note (d).
- 8. 5.6115 inch minimum diameter
- 9. 0.000 to 0.010 inch
- 10. Hardface area. Apply hardface per text.
- 11. 5.6060 to 5.6065 inch diameter. Transition between adjacent diameters, if any, shall be smooth. See note (a).
- 12. 5.6002 to 5.6014 inch diameter. See note (c).
- 13. 2.215 to 2.225 inches from Surface Y.
- 14. 5.4855 to 5.4895 inch diameter. See note (e).
- 15. 0.300 inch minimum. Diameter BH located over this distance
- 16. 5.1450 inch Diameter BH at Maximum Material Condition
- 17. 0.410 inch minimum. See note (d).
- 18. 2.864 to 2.884 inches from Surface Y, reference
- 19. 5.5085 inch minimum diameter
- 20. Hardface is optional and may be incomplete.
- 21. 5.5030 to 5.5035 inch diameter. Transition between adjacent diameters, if any, shall be smooth. See note (e).

Legend for figure 9 (continued)

- 22. Chamfer 0.020 to 0.040 inch x 45°±2°
- 23. 5.128 to 5.130 inches diameter. See note (f).
- 24. 0.101 to 0.141 inch radius
- 25. 0.300 inch minimum. See note (d).
- 26. 4.294 to 4.324 inches from Surface Y, reference
- 27. 5.1500 inches minimum diameter
- 28. 5.1450 to 5.1445 inches. Transition between adjacent diameters, if any, shall be smooth. See note (f).
- 29. 5.0820 to 5.0860 inches diameter. See note (e).
- 30. 0.220 inch minimum. See note (d).
- 31. 4.894 to 4.914 inches from Surface Y
- 32. 5.1050 inches minimum diameter
- 33. 5.0995 to 5.100 inches diameter. Transition between adjacent diameters, if any, shall be smooth. See note (e).
- 34. 0.047 to 0.078 inch radius

8A. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - KNIFE-EDGE COATING REPAIR.

NOTE

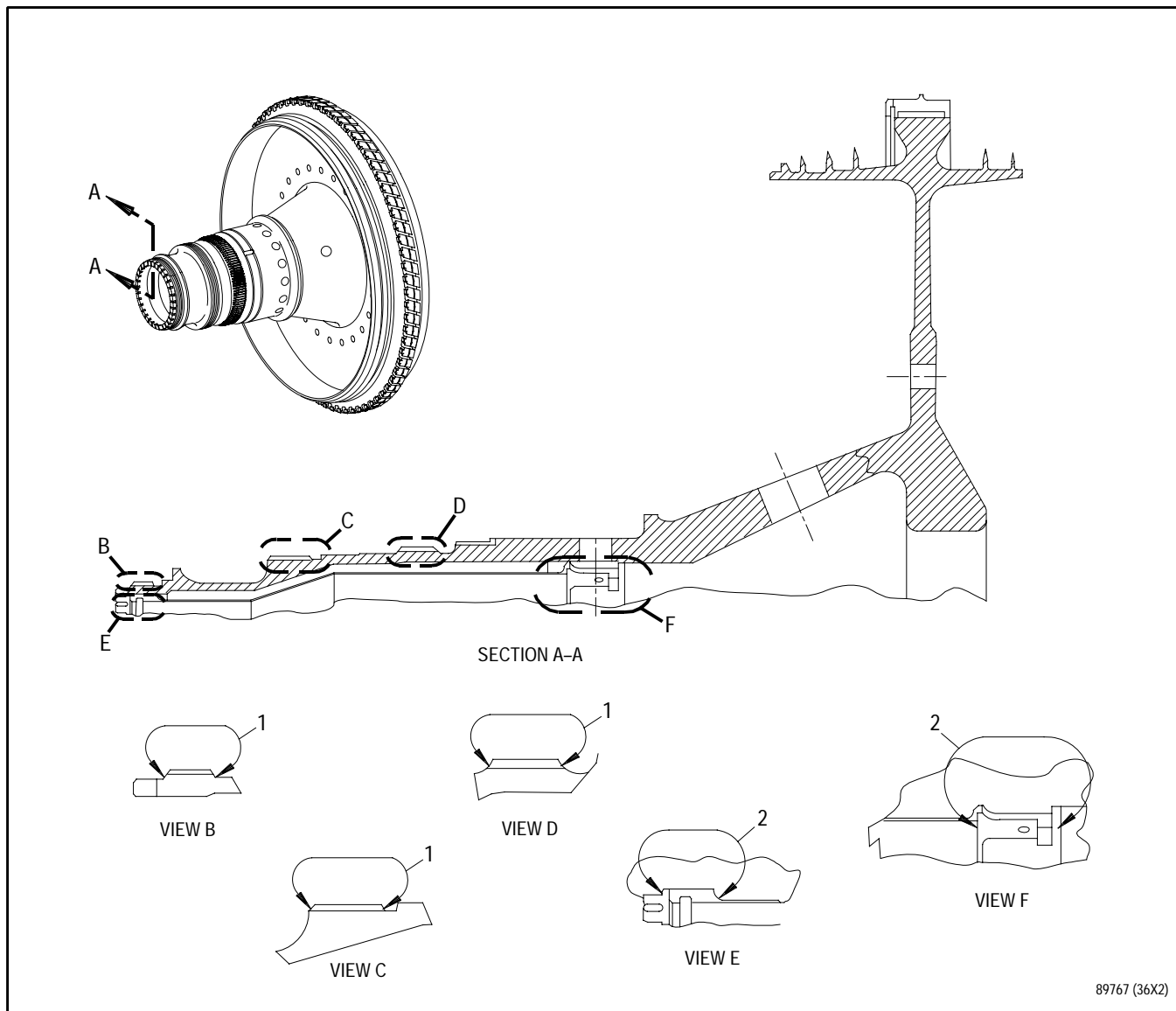
Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor desires to revise procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. Perform proprietary repair as follows:
 - (1) Proprietary repairs for following distress mode may be performed only by qualified repair sources identified in QRSL. Refer to T.O. 2J-F100-53-1, WP 603 00.
 - JGDFGZC Worn knife-edge coating

9. SIXTH STAGE COMPRESSOR DISK AND HUB ASSEMBLY - ANTIGALLING COMPOUND APPLICATION.

(See Figure 10.)

- a. Mask disk so identification numbers will not be obscured by antigalling compound. Ensure the following conditions are met:
 - (1) Only numbers on outermost OD of disk shall be masked.
 - (2) Critical disk areas such as blade slot inner faces, snap diameter surfaces, and rim front and rear faces shall not be masked.
- b. Apply PWA 36545-3 antigalling compound to areas shown in figure 10 per SPOP 748. Refer to T.O. 2-1-111. Surface preparation is not required.



1. Apply antigalling compound per text.
2. Apply antigalling compound per text. Antigallant shall be applied to OD of heat shield where surface contacts hub before assembly with disk.

Figure 10. Sixth Stage Compressor Disk and Hub Assembly - Antigalling Compound Application

WORK PACKAGE

TECHNICAL PROCEDURES

SEATS, NO. 2, 3, AND 4 BEARING SEAL -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 78

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	34	26	58	0
2	26	35 - 41	0	59	26
2A Added	26	42	26	60 - 61	0
2B Blank Added	26	43	0	62	26
3 - 8	0	44	26	63	0
9	31	45	0	64	26
10 - 29	0	46	26	65	0
30 - 30B	31	47 - 53	0	66 - 73	31
30C Deleted	31	54	26	74 Blank	31
30D Blank Deleted	31	55 - 56	0	75 Deleted	31
31	31	57	26	76 Blank Deleted	31
32 - 33	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures - Marking, General - - - - -	WP 023 00
General Procedures - Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Cleaning, Vapor Degreaser (SPOP 3) - - - - -	SWP 031 02
Lapping of Main Bearing Carbon Seals, Seal Plates, and Spacers - - - - -	SWP 091 05
Plating, Chromium, on Steel, Nickel, or Cobalt (SPOP 22) - - - - -	SWP 092 06
Plating, Nickel, on Steel (SPOP 29) - - - - -	SWP 092 11

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE, CROCUS	P-C-458

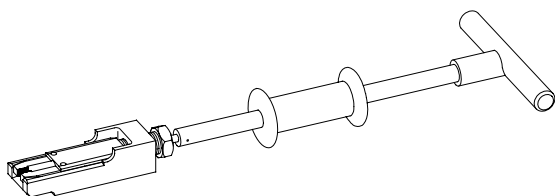
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
PIN, STRAIGHT, HEADLESS	4022667	2
PIN, STRAIGHT, HEADLESS	4059198	2
PIN	MS171432	1
PIN	MS171462	1

APPLICABLE SUPPORT EQUIPMENT

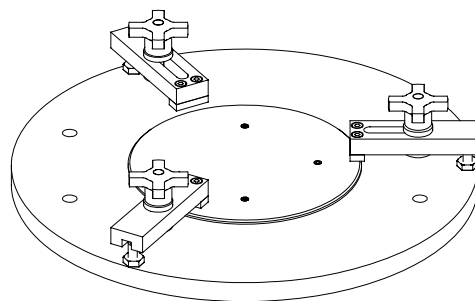
Paragraph	Function - Tool Nomenclature	Tool Number
11	NO. 3 AND 4 BEARING SEAL SEAT ASSEMBLIES - PIN REPLACEMENT	
	FIXTURE, HOLDING, SEAL, NO. 4 BEARING FRONT OR REAR	PWA 71552
	ADAPTER, PULLER, UNIVERSAL - - - - -	PWA 71537

ILLUSTRATED SUPPORT EQUIPMENT



PWA 71537 -C

Figure T1. PWA 71537 ADAPTER



PWA 71552 -C

Figure T2. PWA 71552 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 2, 3, and 4 bearing seal seats.

2. NO. 2, 3, AND 4 BEARING SEAL SEATS - FLAME DEPOSITION COATING AND LAPPING REPAIR.

(See Figures 1 through 6.)

NOTE

Base material is AMS 6322 or AMS 6323 steel.

- a. Strip PWA 50 flame deposited chromium carbide coating. Refer to T.O. 2-1-111, SPOP 47.
- b. Send seal seat to address listed for Union Carbide Corporation in T.O. 2-1-111 for application of PWA 50 flame deposited chromium carbide coating.

- c. Remove excess flameplate by grinding. Leave enough flameplate to allow for lapping.



Hand lapping can cause deterioration of seal hardface coating.

NOTE

Lap only if required to meet serviceable limits or seal seat is used with a new carbon seal.

- d. Lap sealing surface to obtain required surface finish, parallelism, squareness, and flatness. Refer to T.O. 2J-F100-53-1, SWP 091 05.
- e. Use Magne Gage, or equivalent, to check for minimum 0.002 inch flameplate thickness.

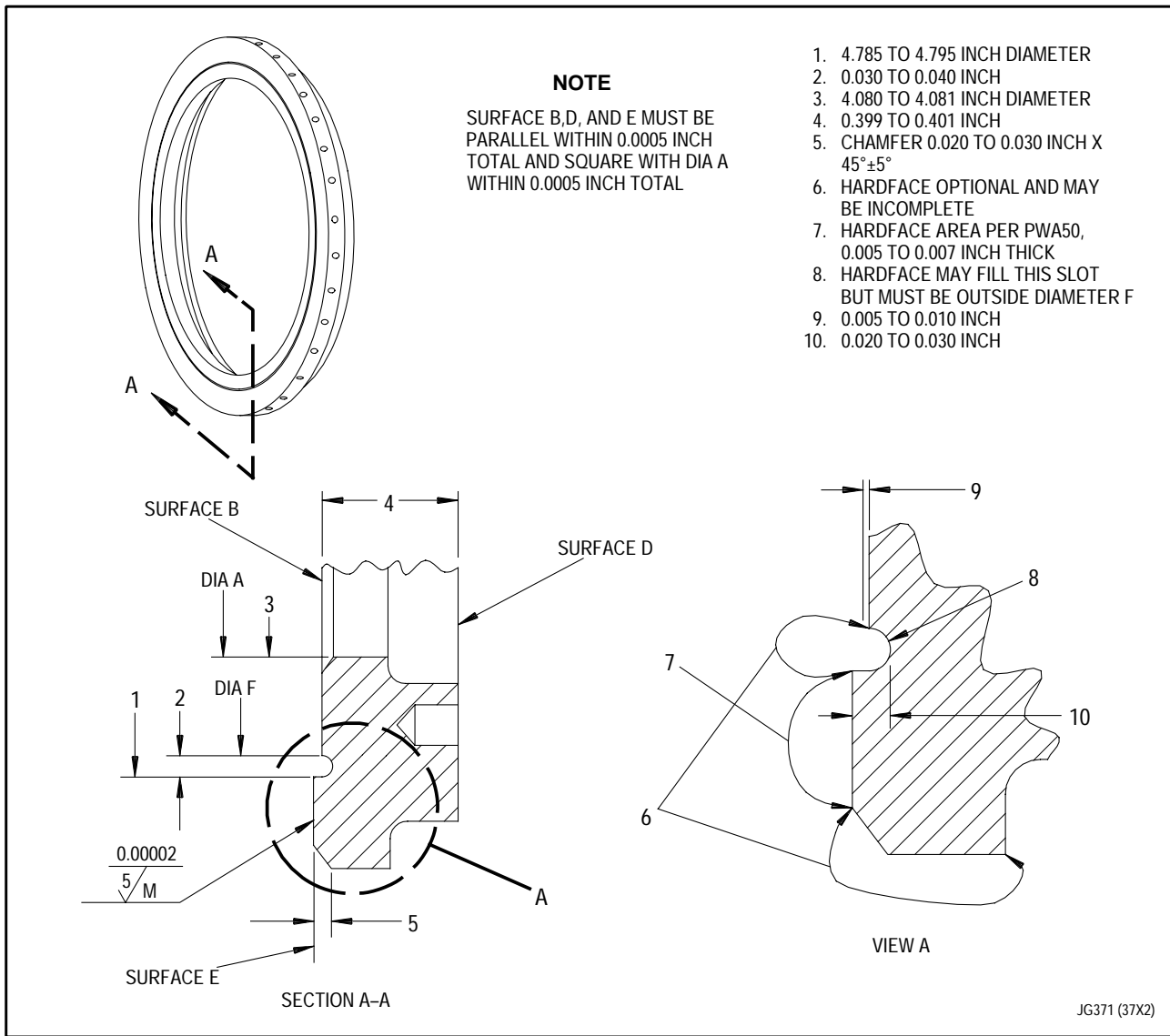


Figure 1. No. 2 Bearing Rear Seal Seat - Flame Deposition Coating and Lapping Repair (PN 4001528)

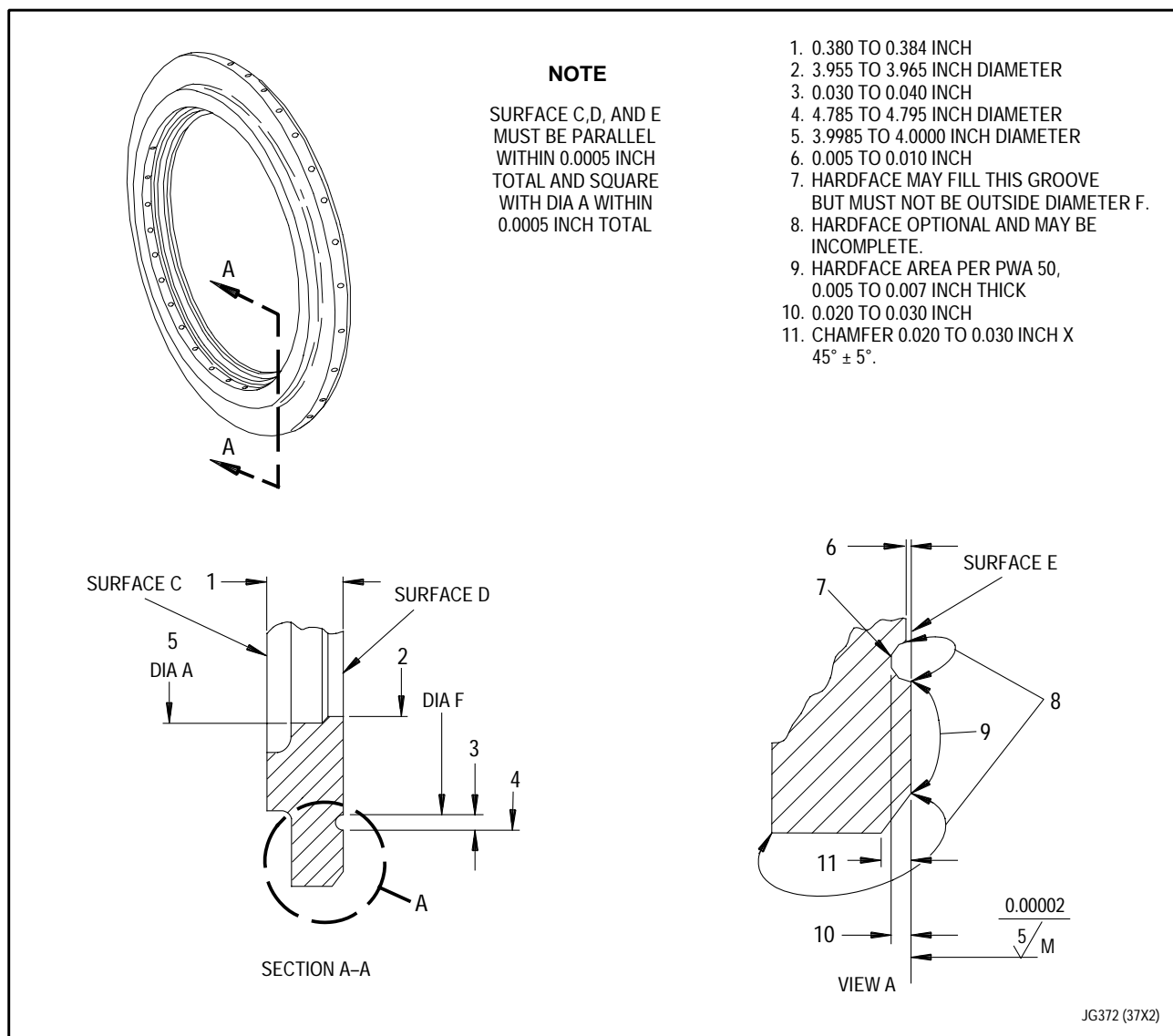


Figure 2. No. 2 Bearing Rear Seal Seat - Flame Deposition Coating and Lapping Repair (PN 4001529)

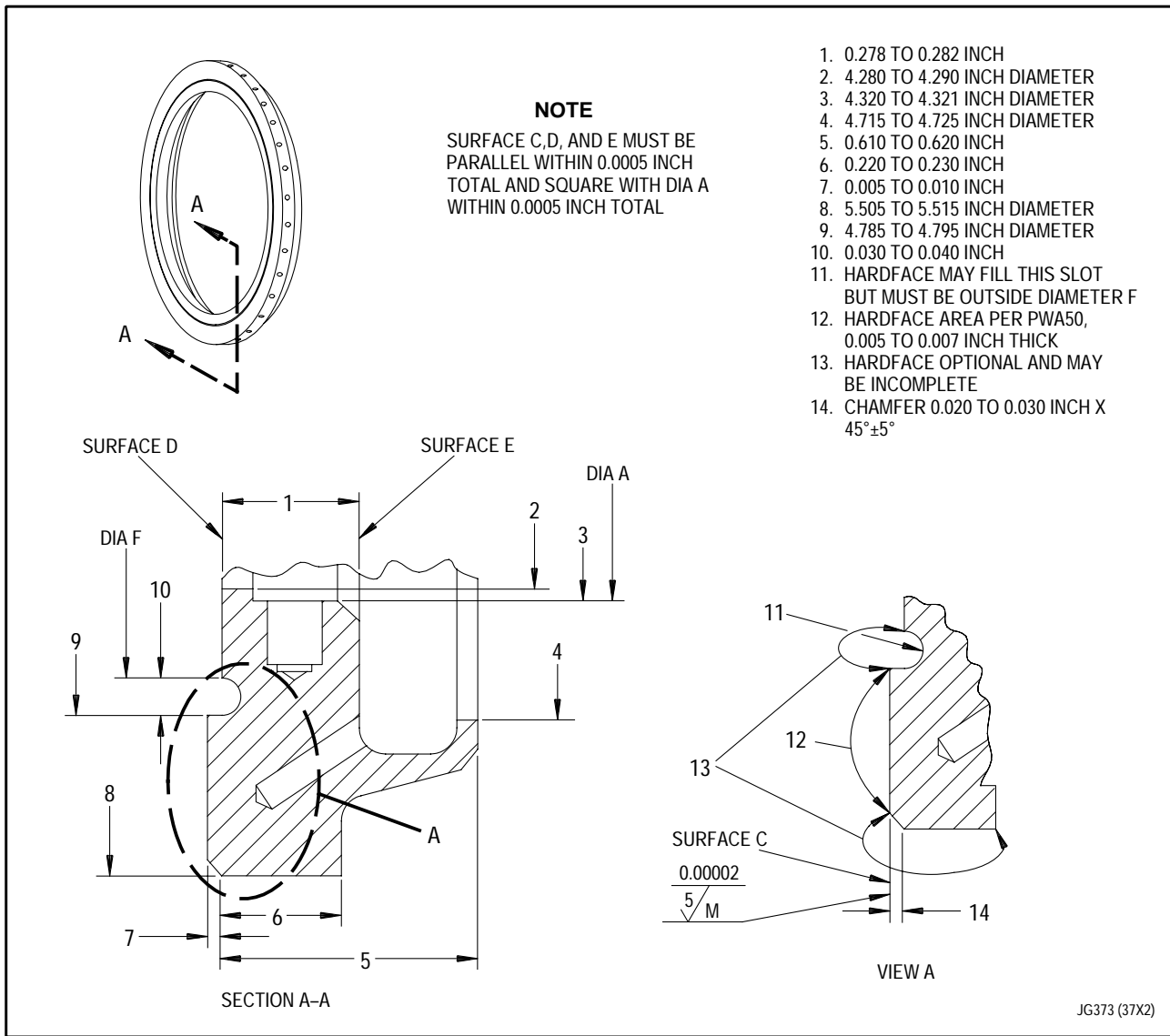


Figure 3. No. 3 Bearing Front Seal Seat - Flame Deposition Coating and Lapping Repair (PN 4022669)

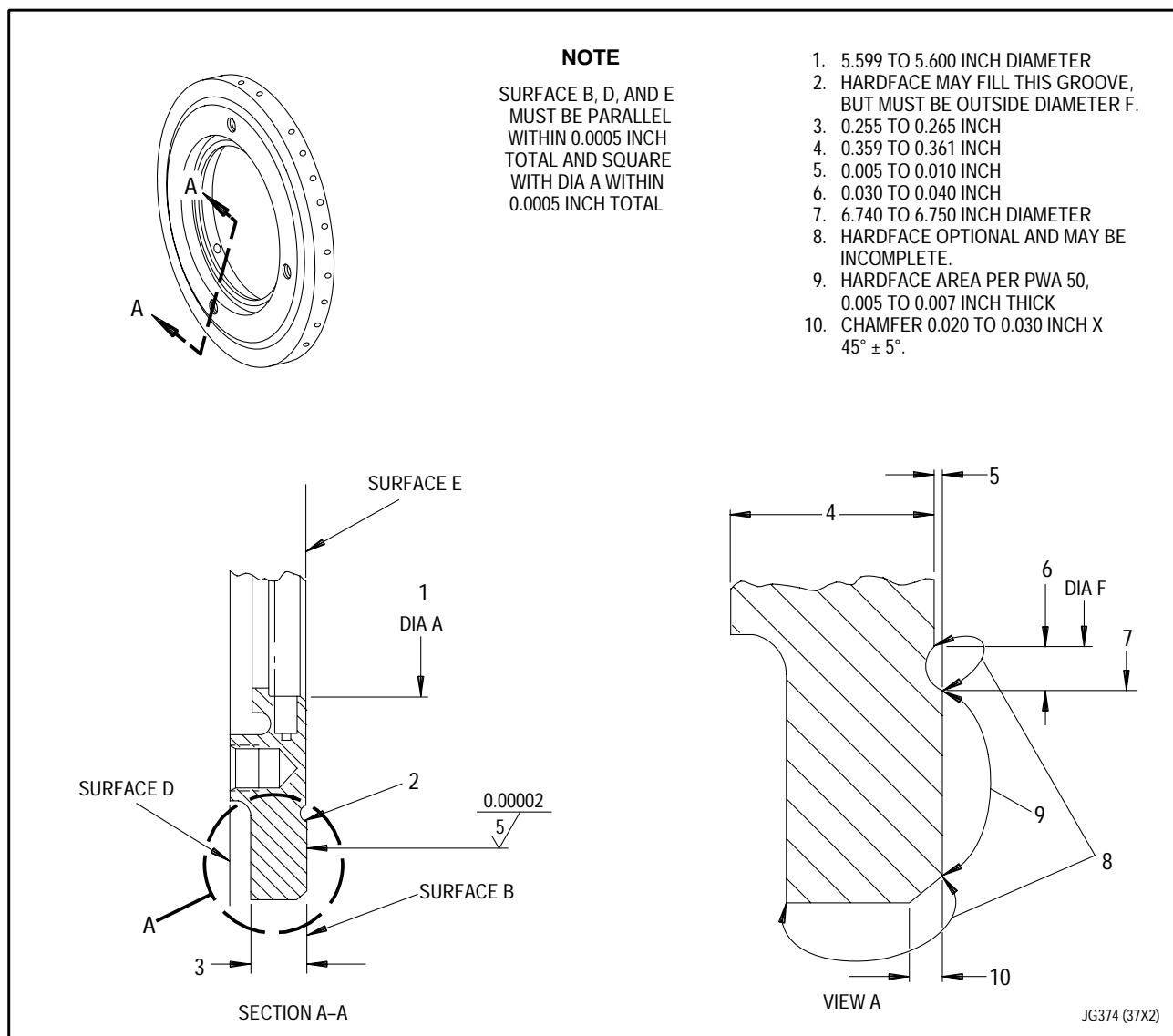


Figure 4. No. 3 Bearing Rear Seal Seat - Flame Deposition Coating and Lapping Repair (PN 4022668)

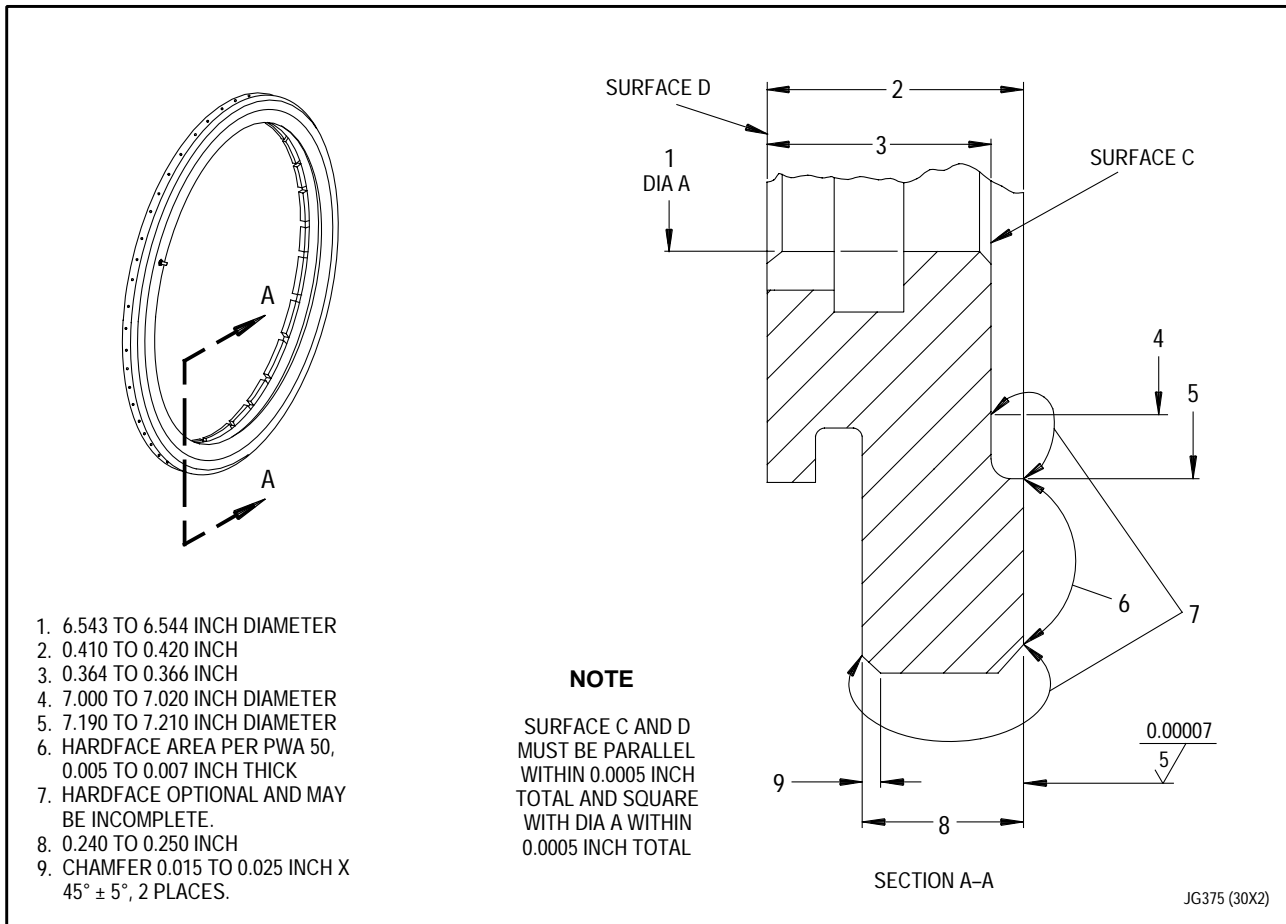
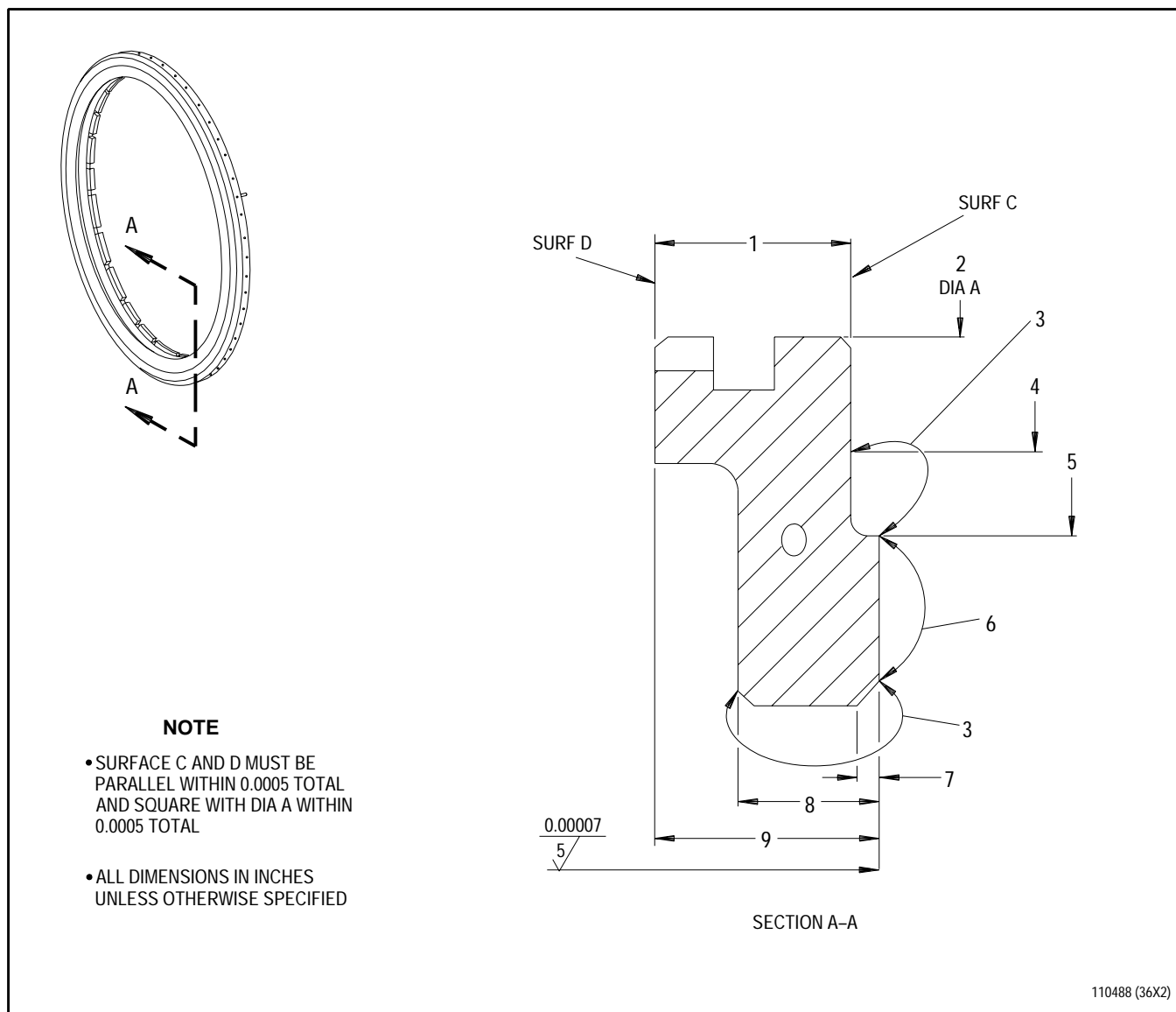


Figure 5. No. 4 Bearing Front Seal Seat - Flame Deposition Coating and Lapping Repair (PN 4032669)



1. 0.329 to 0.331 inch
2. 6.457 to 6.458 inches diameter
3. Hardface optional and may be incomplete
4. 7.000 to 7.020 inches diameter
5. 7.190 to 7.210 inches diameter
6. Hardface Area A per PWA 50, 0.005 to 0.007 inch thick
7. Chamfer 0.015 to 0.025 inch x $45^{\circ} \pm 5^{\circ}$, 2 places
8. 0.240 to 0.250 inch
9. 0.375 to 0.385 inch

Figure 6. No. 4 Bearing Rear Seal Seat (PN 4083144) - Flame Deposition Coating and Lapping Repair

**3. NO. 2 BEARING FRONT SEAL SEAT
(PN 4001528) - NICKEL PLATE REPAIR OF
INSIDE DIAMETER.**

(See Figure 7.)

NOTE

Parent material is AMS 6322 or 6323 steel.

- a. Machine ID to dimension(1, figure 7).
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02.
- d. Nickel plate area(2) per dimension(7). Refer to T.O. 2J-F100-53-1, SWP 092 11.
- e. Machine ID to finish dimensions(8 and 9).
- f. Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.
- g. Restore hardface in area(10) if necessary, per paragraph 2.

Legend for figure 7

- 1. 4.091 to 4.096 inch diameter, hold to minimum value. This diameter to be concentric with Diameter C within 0.002 inch diameter Regardless of Feature Size, and perpendicular to Surface B within 0.0005 inch Regardless of Feature Size.
- 2. Nickel plate area.
- 3. Plate optional and may be incomplete.
- 4. 0.040 inch
- 5. Existing 0.050 to 0.060 inch diameter holes, no plating permitted in holes.
- 6. Plate optional and may be incomplete.
- 7. 4.066 inch diameter maximum
- 8. Chamfer 0.065 to 0.085 inch x 45° ±2.
- 9. 4.080 to 4.081 inch diameter concentric with Diameter C within 0.002 inch diameter Regardless of Feature Size, and perpendicular to Surface B within 0.0005 inch Regardless of Feature Size.
- 10. Hardface area.
- 11. Electrical contact points permitted in this area only.

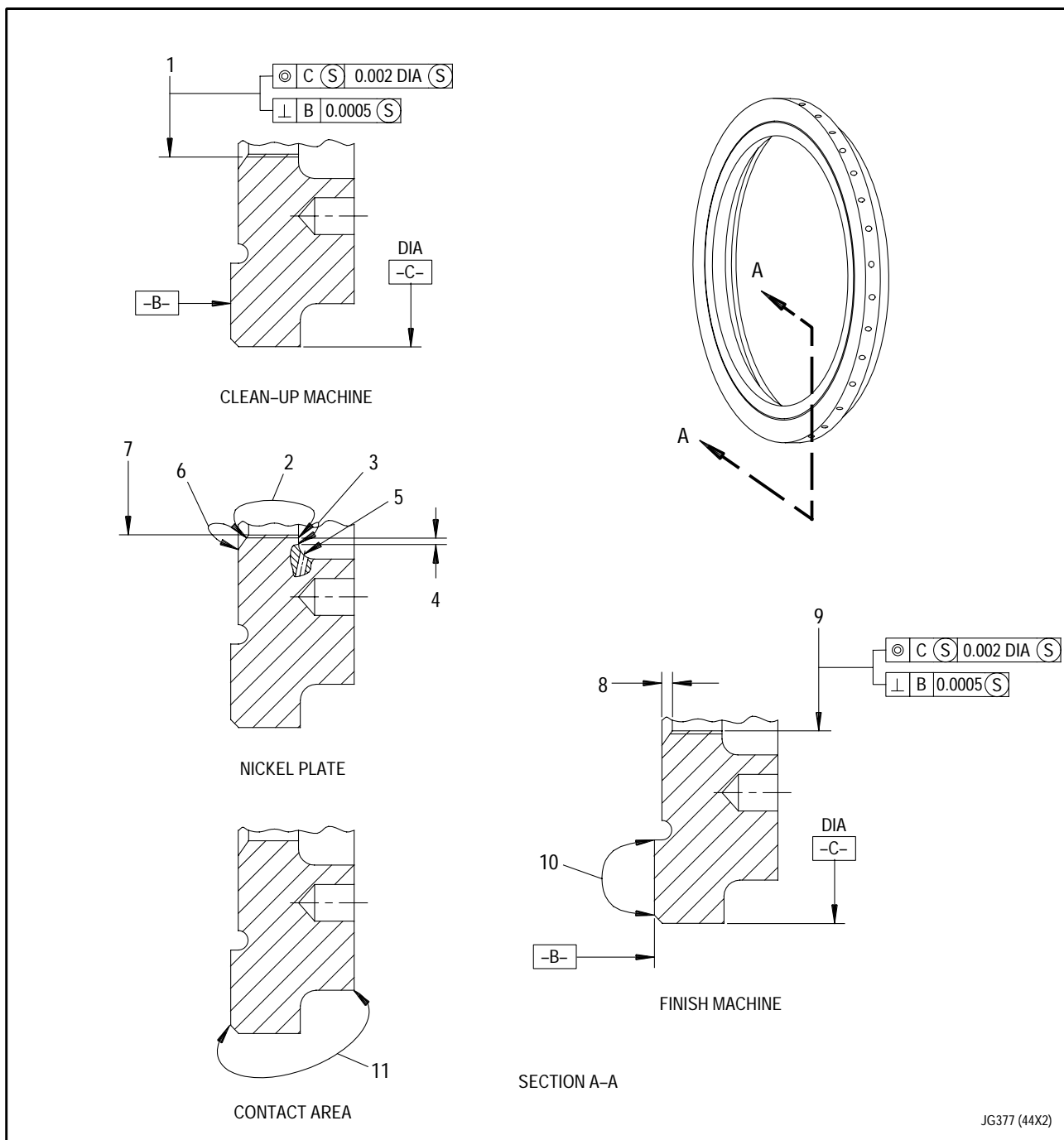


Figure 7. No. 2 Bearing Front Seal Seat - Nickel Plate Repair of Inside Diameter

**4. NO. 2 BEARING FRONT SEAL SEAT
(PN 4001528) - NICKEL PLATE REPAIR OF
FRONT INNER FACE.**

(See Figure 8.)

NOTE

Parent material is AMS 6322 or 6323 steel.

- a. Machine surface(3, figure 8) to dimensions(1 and 2).
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02.

d. Nickel plate area(15) per dimension(13). Refer to T.O. 2J-F100-53-1, SWP 092 11.

e. Machine surface(11) to finish dimensions(8 through 10).

f. Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02. Shallow etch in area near part number.

g. Restore hardface in area(12) if necessary, per paragraph 2.

Legend for figure 8

- 1. This surface to be parallel with Surface B within 0.0005 inch.
- 2. 0.391 to 0.396 inch hold to maximum value.
- 3. Machining surface.
- 4. 4.760 to 4.780 inch diameter
- 5. 0.005 to 0.020 inch radius
- 6. 4.760 to 4.780 inch diameter
- 7. 0.005 to 0.020 inch radius
- 8. This surface to be perpendicular to Diameter A within 0.0005 inch regardless of feature size of Diameter A and parallel to Surface B within 0.0005 inch.
- 9. 0.399 to 0.401 inch
- 10. Chamfer 0.065 to 0.085 inch x 45° ±2°.
- 11. Machining surface.
- 12. Hardface area.
- 13. 0.406 inch minimum
- 14. Plate optional and may be incomplete.
- 15. Nickel plate area.
- 16. Plate optional but shall be removed.
- 17. Electrical contact points permitted in this area only.



**5. NO. 2 BEARING FRONT SEAL SEAT
(PN 4001528) - NICKEL PLATE REPAIR OF
REAR INNER FACE.**

(See Figure 9.)

NOTE

Parent material is AMS 6322 or 6323 steel.

- a. Machine surface(3, figure 9) to dimensions(1 and 2).
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02.

d. Nickel plate area(9) per dimension(4). Refer to T.O. 2J-F100-53-1, SWP 092 11.

e. Machine surface(13) to finish dimensions(11 and 12).

f. Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.

g. Restore hardface in area(14) if necessary, per paragraph 2.

Legend for figure 9

- 1. 0.391 to 0.396 inch, hold to maximum value.
- 2. This surface to be parallel to Surface B within 0.0005 inch.
- 3. Machining surface
- 4. 0.406 inch minimum
- 5. Existing 0.050 to 0.060 inch diameter holes, no plating permitted in holes.
- 6. 0.060 inch two places.
- 7. Plate optional and may be incomplete.
- 8. Existing 0.120 to 0.130 inch diameter hole. No plating permitted in holes.
- 9. Nickel plate area.
- 10. Plate optional and may be incomplete.
- 11. 0.399 to 0.401 inch
- 12. This surface to be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size of Diameter A, and to be parallel with Surface B within 0.0005 inch.
- 13. Machining surface
- 14. Hardface area
- 15. Electrical contact points permitted in this area only.

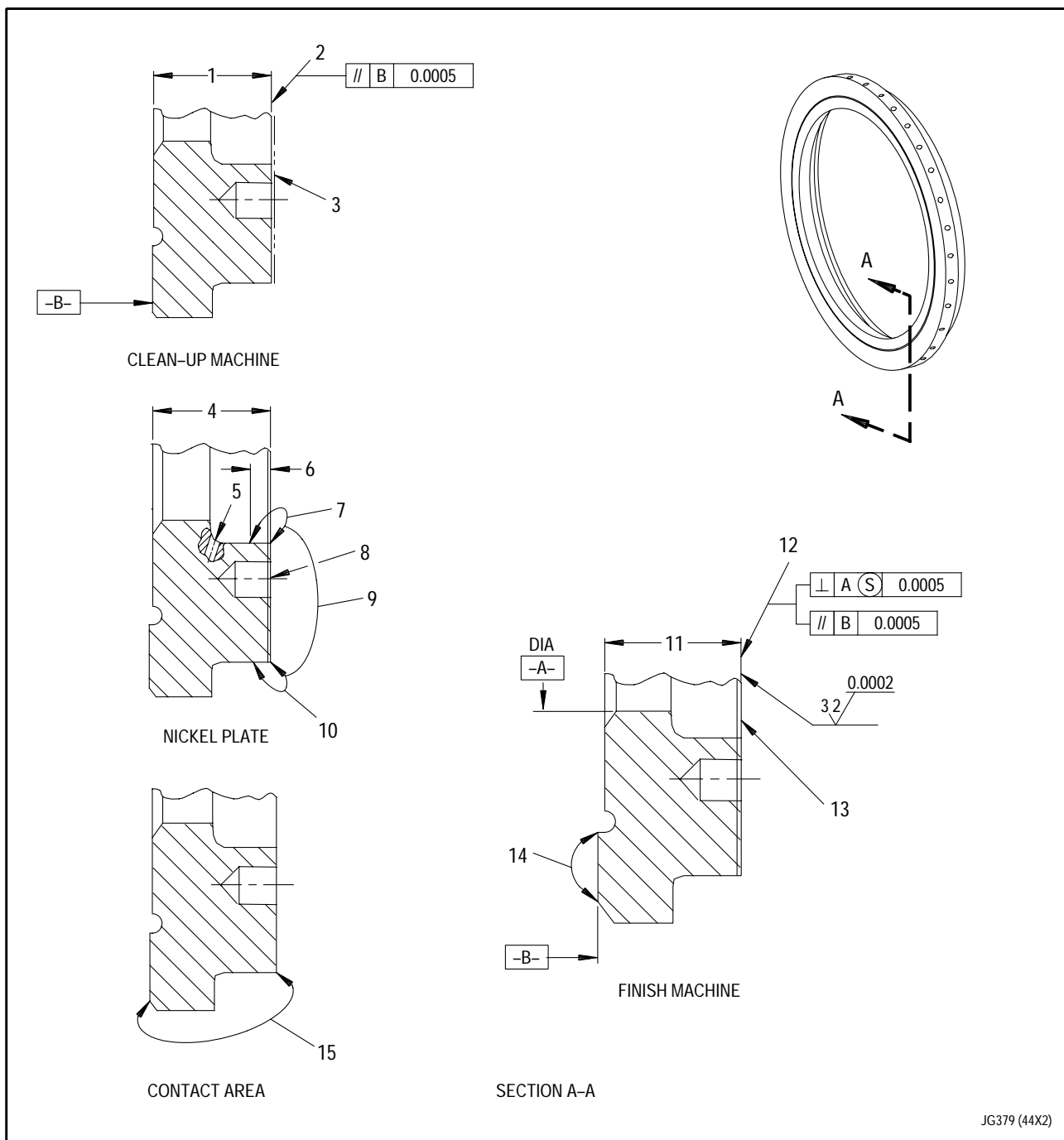


Figure 9. No. 2 Bearing Front Seal Seat - Nickel Plate Repair of Rear Inner Face

**6. NO. 2 BEARING FRONT SEAL SEAT
(PN 4001528) - NICKEL PLATE REPAIR OF
FRONT AND REAR INNER FACES.**

(See Figure 10.)

NOTE

Parent material is AMS 6322 or
6323 steel.

- a. Measure dimension (6, figure 10)
from surface(7) to unworn
area(8) and record value.
- b. Machine entire surface(9) to
dimension(6) plus 0.004 to 0.009
inch. Hold to minimum value.

- c. Machine surface(2) to
dimension(6) plus dimension(5).
- d. Machine Diameter A if required
per paragraph 3.
- e. Fluorescent penetrant inspect.
Refer to T.O. 2-1-111 (SPOP 62).
No cracks allowed.
- f. Vapor degrease. Refer to
T.O. 2J-F100-53-1, SWP 031 02.

NOTE

If repair is required in more than one area, all machining should be done prior to plating.

- g. Nickel plate surface are(29) to dimension(31). Refer to T.O. 2J-F100-53-1, SWP 092 11. No plating permitted in holes.
- h. Nickel plate surface area(24) to dimension(27) plus dimension(6).
- i. Plate Diameter A per paragraph 3 if required.
- j. Machine surface(20) to dimension(33) recorded in step a. ± 0.001 inch and dimensions(12 and 19).
- k. Machine surface(17) to dimension(13).
- l. Machine Diameter A if required per paragraph 3.
- m. Permanently identify with beehive symbol per T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.
- n. Restore hardface on surface(18) if necessary, per paragraph 2.

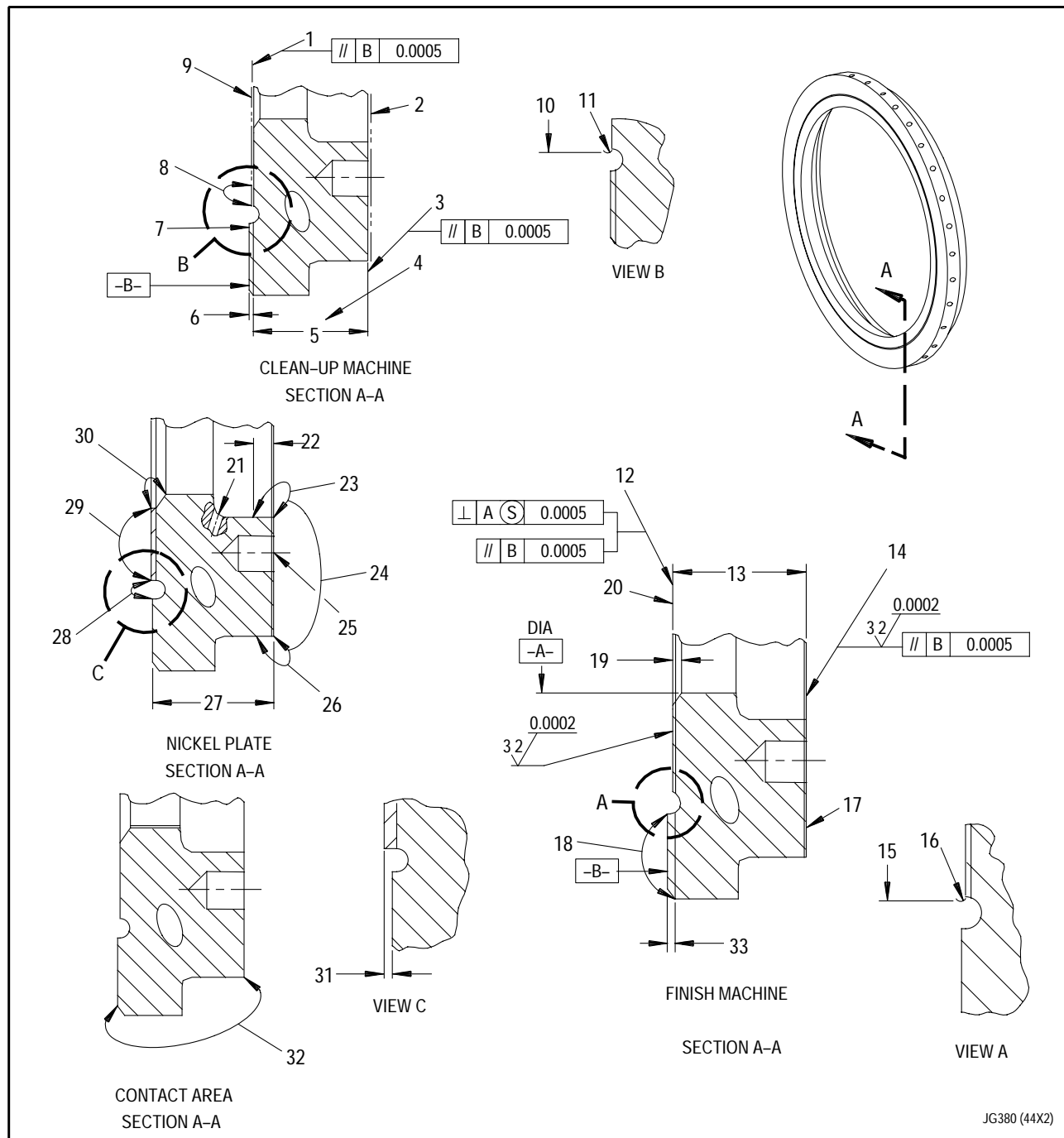


Figure 10. No. 2 Bearing Front Seal Seat - Nickel Plate Repair of Front and Rear Inner Faces

Legend for figure 10

1. This surface shall be parallel to Surface B within 0.0005 inch.
2. Machining surface rear (clean-up).
3. This surface shall be parallel to Surface B within 0.0005 inch.
4. Hold to minimum value.
5. 0.391 to 0.396 inch
6. Dimension to be measured (clean-up machine).
7. Hardface surface reference for clean-up machine.
8. Unworn surface
9. Machining surface front (clean-up)
10. 4.760 to 4.780 inch diameter
11. 0.005 to 0.020 inch radius
12. This surface to be perpendicular to Diameter A within 0.0005 inch
Regardless of Feature Size of Diameter A and parallel to
Surface B within 0.0005 inch.
13. 0.399 to 0.401 inch
14. This surface to be parallel with Surface B within 0.0005 inch.
15. 4.760 to 4.780 inch diameter
16. 0.005 to 0.020 inch radius
17. Machining surface rear (finish).
18. Hardface surface reference for finish machine.
19. Chamfer 0.065 to 0.085 inch x 45° ±2°.
20. Machining surface front (finish).
21. Existing 0.050 to 0.060 inch diameter holes, no plating
permitted in holes.
22. 0.060 inch two places
23. Plate optional and may be incomplete.
24. Nickel plate area rear.
25. Existing 0.120 to 0.130 inch diameter hole, no plating permitted
in holes.
26. Plate optional and may be incomplete.
27. 0.406 inch minimum
28. Plate optional but shall be removed.
29. Nickel plate area front.
30. Plate optional and may be incomplete.
31. 0.002 inch minimum
32. Electrical contact points permitted in this area only.
33. Dimension to be measured (finish machine), see item(6).

**7. NO. 2 BEARING REAR SEAL SEAT
(PN 4001529) - NICKEL PLATE REPAIR OF
INSIDE DIAMETER.**

(See Figure 11.)

NOTE

Parent material is AMS 6322 or 6323 steel.

- a. Machine ID to dimension(1, figure 11).
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02.
- d. Nickel plate area(5) per dimension(4). Refer to T.O. 2J-F100-53-1, SWP 092 11.
- e. Machine ID to finish dimensions(9, 12, and 14).
- f. Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.
- g. Restore hardface in area(13) if necessary, per paragraph 2.

Legend for figure 11

- 1. 4.010 to 4.015 inch diameter concentric with Diameter B within 0.002 inch diameter at Maximum Material Condition and perpendicular with Surface E within 0.0005 inch Regardless of Feature Size. Hold to minimum value.
- 2. 0.045 to 0.055 inch
- 3. 0.005 to 0.020 inch radius
- 4. 3.985 inch diameter maximum
- 5. Nickel plate area
- 6. Plate optional and may be incomplete.
- 7. Existing 0.050 to 0.060 inch diameter holes, no plating in holes.
- 8. Plate optional and may be incomplete.
- 9. 3.9985 to 4.0000 inch diameter concentric with Diameter B within 0.002 inch diameter Regardless of Feature Size and perpendicular to Surface E within 0.0005 inch Regardless of Feature Size.
- 10. 3.955 to 3.965 inch diameter concentric with Diameter A within 0.005 inch diameter at Maximum Material Condition. Finish if necessary.
- 11. 0.045 to 0.055 inch
- 12. 0.005 to 0.020 inch radius
- 13. Hardface area
- 14. Chamfer 0.010 to 0.030 inch x 45° ±5°.
- 15. Electrical contact points permitted in this area only.

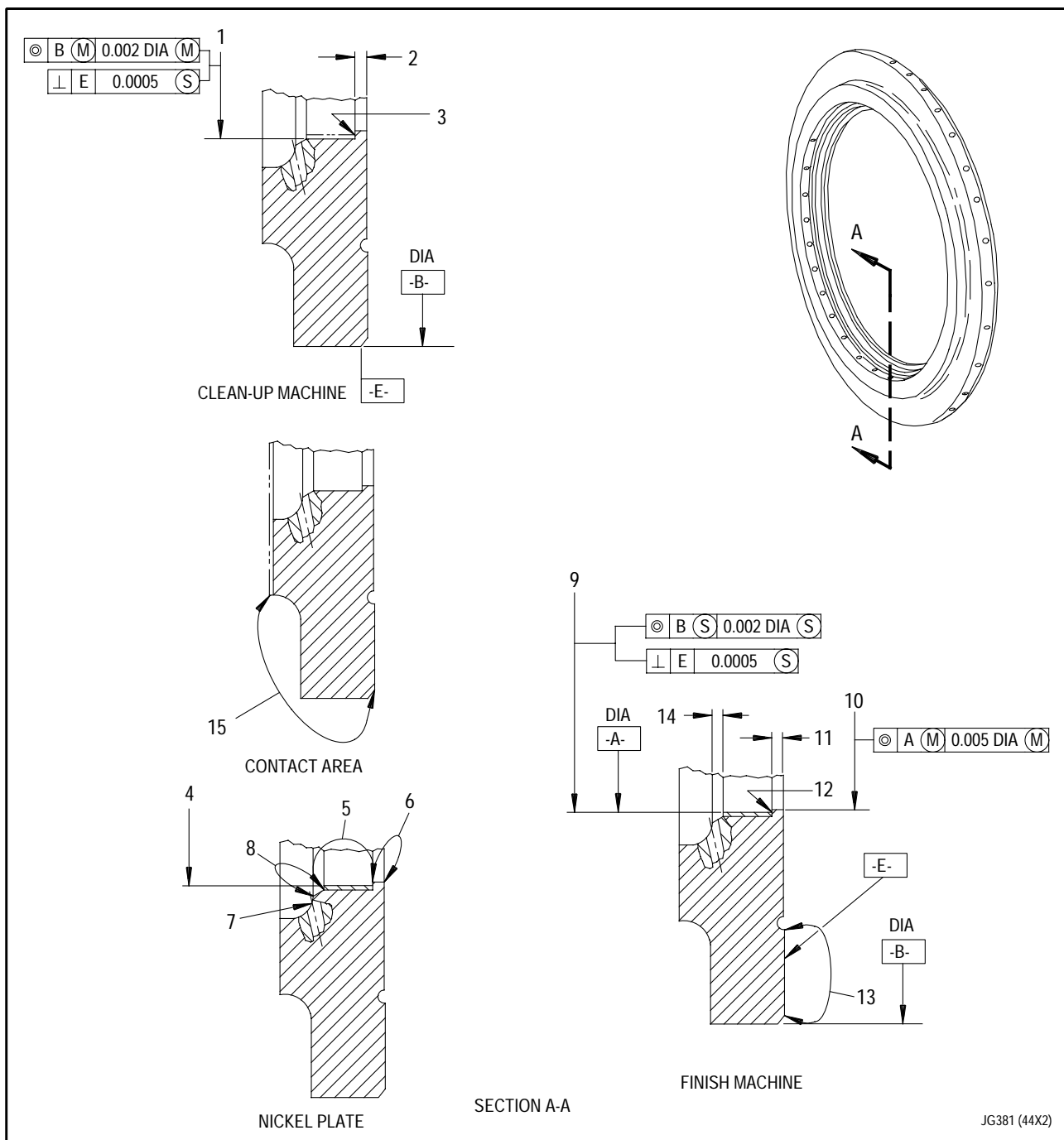


Figure 11. No. 2 Bearing Rear Seal Seat - Nickel Plate Repair of Inside Diameter

**8. NO. 2 BEARING REAR SEAL SEAT
(PN 4001529) - NICKEL PLATE REPAIR OF
FRONT INNER FACE.**

(See Figure 12.)

NOTE

Parent material is AMS 6322 or 6323 steel.

- a. Machine surface(3, figure 12) to dimensions(1 and 2).
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02.

d. Nickel plate area(7) per dimension(4). Refer to T.O. 2J-F100-53-1, SWP 092 11.

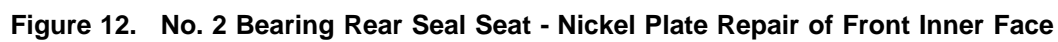
e. Machine surface(12) to finish dimensions(10 and 11).

f. Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.

g. Restore hardface in area(13) if necessary, per paragraph 2.

Legend for figure 12

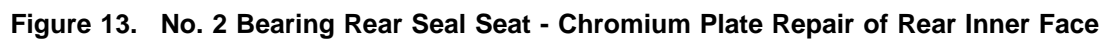
- 1. This surface to be parallel with Surface E within 0.0005 inch.
- 2. 0.374 to 0.377 inch, hold to maximum value.
- 3. Machining surface (clean-up)
- 4. 0.389 inch minimum
- 5. Existing 0.050 to 0.060 inch diameter holes, no plating in holes.
- 6. Plate optional and may be incomplete.
- 7. Nickel plate area
- 8. Plate optional and may be incomplete.
- 9. 0.060 inch, two places
- 10. This surface to be perpendicular to Diameter A within 0.005 inch Regardless of Feature Size and parallel with Surface E within 0.0005 inch.
- 11. 0.380 to 0.384 inch
- 12. Machining surface (finish)
- 13. Hardface area
- 14. Electrical contact points permitted in this area only.



(See Figure 13.)

a. Machine surface(3, figure 13) to dimensions(1 and 2).

Parent material is AMS 6322 or 6323 steel.



Legend for figure 13

1. 0.374 to 0.377 inch, hold to maximum value.
 2. This surface to be parallel with Surface E within 0.0005 inch.
 3. Machining surface (clean-up)
 4. 0.005 to 0.200 inch radius
 5. 4.760 to 4.780 inch diameter
 6. 0.389 inch
 7. Plate optional and may be incomplete
 8. Chromium Plate area
 9. Plate optional but shall be removed.
 10. This surface to be perpendicular to Diameter A within 0.005 inch
Regardless of Feature Size of Diameter A and parallel to
Surface E within 0.0005 inch.
 11. 3.955 to 3.965 inch diameter concentric with Diameter A within
0.005 inch at Maximum Material Condition. Finish if necessary.
 12. Machining surface (finish)
 13. 0.005 to 0.020 inch radius
 14. 4.760 to 4.780 inch diameter concentric with Diameter A within
0.005 inch diameter at Maximum Material Condition.
 15. Hardface area
 16. 0.045 to 0.055 inch
 17. 0.380 to 0.382 inch
 18. Electrical contact points permitted in this area only.
- b. Fluorescent penetrant inspect.
Refer to T.O. 2J-F100-9. No
cracks allowed.
- c. Vapor degreaser per
T.O. 2J-F100-53-1, SWP 031 02.
- NOTE**
- Nickel plate shall be done (if
necessary) prior to chromium
plate and is not permitted over
chromium plated surface.
- d. Chromium plate area(8) per
dimension(6). Refer to
T.O. 2J-F100-53-1, SWP 092 06.
- e. Machine surface(12) to finish
dimensions(10, 11, 13, 14, 16
and 17).
- f. Permanently identify with
beehive symbol per
T.O. 2J-F100-53-1, SWP 023 02,
shallow etch in area near part
number.
- g. Restore hardface in area(15) if
necessary, per paragraph 2.

**10. NO. 2 BEARING REAR SEAL SEAT
(PN 4001529) - PLATING REPAIR OF FRONT
AND REAR INNER FACES.**

(See Figure 14.)

NOTE

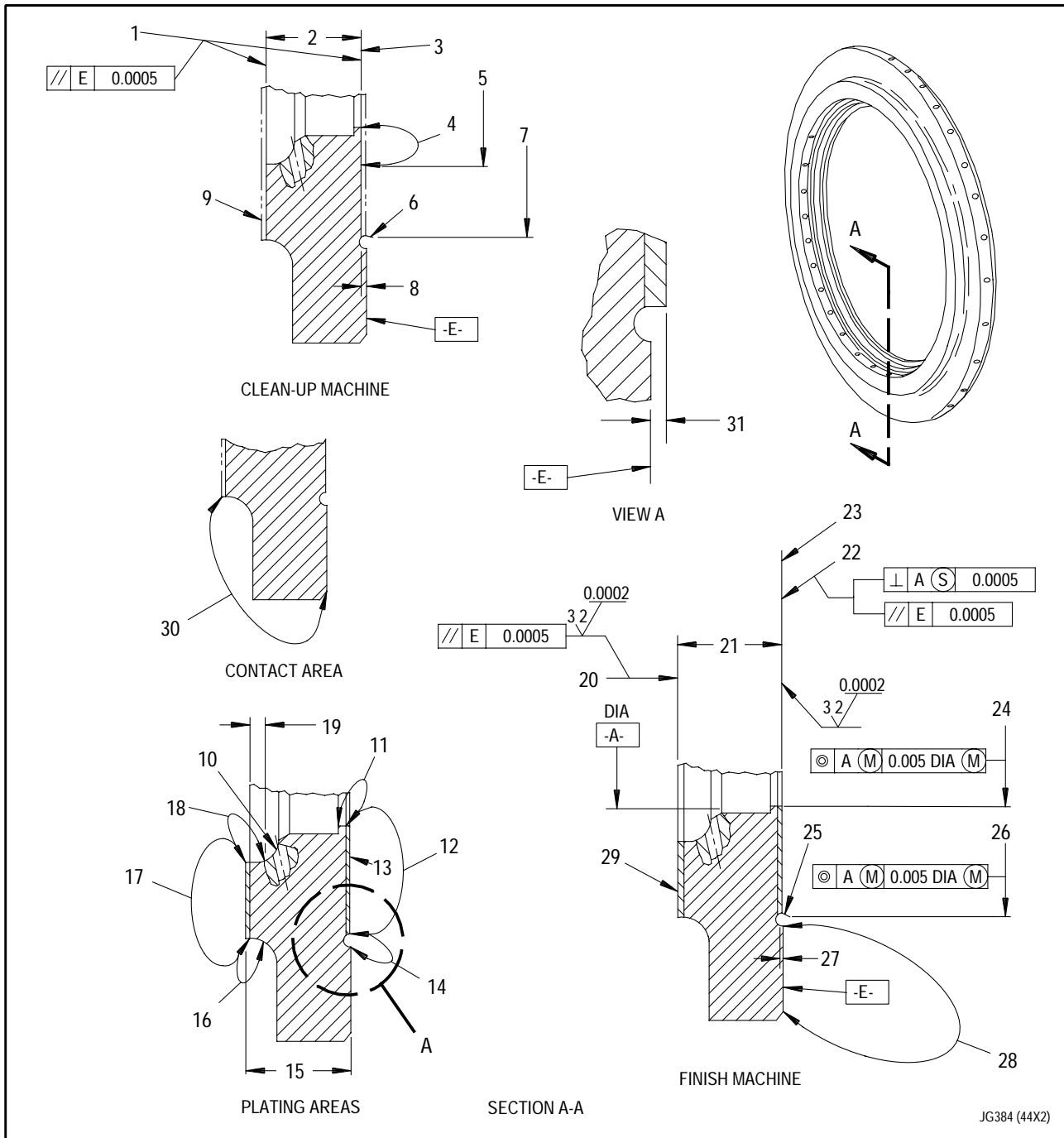
Parent material is AMS 6322 or
6323 steel.

- a. Measure dimension(8, figure 14)
from Surface E to unworn area(4)
and record value.
- b. Machine entire surface(3) to
dimension(8) plus 0.003 to 0.007
inch. Hold to minimum value.

- c. Machine Surface(9) to
dimension(8) plus dimension(2).
- d. Machine Diameter A if required
per paragraph 7.
- e. Fluorescent penetrant inspect.
Refer to T.O. 2J-F100-9.
- f. Vapor degrease per
T.O. 2J-F100-53-1, SWP 031 02.

NOTE

- If repair is required in more than one area, all machining shall be done prior to plating.
- Nickel plate shall be done (if necessary) prior to chromium plate and is not permitted over chromium plated surface.
- g. Nickel plate surface area(17) to dimension(15). Refer to T.O. 2J-F100-53-1, SWP 092 11. No plating permitted in holes.
- h. Chromium plate surface area(12) to dimension(31). Refer to T.O. 2J-F100-53-1, SWP 092 06.
- i. Plate Diameter A per paragraph 7 if required.
- j. Machine surface(23) to dimension(27) recorded in step a. ± 0.001 inch and dimension(22 and 21).
- k. Machine surface(29) to dimensions(20 and 21).
- l. Machine Diameter A if required per paragraph 7 if required.
- m. Permanently identify with beehive symbol per T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.
- n. Restore hardface on surface (28) if necessary, per paragraph 2.



Legend for figure 14

1. This surface shall be parallel to Surface E within 0.0005 inch.
2. 0.374 to 0.378 inch hold to maximum value
3. Machining surface rear (clean-up)
4. Unworn area
5. 4.180 inch diameter maximum
6. 0.005 to 0.020 inch radius
7. 4.760 to 4.780 inch diameter
8. Dimension to be measured during clean-up machine.
9. Machining surface front (clean-up)
10. Existing 0.050 to 0.060 inch diameter holes, no plating permitted in holes.
11. Plate optional and may be incomplete.
12. Chromium plate area. For parts that have been previously repaired, all chrome plate shall be removed from this surface prior to nickel plating for buildup. 0.002 inch maximum parent material removal permitted.
13. Chromium plate over nickel plat if necessary.
14. Plate optional but shall be removed.
15. 0.394 inch minimum.
16. Plate optional and may be incomplete.
17. Nickel plate area
18. Plate optional and may be incomplete.
19. 0.060 inch, two places
20. This surface to be parallel with Surface E within 0.0005 inch.
21. 0.380 to 0.382 inch
22. This surface to be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size and parallel to Surface E within 0.0005 inch.
23. Machining surface rear (finish machine)
24. 3.955 to 3.965 inch diameter concentric with Diameter A within 0.005 inch diameter at Maximum Material Condition. Finish if necessary.
25. 0.005 to 0.020 inch radius
26. 4.760 to 4.780 inch diameter concentric with Diameter A within 0.005 inch diameter at Maximum Material Condition.
27. Dimension to be measured during finish machining. See item 8.
28. Machining surface (finish machining).
29. Hardface area.
30. Electrical contact points permitted in this area only.
31. 0.002 inch minimum.

11. NO. 3 AND 4 BEARING SEAL SEAT ASSEMBLIES - PIN REPLACEMENT.

(See Figures 15 through 17 and 18A.)

NOTE

This repair applies to standard size pins PNs 4022667 and MS171432 and oversize pins PNs 4059198 and MS171462.

- a. Replace pins(1, figure 15 or 16) in No. 3 bearing front or rear seal seat assembly as follows:

- (1) Drill out pins and remove using standard shop tools.

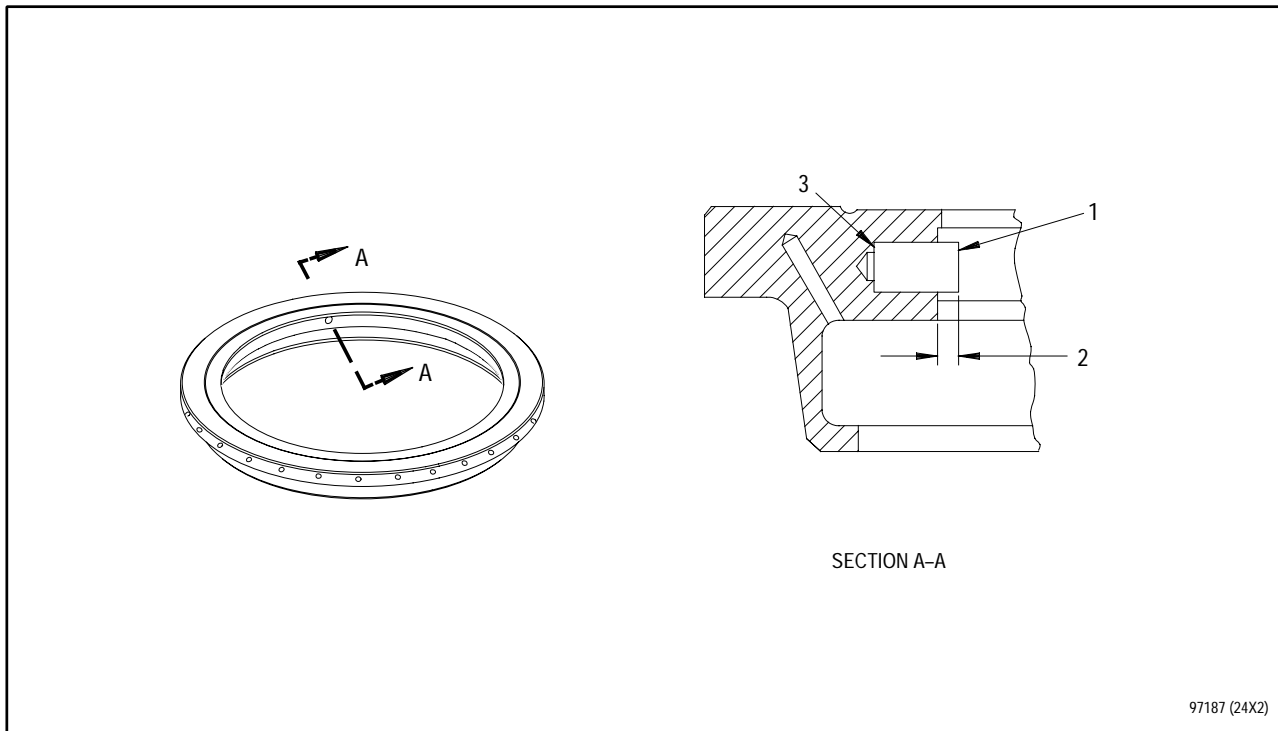
- (2) Determine part number of replacement pins as follows:

- (a) Measure pin hole diameter in seal seat using standard small hole gages or equivalent.

- (b) If hole nominal diameter is 0.1240 inch, select standard size pin PN 4022667. If hole nominal diameter is 0.1380 inch, select oversize pin PN 4059198.

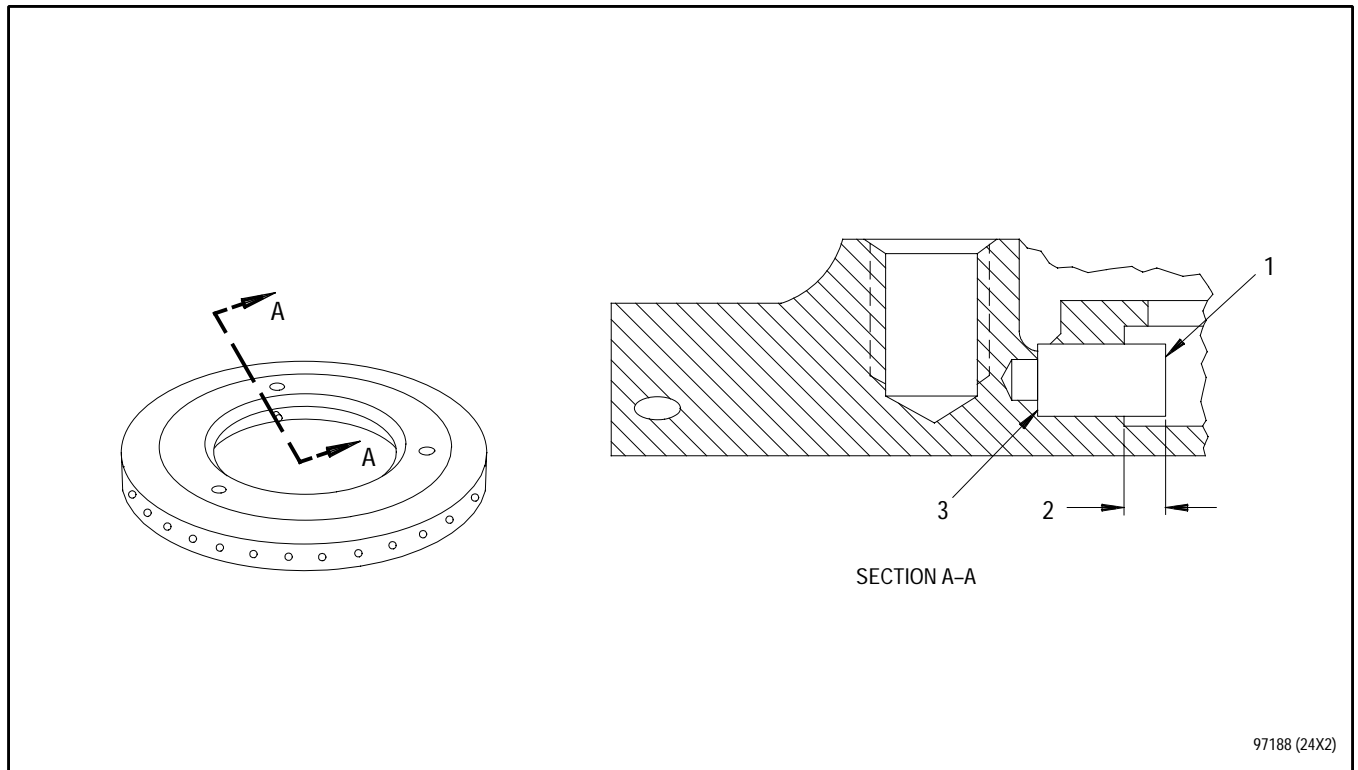
- (3) Chill replacement pins in dry ice for 20 minutes minimum.

- (4) Install pins to bottom in hole using brass mallet. Verify installed dimension(2, figure 15 or 16).



1. Pin PN 4022667 or 4059198 (oversize), 2 required
2. 0.060 inch maximum
3. Pin must bottom

Figure 15. No. 3 Bearing Front Seal Seat Assembly (PN 4022669) - Pin Replacement

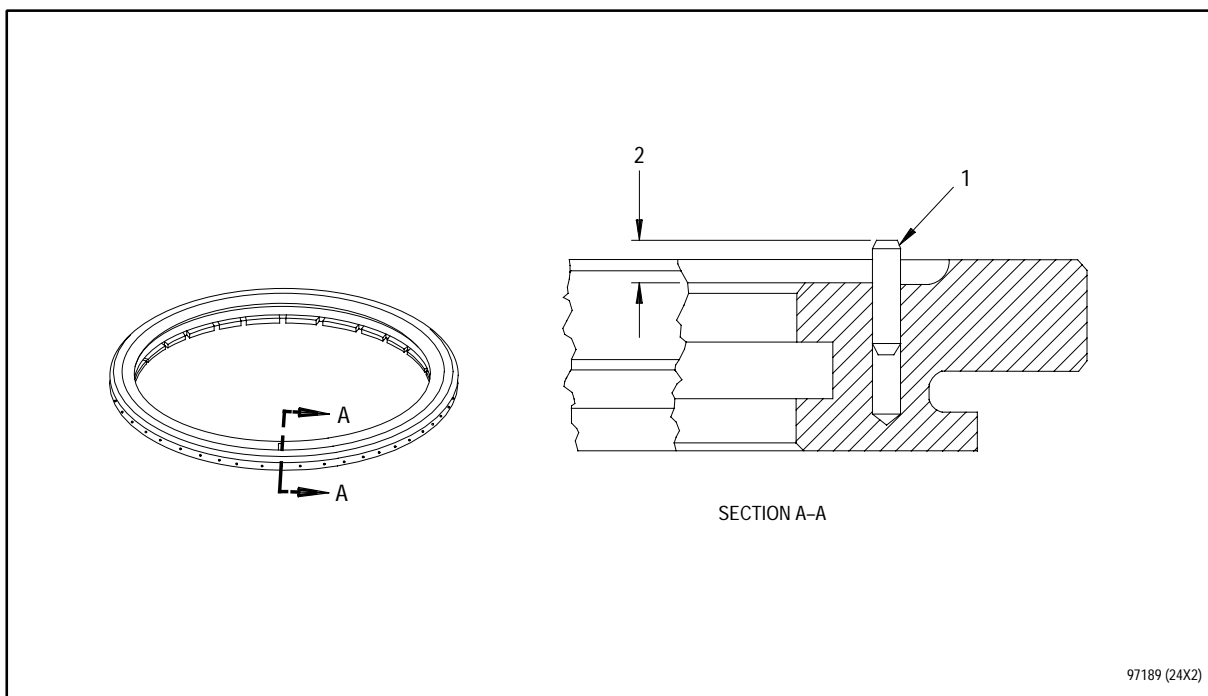


1. Pin PN 4022667 or 4059198 (oversize), 2 required
2. 0.080 inch maximum
3. Pin must bottom

Figure 16. No. 3 Bearing Rear Seal Seat Assembly (PN 4022668) - Pin Replacement

- b. Replace pin(1, figure 17) in No. 4 bearing front seal seat assembly as follows:
- (1) Install front seal seat assembly in PWA 71552 fixture(3, figure 18A) as follows.
 - (a) Loosen hand knobs(4) and slide clamps(5) outward.
 - (b) Install front seal seat assembly(1) on base of fixture with pin(2) facing up. Secure in place using clamps(5) and hand knobs(4).
 - (2) Remove pin(2) using PWA 71537 adapter(9) as follows:
 - (a) Rotate plunger(7) counterclockwise to open jaws(6).
 - (b) Install adapter over pin so that pin fits inside jaws. Rotate plunger clockwise to clamp jaws onto pin.
 - (c) Remove pin from seal seat assembly using slide hammer(8).
 - (d) Rotate plunger counterclockwise to open jaws. Remove and discard pin.

- (3) Determine part number of replacement pin as follows:
 - (a) Measure pin hole diameter using standard small hole gages or equivalent.
 - (b) If hole nominal diameter is 0.0635 inch, select standard size pin PN MS171432. If hole nominal diameter is 0.0795 inch, select oversize pin PN MS171462.
- (4) Chill replacement pin in dry ice for 20 minutes minimum.
- (5) Install pin(1, figure 17) to depth(2) using brass mallet.
- (6) Remove seal seat assembly from PWA 71552 fixture.

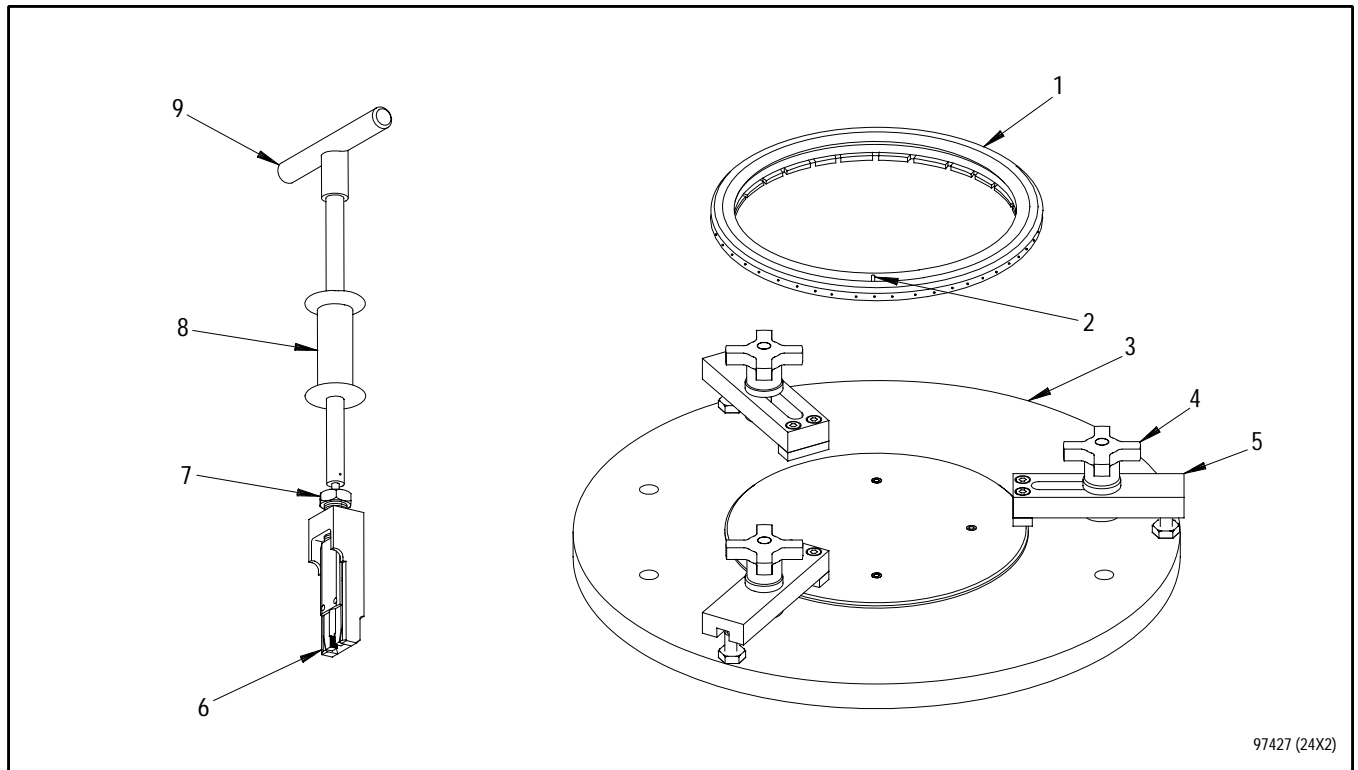


1. Pin PN MS171432 or MS171462 (oversize)
2. 0.090 to 0.110 inch

Figure 17. No. 4 Bearing Front Seal Seat Assembly (PN 4032669) - Pin Replacement

Figure 18. Deleted.

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1. Seal seat assembly
2. Pin
3. PWA 71552 fixture
4. Hand knob
5. Clamp
6. Jaws
7. Plunger
8. Slide hammer
9. PWA 71537 adapter

Figure 18A. No. 4 Bearing Front Seal Seat Assembly - Pin Replacement

**12. NO. 3 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4022669) - PLATING REPAIR.**

(See Figure 19.)

NOTE

Dimension(5, figure 19) can be restored by plating either Surface A or Surface B or both surfaces, depending on need. If both surfaces require repair, each shall be machined, plated, and finish machined completely before proceeding with the opposite surface. Nickel plating shall be done (if necessary) prior to chromium plating and is not permitted over chromium plating surface. Parent material is AMS 6322 with hardness of Rockwell C35 to 40, or equivalent.

a. Repair Surface A as follows:

- (1) Machine Surface A to dimensions(4 and 5).

- (2) Chromium plate(13) Surface A. Refer to T.O. 2J-F100-53-1, SWP 092 06.

- (3) Finish machine Surface A to dimensions(4 and 5), maintaining surface finish indicated.

b. Repair Surface B as follows:

- (1) Machine Surface B to dimensions(5 and 9).
- (2) Nickel plate (3) Surface B to dimensions(5 and 10). Refer to T.O. 2J-F100-53-1, SWP 092 11. After plating, bake at 375°±11°F (191° ±5.6°C).
- (3) Finish machine Surface B to dimensions(5, 8, and 9) maintaining surface finish indicated.

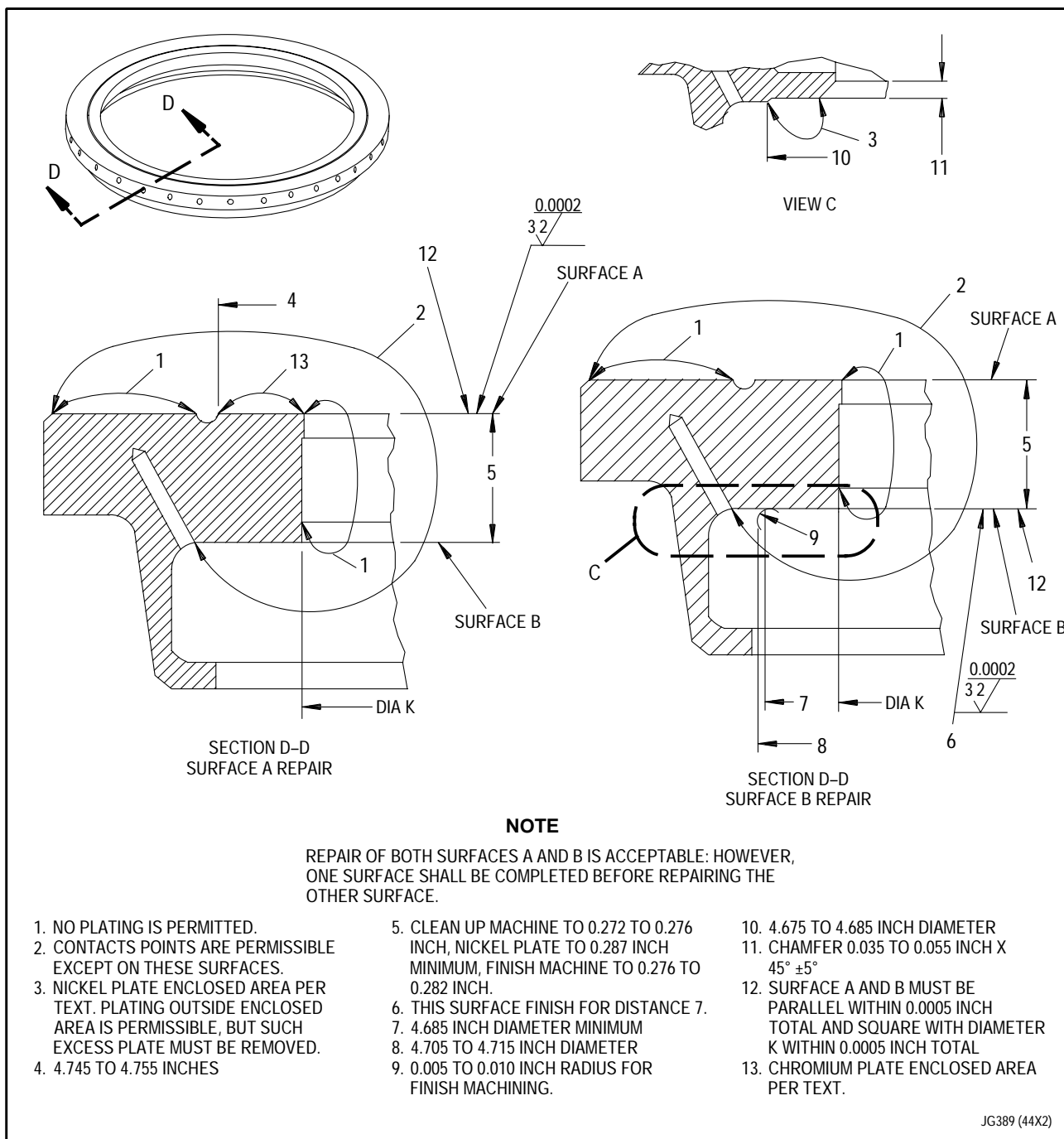


Figure 19. No. 3 Bearing Front Seal Seat Assembly - Plating Repair (PN 4022669)

**13. NO. 3 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4022669) - NICKEL PLATE
REPAIR OF INSIDE DIAMETER.**

(See Figure 20.)

- a. Remove pin, if present, per paragraph 11.
- b. Inspect pin hole. If damaged, repair per paragraph 16.

NOTE

Parent material is AMS 6322 or
AMS 6323 steel.

- c. Machine to before plate dimensions(1, 2, and 3, figure 20). If necessary, remove previous chrome plate from Area 6. 0.002 inch maximum parent material removal permitted.
- d. Fluorescent penetrant inspect per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- e. Clean per SPOP 209, Method A. Refer to T.O. 2-1-111.
- f. Nickel plate area(7) per dimension(5). Refer to T.O. 2J-F100-53-1, SWP 092 11. No plate permitted in holes.
- g. Machine to final dimensions(8 through 12).
- h. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02.
- i. Install new pin per paragraph 11.
- j. Restore hardface in area(13) if necessary per paragraph 2.

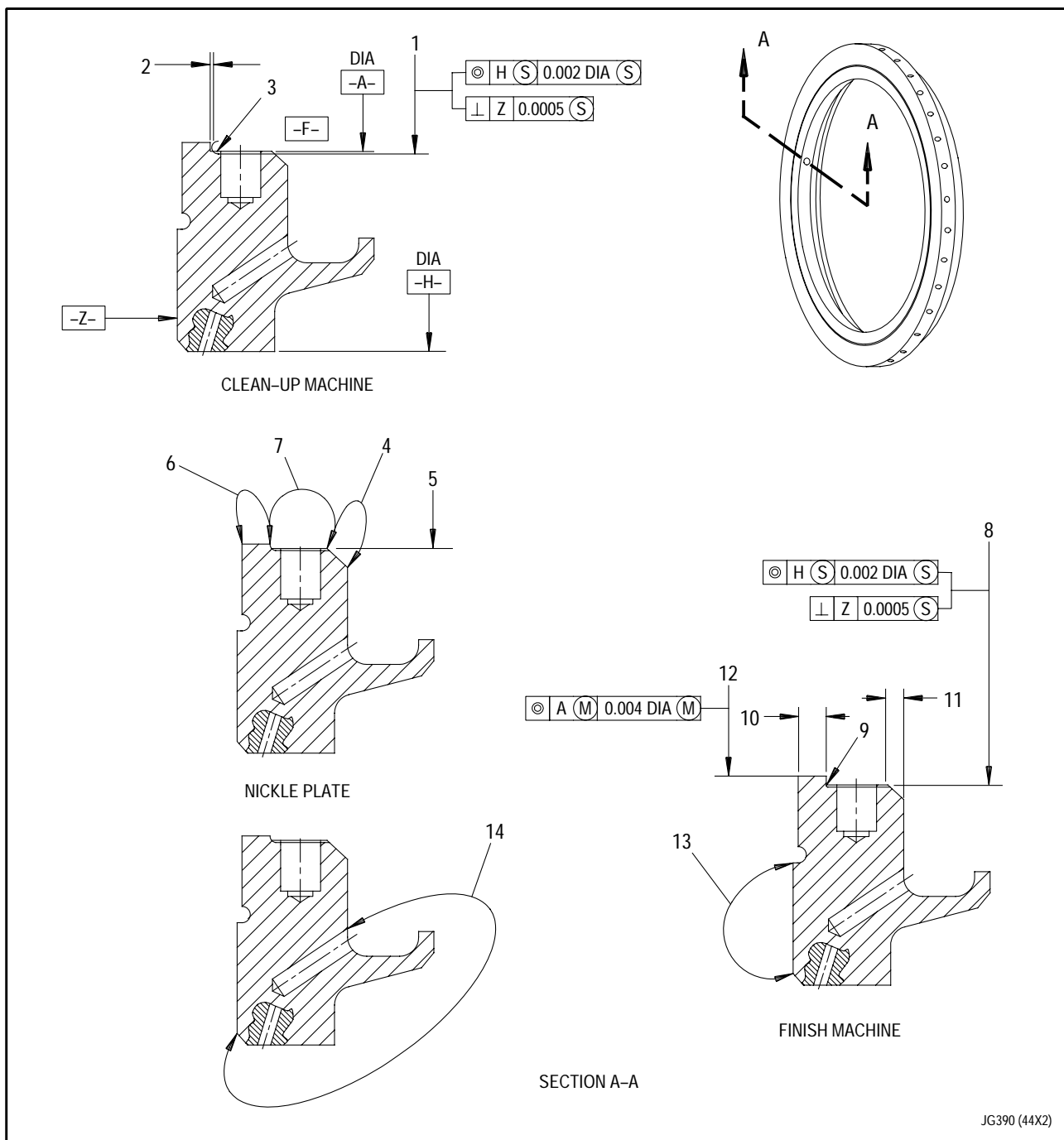


Figure 20. No. 3 Bearing Front Seal Seat Assembly - Nickel Plate Inside Diameter Repair

Legend for figure 20

1. 4.331 to 4.336 inch diameter, hold to minimum value. This diameter to be concentric with Diameter H within 0.002 inch diameter Regardless of Feature Size. Also, perpendicular to Surface Z within 0.0005 inch Regardless of Feature Size.
2. 0.001 to 0.005 inch
3. 0.005 to 0.020 inch radius
4. Plate optional and may be incomplete.
5. 4.306 inch diameter maximum
6. Plate optional and may be incomplete.
7. Nickel plate area
8. 4.320 to 4.321 inch diameter concentric with Diameter H within 0.002 inch diameter Regardless of Feature Size. Also perpendicular with Surface Z within 0.0005 inch Regardless of Feature Size.
9. 0.005 to 0.020 inch
10. 0.040 to 0.060 inch
11. Chamfer 0.035 to 0.055 inch x 45° ±5°.
12. 4.280 to 4.290 inch diameter finish if required. This diameter to be concentric with Diameter A within 0.004 inch diameter at Maximum Material Condition.
13. Hardface surface
14. Electrical contact points permitted in this area only.

**14. NO. 3 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4022669) - CHROMIUM PLATE
REPAIR OF FRONT INNER FACE.**

(See Figure 21.)

NOTE

Parent material is AMS 6322 or
6323 steel.

- a. Machine surface(5, figure 21) to dimensions(1, 2, and 3). If necessary, remove previous chrome plate from area(7). 0.002 inch maximum parent material removed permitted.
- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 62). No cracks allowed.
- c. Vapor degrease per
T.O. 2J-F100-53-1, SWP 031 02.

NOTE

In area(7) nickel plate shall be done prior to chromium plate and is not permitted over chromium plate surface. See paragraph 13.

- d. Chromium plate surface(9) to dimension(6) per
T.O. 2J-F100-53-1, SWP 092 06.
No plating permitted in holes.
- e. Machine to final dimensions(10, 11, and 12).
- f. Permanently identify with beehive symbol per
T.O. 2J-F100-53-1, SWP 023 02,
shallow etch in area near part number.
- g. Restore hardface in area(13) if necessary per paragraph 2.

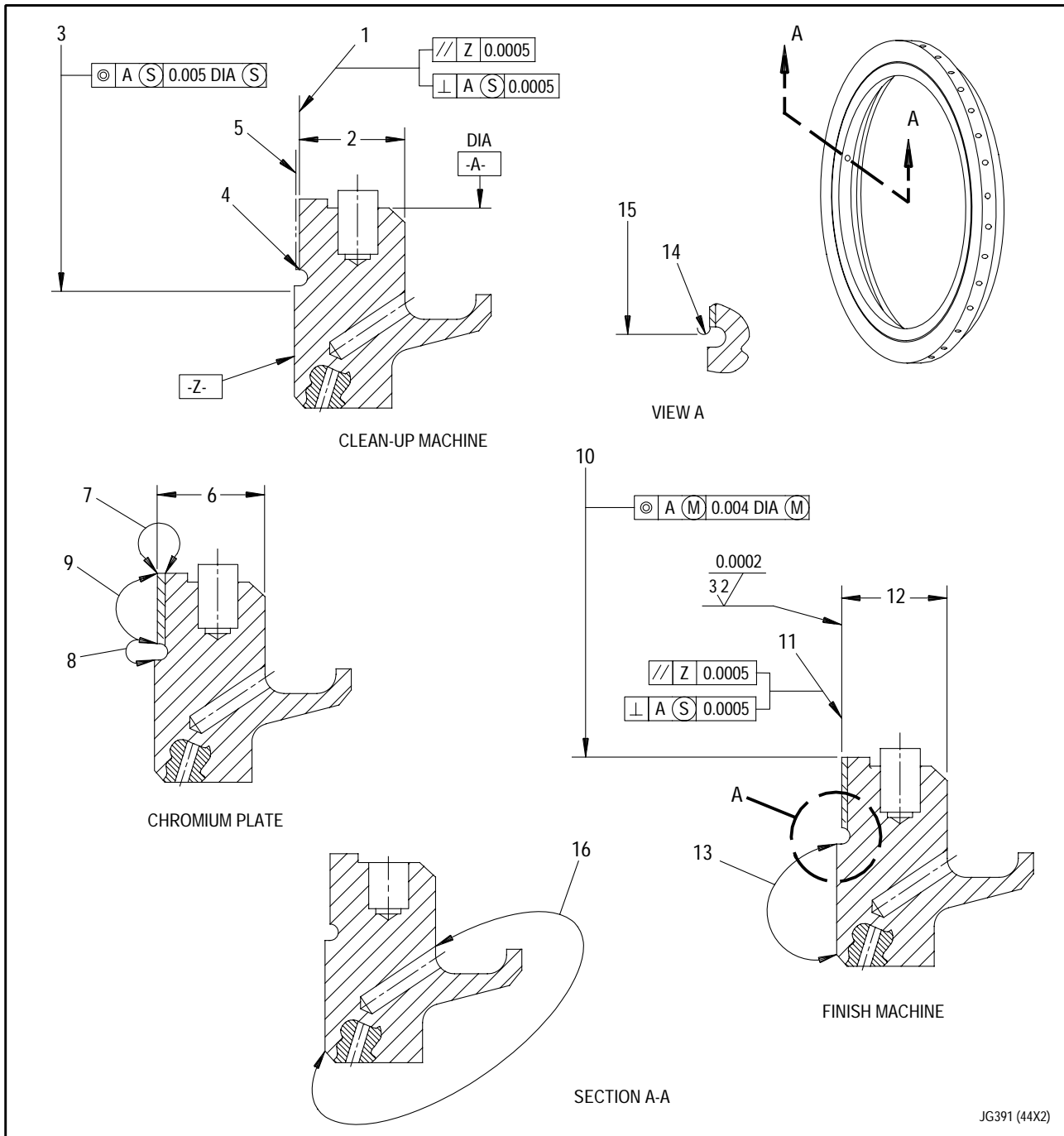


Figure 21. No. 3 Bearing Front Seal Seat Assembly - Chromium Plate Repair of Front Inner Face

Legend for figure 21

1. This surface to be parallel with Surface Z within 0.0005 inch and perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size.
2. 0.2725 to 0.2760 inch, hold to maximum value.
3. 4.740 to 4.750 inch diameter concentric with Diameter A within 0.005 inch diameter Regardless of Feature Size.
4. 0.005 to 0.020 inch radius
5. Machining surface.
6. 0.287 inch minimum
7. Plate optional and may be incomplete.
8. Plate optional but shall be removed.
9. Chromium Plate area.
10. 4.280 to 4.290 inch diameter finish if required. This diameter to be concentric with Diameter A within 0.004 inch diameter at Maximum Material Condition.
11. This surface to be parallel with Surface Z within 0.0005 inch and perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size.
12. 0.278 to 0.280 inch
13. Hardface surface.
14. 0.005 to 0.020 inch radius
15. 4.770 to 4.780 inch diameter
16. Electrical contact points permitted in this area only.

**15. NO. 3 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4022669) - NICKEL PLATE
REPAIR OF REAR INNER FACE.**

(See Figure 22.)

NOTE

Parent material is AMS 6322 or
6323 steel.

- a. Machine surface(3, figure 22) to
dimensions(1, 2, 4 and 5).
- b. Fluorescent penetrant inspect.
Refer to T.O. 2-1-111 (SPOP 62).
No cracks allowed.
- c. Vapor degrease per
T.O. 2J-F100-53-1, SWP 031 02.

d. Nickel plate area(8) per
dimension(6). Refer to
T.O. 2J-F100-53-1, SWP 092 11.
No plate permitted in holes.

e. Machine to final dimensions(9
through 15).

f. Permanently identify with
beehive symbol per
T.O. 2J-F100-53-1, SWP 023 02,
shallow etch in area near part
number.

g. Restore hardface in area(16) if
necessary per paragraph 2.

Legend for figure 22

- 1. 4.685 to 4.695 inch diameter concentric with Diameter A within
0.005 inch diameter at Maximum Material Condition.
- 2. 0.005 to 0.020 inch radius
- 3. Machining surface
- 4. 0.272 to 0.275 inch, hold to maximum value.
- 5. This surface shall be parallel with Surface Z within
0.0005 inch. Also, perpendicular with Diameter A within
0.0005 inch Regardless of Feature Size.
- 6. 0.287 inch minimum
- 7. Plate optional and may be incomplete.
- 8. Nickel plate area
- 9. This surface shall be perpendicular with Diameter A within
0.0005 inch Regardless of Feature Size. Also, parallel with
Surface Z within 0.0005 inch.
- 10. 4.685 inch minimum diameter.
- 11. 4.705 to 4.715 inch diameter concentric with Diameter A within
0.005 inch diameter at Maximum Material Condition.
- 12. 0.005 to 0.020 inch radius
- 13. Chamfer 0.035 to 0.055 inch x 45° ±5°.
- 14. 0.278 to 0.282 inch
- 15. For distance(10)
- 16. Hardface surface
- 17. Electrical contact points permitted in this area only.

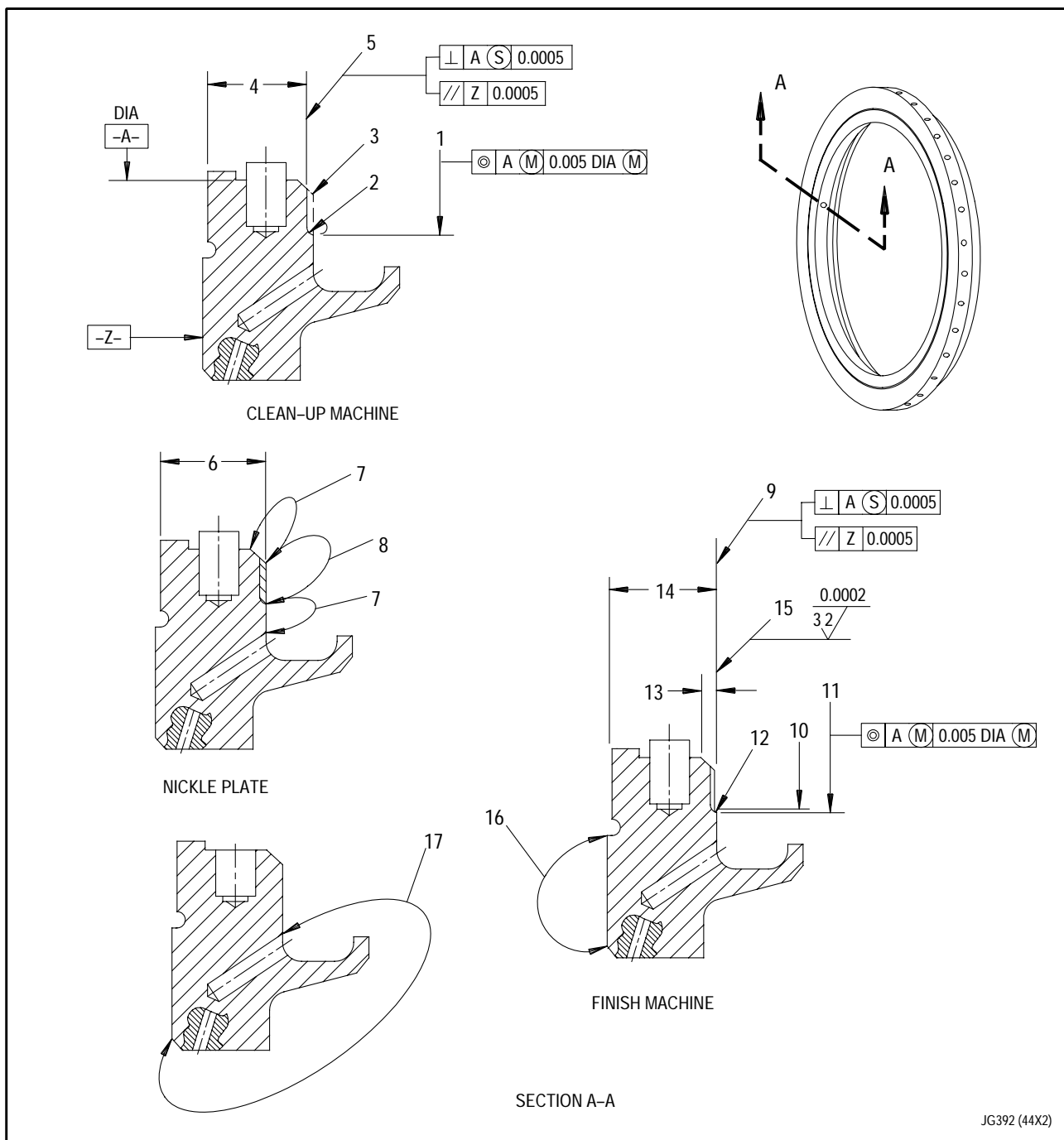


Figure 22. No. 3 Bearing Front Seal Seat Assembly - Nickel Plate Repair of Rear Inner Face

**16. NO. 3 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4022669) - DOWEL PIN HOLE
REPAIR.**

(See Figure 23.)

NOTE

This repair applies to pin
PN 4022667 only.

- a. Remove PN 4022667 pin(1,
figure 23) per paragraph 11.
- b. Machine hole to diameter(4).
- c. Install new PN 4059198 pin(5) to
dimension shown per paragraph
11. Pin must bottom out in
hole.

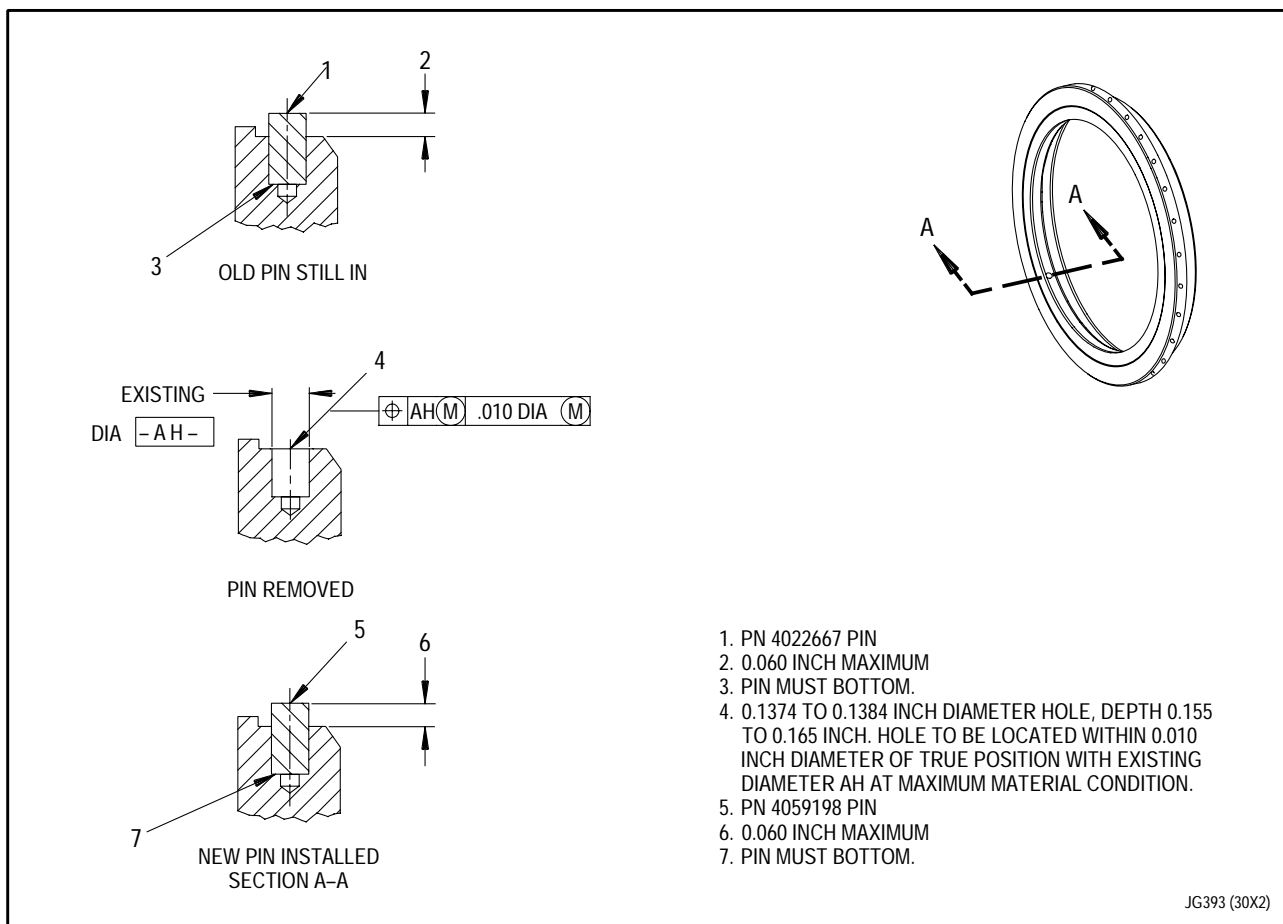


Figure 23. No. 3 Bearing Front Seal Seat Assembly - Dowel Pin Hole Repair

**17. NO. 3 BEARING REAR SEAL SEAT
ASSEMBLY (PN 4022668) - NICKEL PLATE
REPAIR OF INSIDE DIAMETER.**

(See Figure 24.)

- a. Remove pin(14, figure 24), if present, per paragraph 11.

NOTE

Parent material is AMS 6322 or AMS 6323 steel.

- b. Machine ID to dimensions(1, 3 and 4).
- c. Fluorescent penetrant inspect per SPOP 62. Refer to T.O. 2-1-111. No cracks allowed.
- d. Clean per SPOP 209, Method A. Refer to T.O. 2-1-111.
- e. Nickel plate area(6) per dimension(7). Refer to T.O. 2J-F100-53-1, SWP 092 11. No plating permitted in holes.
- f. Machine to finish dimensions(9 through 13).
- g. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02.
- h. Inspect pin hole(14). If damaged, repair per paragraph 21.
- i. Install pin(14) PN 4022667 per paragraph 11. Pin must bottom out in hole.
- j. Restore hardface in area(2) if necessary, per paragraph 2.

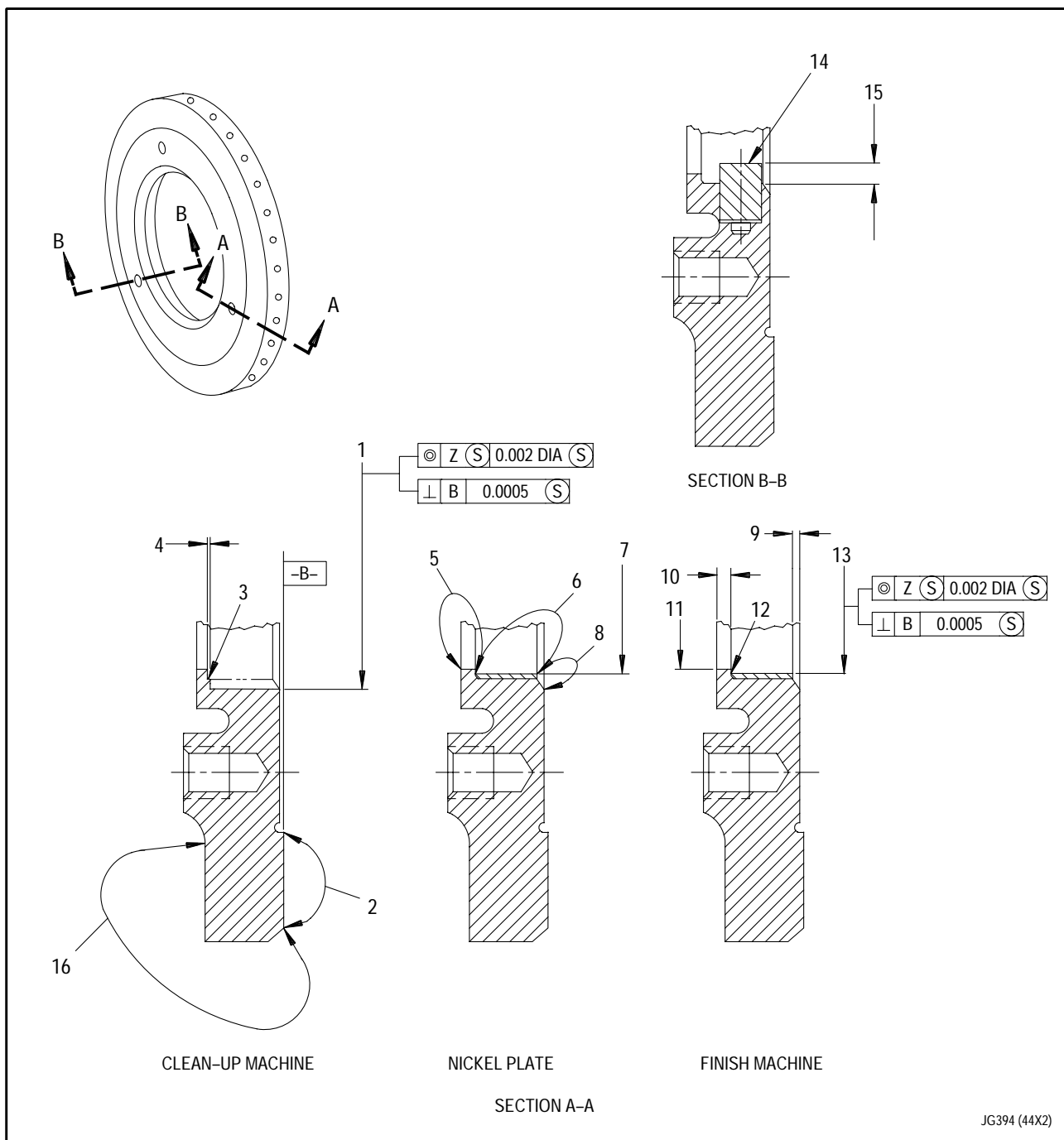


Figure 24. No. 3 Bearing Rear Seal Seat Assembly - Nickel Plate Repair of Inside Diameter

Legend for figure 24

1. 5.610 to 5.615 inches diameter concentric with Diameter Z within 0.002 inch diameter Regardless of Feature Size. Also, perpendicular to Surface B within 0.0005 inch Regardless of Feature Size. Hold to minimum value.
2. Hardface area
3. 0.005 to 0.020 inch radius
4. 0.001 to 0.005 inch
5. Plate optional and may be incomplete.
6. Nickel plate area
7. 5.585 inches diameter maximum
8. Plate optional and may be incomplete.
9. Chamfer 0.030 to 0.050 inch x 45°±2°.
10. 0.050 to 0.060 inch
11. 5.512 to 5.522 inches diameter, finish if necessary.
12. 0.005 to 0.020 inch radius
13. 5.599 to 5.600 inches diameter concentric with Diameter Z within 0.002 inch diameter Regardless of Feature Size. Also, perpendicular to Surface B within 0.0005 inch Regardless of Feature Size.
14. Antirotation pin PN 4022667. Relation of flat on pin to other features not important.
15. 0.080 inch maximum. Pin must bottom.
16. Electrical contact points permitted in this area only.

**18. NO. 3 BEARING REAR SEAL SEAT
ASSEMBLY (PN 4022668) - NICKEL PLATE
REPAIR OF FRONT INNER FACE.**

(See Figure 25.)

NOTE

Parent material is AMS 6322 or
AMS 6323 steel.

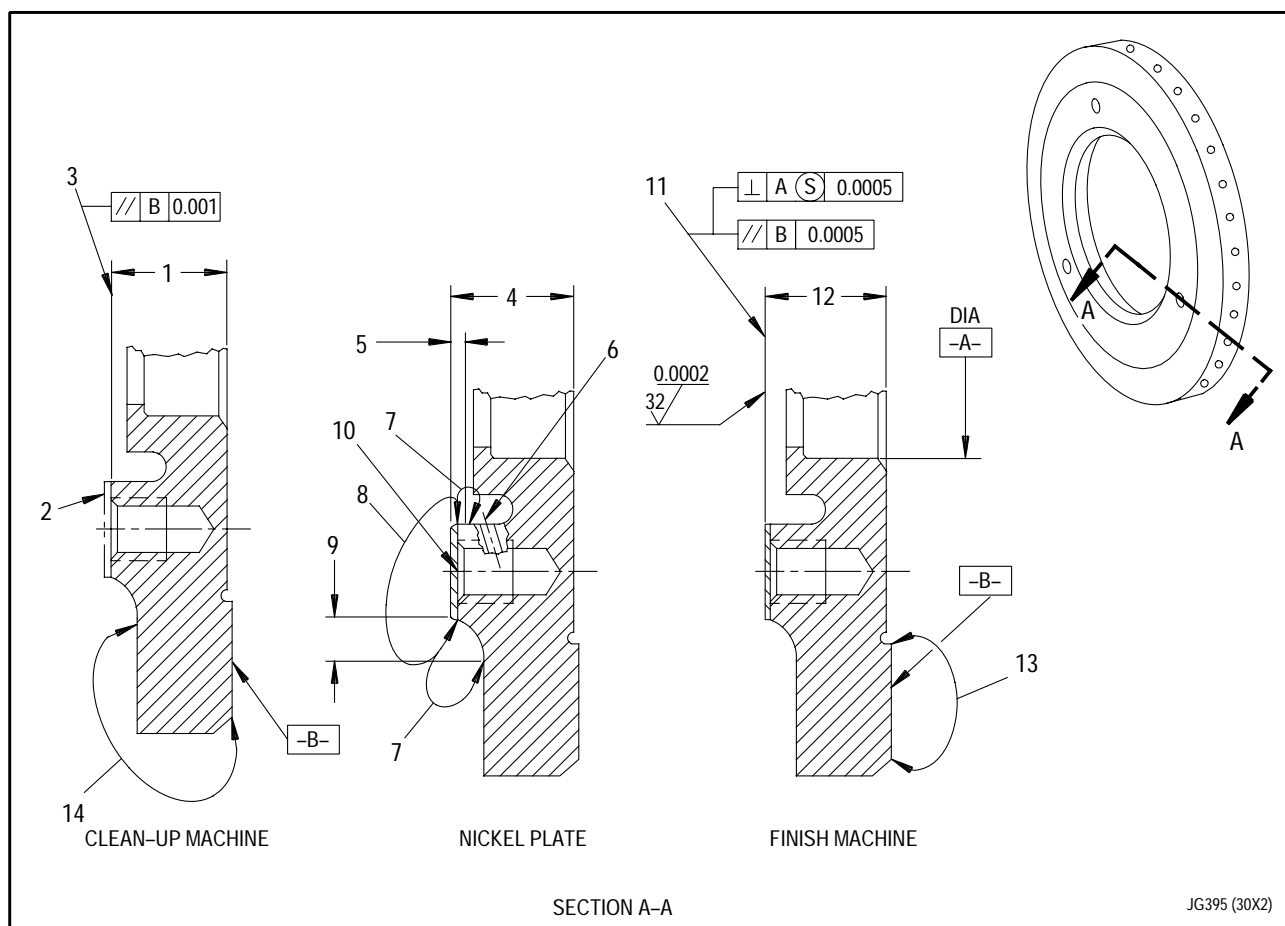
- a. Machine surface(2, figure 25) to dimensions(1 and 2).
- b. Fluorescent penetrant inspect per SPOP 62. Refer to T.O. 2-1-111. No cracks allowed.
- c. Clean per SPOP 209, Method A. Refer to T.O. 2-1-111.

d. Nickel plate area(8) per dimension(4). Refer to T.O. 2J-F100-53-1, SWP 092 11. No plating permitted in holes.

e. Machine to final dimensions(11 and 12).

f. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02.

g. Restore hardface in area(13) if necessary, per paragraph 2.



1. 0.351 to 0.356 inch hold to maximum value.
2. Machining surface.
3. This surface shall be parallel to Surface B within 0.001 inch.
4. 0.366 inch minimum
5. 0.100 inch
6. No plate permitted in holes.
7. Plate optional and may be incomplete.
8. Nickel plate area
9. 0.130 inch
10. No plate permitted in holes.
11. This surface to be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size. Also, shall be parallel to Surface B within 0.0005 inch.
12. 0.359 to 0.361 inch
13. Hardface surface
14. Electrical contact points permitted in this area only.

Figure 25. No. 3 Bearing Rear Seal Seat Assembly - Nickel Plate Repair of Front Inner Face

**19. NO. 3 BEARING REAR SEAL SEAT
ASSEMBLY (PN 4022668) - NICKEL PLATE
REPAIR OF REAR INNER FACE.**

(See Figure 26.)

NOTE

Parent material is AMS 6322 or
6323 steel.

- a. Machine surface(2, figure 26) to
dimensions(1, 3 and 4).
- b. Fluorescent penetrant inspect.
Refer to T.O. 2-1-111 (SPOP 62).
No cracks allowed.
- c. Vapor degrease per
T.O. 2J-F100-53-1, SWP 031 02.

d. Nickel plate area(7) per
dimension(5). Refer to
T.O. 2J-F100-53-1, SWP 092 11.
No plating permitted in holes.

e. Machine to final dimensions(9
through 13).

f. Permanently identify with
beehive symbol per
T.O. 2J-F100-53-1, SWP 023 02,
shallow etch in area near part
number.

g. Restore hardface in area(14) if
necessary, per paragraph 2.

Legend for figure 26

- 1. 0.351 to 0.356 inch, hold to maximum value.
- 2. Machining surface
- 3. 6.700 to 6.730 inch diameter concentric with Diameter A
within 0.010 inch diameter at Maximum Material Condition.
- 4. 0.005 to 0.020 inch radius
- 5. 0.366 inch minimum
- 6. Plate optional and may be incomplete.
- 7. Nickel Plate area
- 8. Plate optional but shall be removed.
- 9. 0.359 to 0.361 inch
- 10. This surface shall be perpendicular to Diameter A within
0.0005 inch Regardless of Feature Size and parallel to
Surface B within 0.000 5 inch.
- 11. Chamfer 0.030 to 0.050 inch x 45° ±2°.
- 12. 0.005 to 0.020 inch radius
- 13. 6.700 to 6.730 inch diameter concentric with Diameter A
within 0.010 inch diameter of Maximum Material Condition.
- 14. Hardface surface.
- 15. Electrical contact points permitted in this area only.



**20. NO. 3 BEARING REAR SEAL SEAT
ASSEMBLY (PN 4022668) - NICKEL PLATE
REPAIR OF FRONT AND REAR INNER FACES.**

(See Figure 27.)

NOTE

Parent material is AMS 6322 or
6323 steel.

- a. Measure dimension(6, figure 27)
from surface(5) to unworn
area(2) and record value.
- b. Machine entire surface(1) to
dimension(6) plus 0.004 to 0.009
inch. Hold to minimum value.
- c. Machine surface(8) to
Dimension(7) plus dimension(6).

- d. Fluorescent penetrant inspect.
Refer to T.O. 2-1-111 (SPOP 62).
No cracks allowed.

- e. Vapor degrease per
T.O. 2J-F100-53-1, SWP 031 02.

NOTE

If repair is required in more
than one area, all machining
should be done prior to
plating.

- f. Nickel plate area(17) to
dimension(15). Refer to
T.O. 2J-F100-53-1, SWP 092 11.
No plating permitted in holes.

- g. Nickel plate area(12) to dimension(14) per step f.
- h. Plate Diameter A per paragraph 17, if required.
- i. Machine surface(20) to dimension(22) recorded in step a, ± 0.001 inch and dimensions(21, 23 and 24).
- j. Machine Surface E to dimension(19).
- k. Machine Diameter A, if required, per paragraph 17.
- l. Permanently identify with beehive symbol per T.O. 2J-F100-53-1, SWP 023 02, shallow etch in area near part number.
- m. Restore hardface on surface (26) if necessary per paragraph 2.



Legend for figure 27

1. Machining surface rear.
2. Unworn area
3. 6.700 to 6.730 inch diameter concentric with Diameter A within 0.010 inch diameter at Maximum Material Condition.
4. 0.005 to 0.020 inch radius
5. Hardface area reference for clean-up machine.
6. Dimension measured and clean-up machined per text.
7. 0.351 to 0.356 inch hold to maximum value.
8. Machining surface front.
9. Plate optional and may be incomplete.
10. 0.100 inch, two places
11. No plate permitted in holes.
12. Nickel plate area front.
13. Plate optional and may be incomplete.
14. 0.366 inch minimum
15. 0.002 inch minimum
16. Plate optional but shall be removed.
17. Nickel plate area
18. This surface to be parallel to Surface B within 0.0005 inch.
19. 0.359 to 0.361 inch
20. Machining surface to be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size. Also, parallel to Surface B within 0.0005 inch.
21. Chamfer 0.030 to 0.050 inch x 45° $\pm 2^\circ$.
22. Dimension measured and finished machined per text.
23. 6.700 to 6.730 inch diameter concentric with Diameter A within 0.010 inch diameter at Maximum Material Condition.
24. 0.005 to 0.020 inch radius
25. Hardface area reference for finish machine.
26. Electrical contact points permitted in this area only.

**21. NO. 3 BEARING REAR SEAL SEAT
ASSEMBLY (PN 4022668) - DOWEL PIN HOLE
REPAIR.**

(See Figure 28.)

NOTE

This repair applies to pin
PN 4022667 only.

- a. Remove old PN 4022667 pin(1,
figure 28) per paragraph 11.
- b. Machine hole to diameter(3).
- c. Install new PN 4059198 pin(4) to
dimension(5) per paragraph 11.
Pin must bottom out in hole.

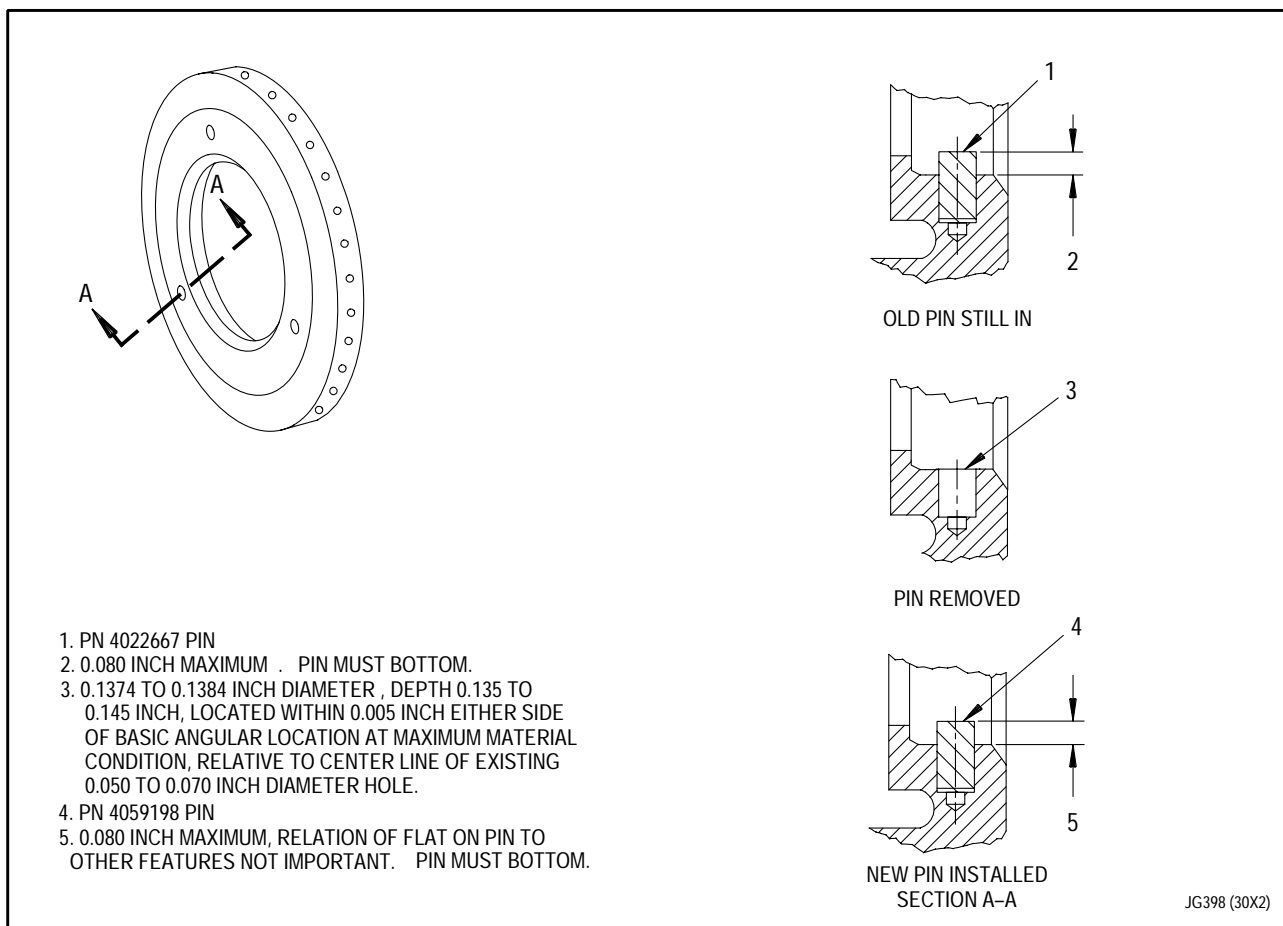


Figure 28. No. 3 Bearing Rear Seal Seat Assembly - Dowel Pin Hole Repair

**22. NO. 2, 3, AND 4 BEARING SEAL SEATS
AND PINS - BLEND REPAIR.**

- a. Remove high metal in damaged seat areas using file or fine stone.
- b. Blend nicks and dents in damaged seat areas using crocus cloth or fine sandpaper.
- c. Blend nicks and scratches to a smooth surface on seat assembly pins using crocus cloth or fine sandpaper.

**23. NO. 4 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4032669) - NICKEL PLATE
INSIDE DIAMETER REPAIR.**

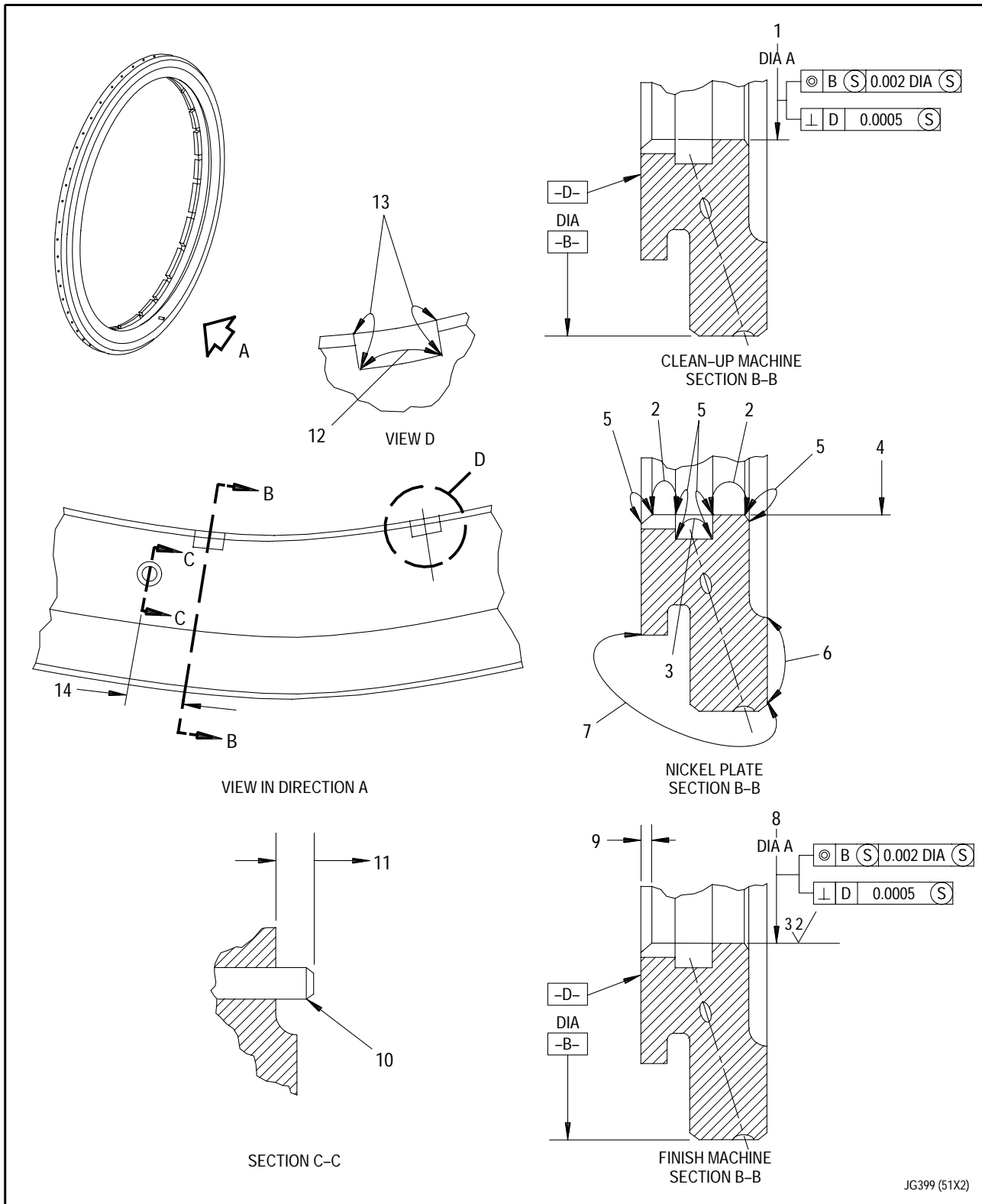
(See Figure 29.)

- a. Remove PN MS171432 pin(10,
figure 29) per paragraph 11.

NOTE

Parent material is AMS 6322 or
AMS 6323 steel.

- b. Machine Diameter A to
dimension(1).
- c. Fluorescent penetrant inspect
machined area per SPOP 82.
Refer to T.O. 2-1-111. No cracks
allowed.
- d. Inspect area(6). If necessary,
restore hardface per
paragraph 2.
- e. Nickel plate area(2) to
dimension(4). Refer to
T.O. 2J-F100-53-1, SWP 092 11.
- f. Finish machine Diameter A to
dimensions(8 and 9).
- g. Permanently identify with
beehive symbol using shallow
etch in area near part number.
Refer to T.O. 2J-F100-53-1,
WP 023 00.
- h. Inspect pin hole. If damaged,
repair hole per paragraph 26.
- i. Install PN MS171432 pin(10) per
paragraph 11.
- j. Inspect area(6). If necessary,
restore hardface per
paragraph 2.



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Legend for figure 29

1. Diameter A. 6.554 to 6.559 inches diameter before plate. This diameter shall be concentric with Diameter B within 0.002 inch and perpendicular to Surface D within 0.0005 inch Regardless of Feature Size. Interrupted surface.
2. Nickel plate area
3. No plate permitted
4. 6.529 inches diameter maximum after plate
5. Plating optional and may be incomplete.
6. Mask this area prior to plating.
7. Electrical contact points permitted in this area only.
8. 6.543 to 6.544 inches diameter after finish machine concentric with Diameter B within 0.002 inch and perpendicular with Surface D within 0.0005 inch Regardless of Feature Size. Interrupted surface.
9. Chamfer 0.015 to 0.025 inch x 45°±5°, both sides
10. Pin PN MS171432
11. 0.090 to 0.110 inch
12. No plate permitted, 24 places
13. Plate optional and may be incomplete, 24 places
14. 3°30'

**24. NO. 4 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4032669) - NICKEL PLATE
FRONT INNER FACE REPAIR.**

(See Figure 30.)

NOTE

Repair of Surfaces D or V are permitted. However, one surface shall be completed before repairing other surface.

- a. Remove PN MS171432 pin(17, figure 30) per paragraph 11.

NOTE

Parent material is AMS 6322 or AMS 6323 steel.

- b. Machine Surface V to dimension(2) for distance(19).

- c. Inspect machined area per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- d. Inspect area(4). If necessary, restore hardface per paragraph 2.
- e. Nickel plate area(20) to dimension(3). Refer to T.O. 2J-F100-53-1, SWP 092 11.

- | | |
|--|--|
| f. Finish machine Surface V to dimensions(5, 6, 7, 8, 9, and 11) for distance(10). | h. Inspect pin hole. If damaged, repair hole per paragraph 26. |
| g. Permanently identify with beehive symbol per T.O. 2J-F100-53-1, WP 023 00, shallow etch in area near part number. | i. Install PN MS171432 pin(17) per paragraph 11. |
| | j. Inspect area(6), restore hardface if necessary per paragraph 2. |

Legend for figure 30

1. This surface shall be parallel to Surface D within 0.0005 inch
2. 0.356 to 0.361 inch before plating
3. 0.371 inch minimum
4. Mask this area prior to repair.
5. This surface shall be parallel to Surface D within 0.0005 inch for distance(10).
6. For distance(10)
7. 0.364 to 0.366 inch after finish
8. Chamfer 0.015 to 0.025 inch x 45° ±5°
9. 0.005 to 0.020 inch modified radius
10. 6.940 to 6.960 inch diameter tangent to(9). This diameter shall be concentric to Diameter A within 0.010 inch diameter with this diameter and Diameter A at Maximum Material Condition.
11. 0.000 to 0.005 inch mismatch permissible after finish
12. Interrupted surface
13. Electrical contact points permitted in this area only
14. Interrupted surface
15. 3°30'
16. No plate permitted in hole
17. PN MS171432 pin
18. 0.090 to 0.110 inch
19. 6.890 to 6.910 inch diameter tangent to(18). Shall be concentric to Diameter A within 0.010 inch diameter with this diameter and Diameter A at Maximum Material Condition.
20. Nickel plate area
21. Plating optional and may be incomplete
22. 0.005 to 0.020 inch modified radius



**25. NO. 4 BEARING FRONT SEAL SEAT
ASSEMBLY (PN 4032669) - NICKEL PLATE REAR
INNER FACE REPAIR.**

(See Figure 31.)

NOTE

Repair of Surfaces D or V are permitted. However, one surface shall be completed before repairing other surface.

- a. Remove PN MS171432 pin(16, figure 31) per paragraph 11.

NOTE

Parent material is AMS 6322 or AMS 6323 steel.

- b. Machine Surface D to dimension(2) for distance(21).
- c. Inspect machined area per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.

Legend for figure 31

- 1. This surface shall be parallel with Surface AE within 0.0005 inch and perpendicular with Diameter A within 0.0005 inch Regardless of Feature Size, for distance(20).
- 2. 0.356 to 0.361 inch before plate
- 3. 0.371 inch minimum after plate
- 4. Mask this area prior to repair
- 5. For distance(10)
- 6. This surface shall be parallel with Surface AE within 0.0005 inch and perpendicular with Diameter A within 0.0005 inch Regardless of Feature Size, for distance(10).
- 7. 0.364 to 0.366 inch after finish
- 8. Chamfer 0.015 to 0.025 inch x 45°±5°
- 9. 0.005 to 0.020 inch modified radius
- 10. 7.140 to 7.160 inches diameter tangent to(9). This diameter shall be concentric with Diameter A within 0.010 inch diameter with this diameter and Diameter A at Maximum Material Condition.
- 11. 0.000 to 0.005 inch mismatch permissible after finish
- 12. Electrical contact points permitted in this area only
- 13. No plate permitted, 24 places
- 14. 0°30'
- 15. Plating optional and may be incomplete, 24 places
- 16. Pin PN MS171432
- 17. 0.090 to 0.110 inch
- 18. 0.005 to 0.020 inch modified radius
- 19. Plating optional and may be incomplete
- 20. Nickel plate area
- 21. 7.090 to 7.110 inches diameter tangent to(18). This diameter shall be concentric with Diameter A within 0.010 inch diameter with this diameter and Diameter A at Maximum Material Condition.

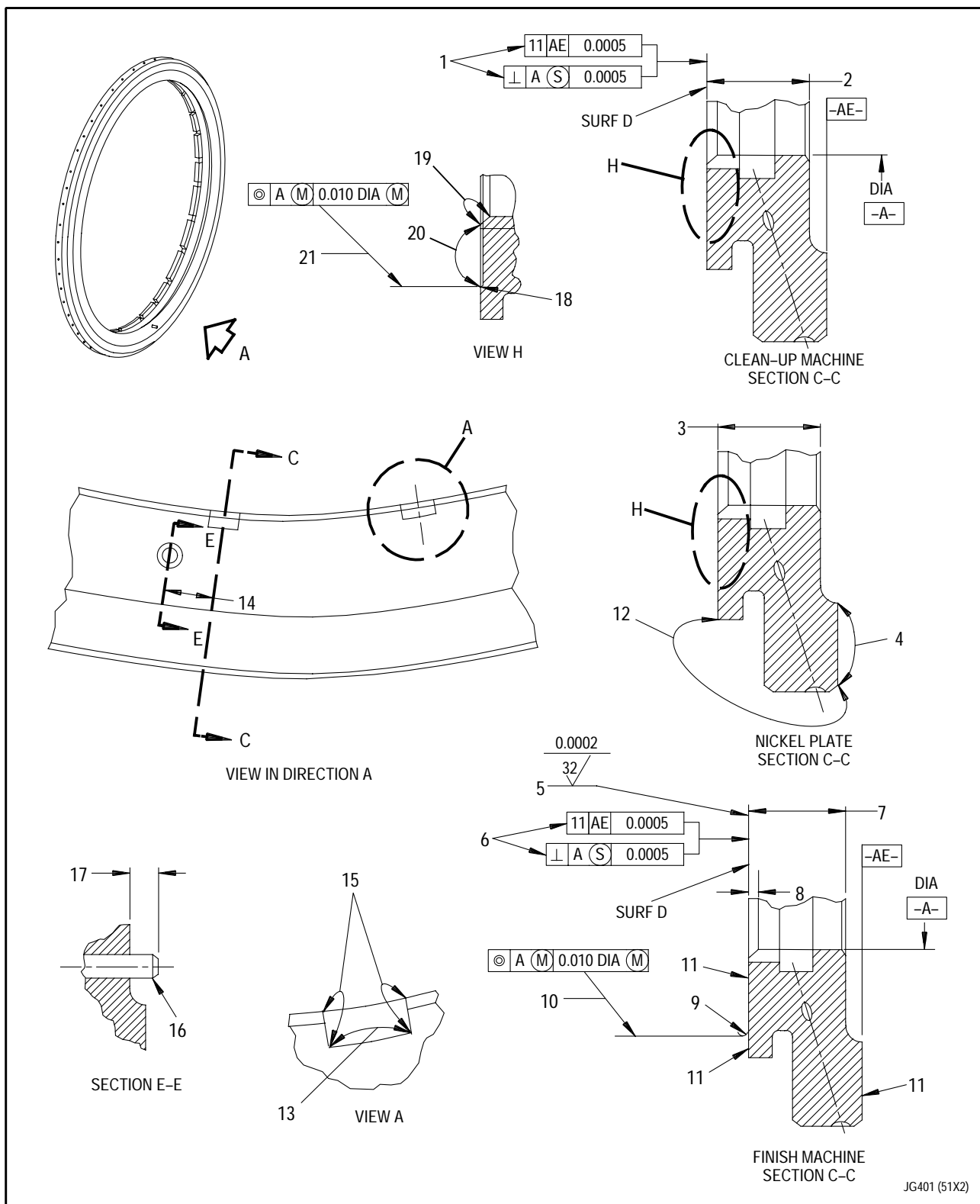


Figure 31. No. 4 Bearing Front Seal Seat Assembly (PN 4032669) - Nickel Plate Rear Inner Face Repair

WP 406 00

- d. Inspect area(4) prior to plating and after plating repair. Restore hardface, if necessary, per paragraph 2.
- e. Nickel plate area(20) to dimension(3). Refer to T.O. 2J-F100-53-1, SWP 092 11.
- f. Finish machine Surface D to dimensions(5, 6, 7, 8, 9, and 11) for distance(10).
- g. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2J-F100-53-1, WP 023 00.
- h. Inspect pin hole. If damaged, repair hole per paragraph 26.
- i. Install PN MS171432 pin(16) per paragraph 11.

26. NO. 4 BEARING FRONT SEAL SEAT ASSEMBLY (PN 4032669) - SPRING PIN HOLE REPAIR.

(See Figure 32.)

NOTE

This repair applies to pin PN MS171432 only.

- a. Remove old PN MS171432 pin per paragraph 11.
- b. Machine hole(3, figure 32) to dimensions(2 and 3).
- c. Install new PN MS171462 pin(5) to dimension(4) per paragraph 11.

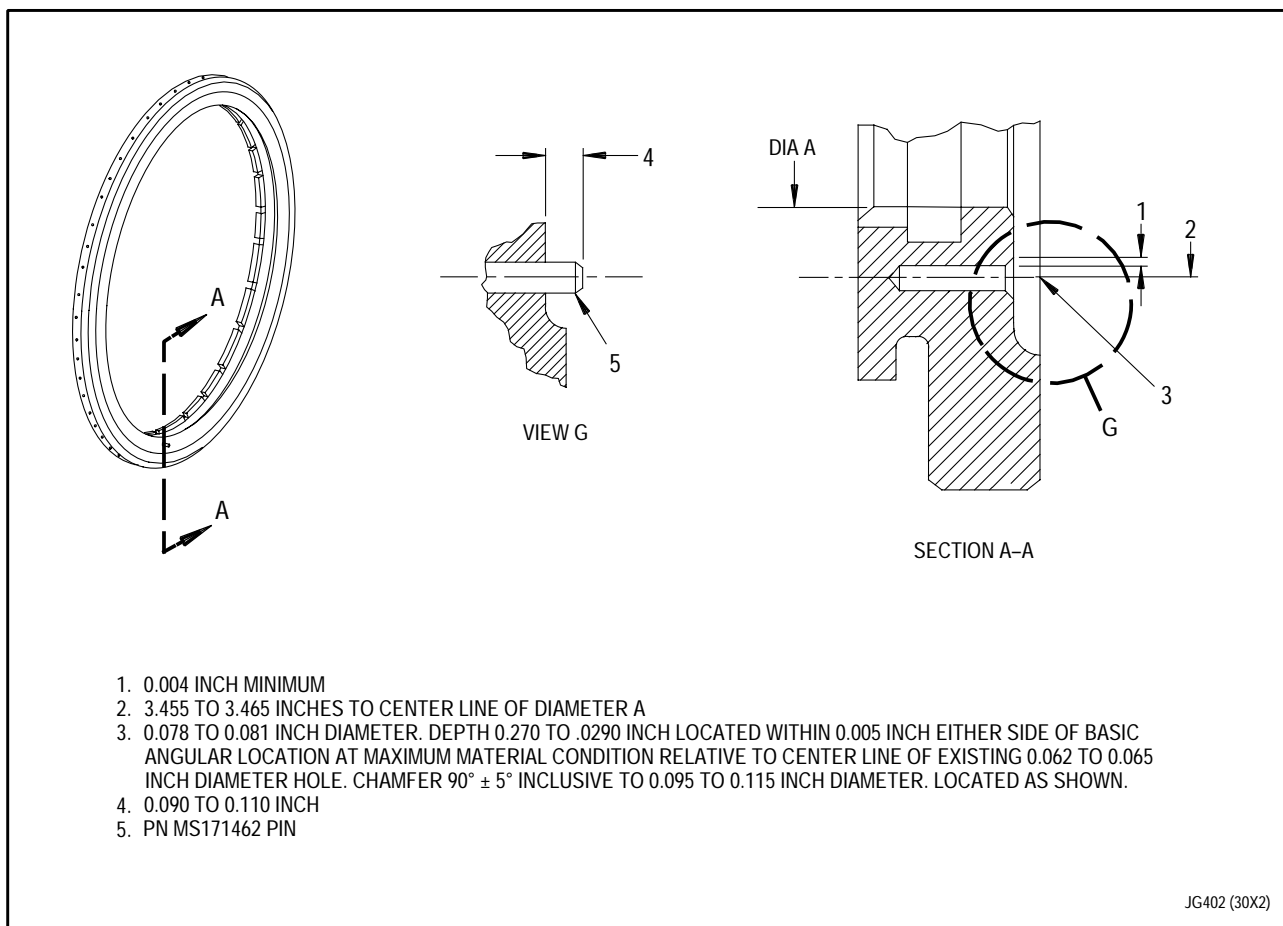


Figure 32. No. 4 Bearing Front Seal Seat Assembly (PN 4032669) - Spring Pin Hole Repair

27. NO. 4 BEARING REAR SEAL SEAT (PN 4083144) - NICKEL PLATE INSIDE DIAMETER REPAIR.

(See Figure 33.)

a. Deleted.

NOTE

Parent material is AMS 6322 or AMS 6323 steel.

b. Machine Diameter A to dimension(1).

c. Fluorescent penetrant inspect machined area per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.

d. Inspect area(6) prior to plating and after plating repair. If necessary, restore hardface per paragraph 2.

e. Nickel plate area(3) to dimension(4). Refer to T.O. 2J-F100-53-1, SWP 092 11.

f. Finish machine Diameter A to dimensions(7 and 8).

Legend for figure 33

1. Diameter A. 6.468 to 6.473 inches diameter before plate. This Diameter shall be concentric to Diameter B within 0.002 inch diameter and perpendicular to Surface C within 0.0005 inch Regardless of Feature Size. Interrupted surface.
2. No plate permitted
3. Nickel plate area
4. 6.443 inches diameter maximum after plate
5. Plating optional and may be incomplete
6. Mask this area prior to repair.
7. Chamfer 0.015 to 0.025 inch x 45°±5° both sides.
8. Diameter A. 6.457 to 6.458 inches diameter after finishing. This diameter shall be concentric with Diameter B within 0.002 inch and perpendicular to Surface C within 0.0005 inch Regardless of Feature Size.
9. Electrical contact points permitted in this area only.

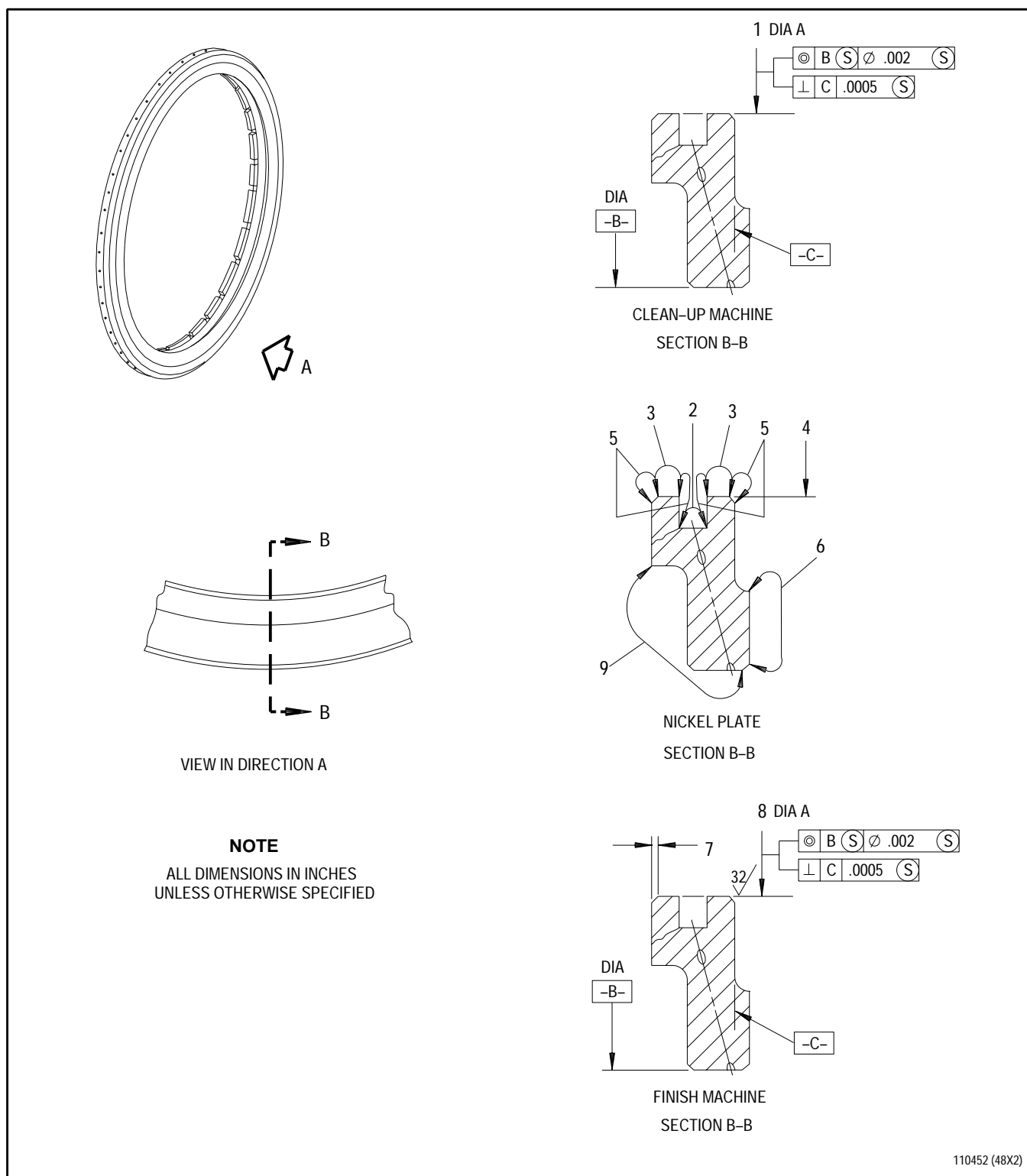


Figure 33. No. 4 Bearing Rear Seal Seat (PN 4083144) - Nickel Plate Inside Diameter Repair

- g. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2-1-111, SPOP 401.

h. Deleted.

i. Deleted.

28. NO. 4 BEARING REAR SEAL SEAT (PN 4083144) - NICKEL PLATE FRONT INNER FACE REPAIR.

(See Figure 34.)

NOTE

Repair of Surfaces D or C are permitted. However, one surface shall be completed before repairing other surface.

a. Deleted.

NOTE

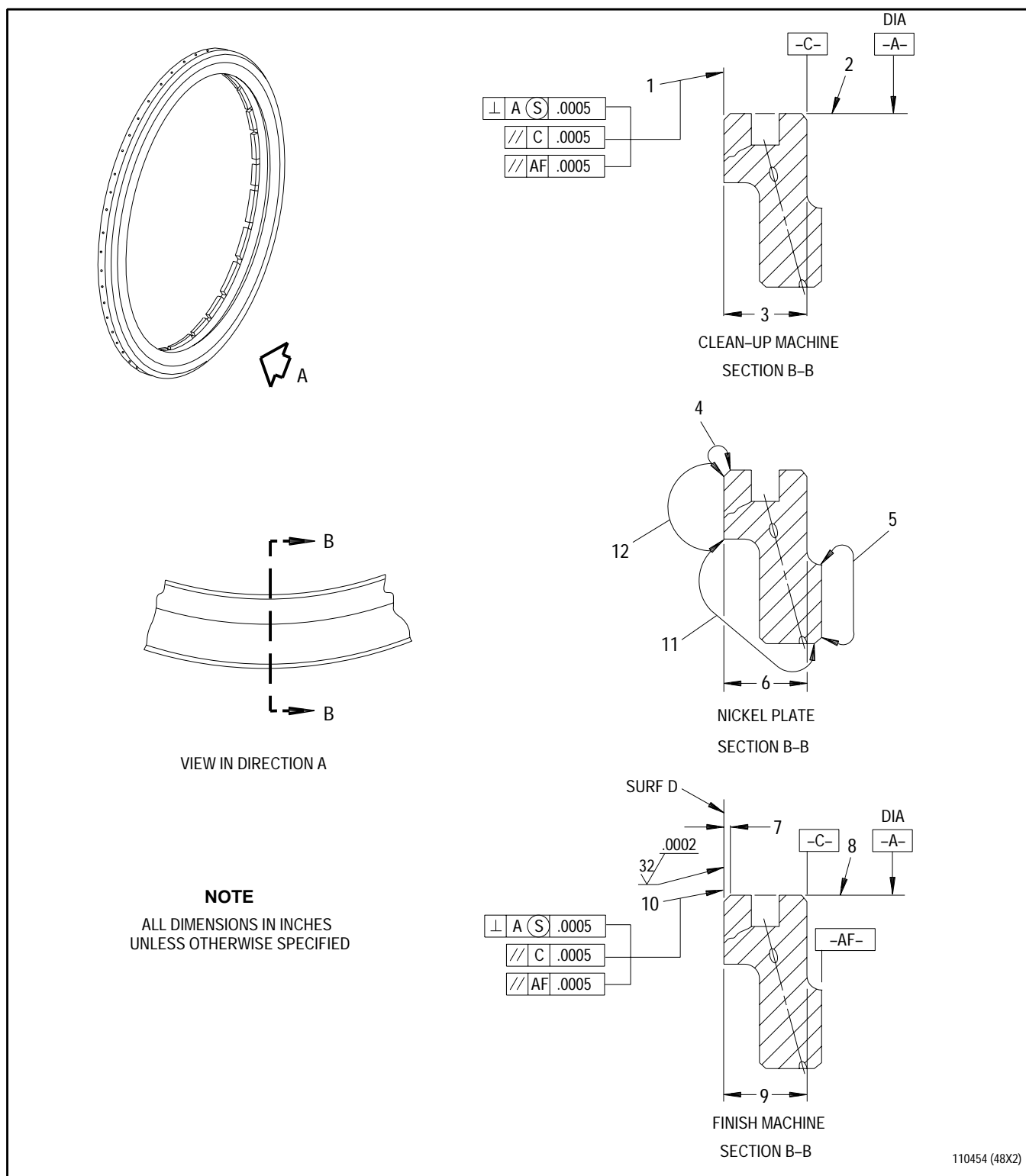
Parent material is AMS 6322 or AMS 6323 steel.

b. Machine Surface D to dimensions(1 and 3).

c. Inspect machined area per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.

Legend for figure 34

- 1. This surface shall be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size and parallel to Surfaces C and AF within 0.0005 inch.
- 2. Interrupted surface
- 3. 0.321 to 0.326 inch before plate
- 4. Plating optional and may be incomplete
- 5. Mask this area prior to repair
- 6. 0.336 inch minimum after plate
- 7. Chamfer 0.015 to 0.025 inch x 45°±5°
- 8. Interrupted surface
- 9. 0.329 to 0.331 inch after finish
- 10. This surface shall be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size and parallel to Surfaces C and AF within 0.0005 inch.
- 11. Electrical contact points permitted in this area only
- 12. Nickel plate area



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T.O. 2J-F100-53-7

WP 406 00

- d. Inspect area(5) prior to plating and after plating repair.
Restore hardface if necessary per paragraph 2.
- e. Nickel plate area(12) to dimension(6). Refer to T.O. 2J-F100-53-1, SWP 092 11.
- f. Finish machine Surface D to dimensions(7, 9 and 10).
- g. Permanently identify with beehive symbol using shallow etch in area near part number.
Refer to T.O. 2-1-111, SPOP 401.
- h. Deleted.
- i. Deleted.

29. NO. 4 BEARING REAR SEAL SEAT (PN 4083144) - NICKEL PLATE REAR INNER FACE REPAIR.

(See Figure 35.)

NOTE

Repair of Surfaces D or C are permitted. However, one surface shall be completed before repairing other surface.

a. Deleted.

NOTE

Parent material is AMS 6322 or AMS 6323 steel.

b. Machine Surface C to dimension(7) for distance(17).

c. Inspect machined area per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.

d. Inspect area(4) prior to plating and after plating repair. If necessary, restore hardface per paragraph 2.

e. Nickel plate area(16) to dimension(3). Refer to T.O. 2J-F100-53-1, SWP 092 11.

f. Finish machine Surface C to dimensions(5, 6, 7, 8, 10, and 11) for distance(9).

g. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2-1-111, SPOP 401.

h. Deleted.

i. Deleted.

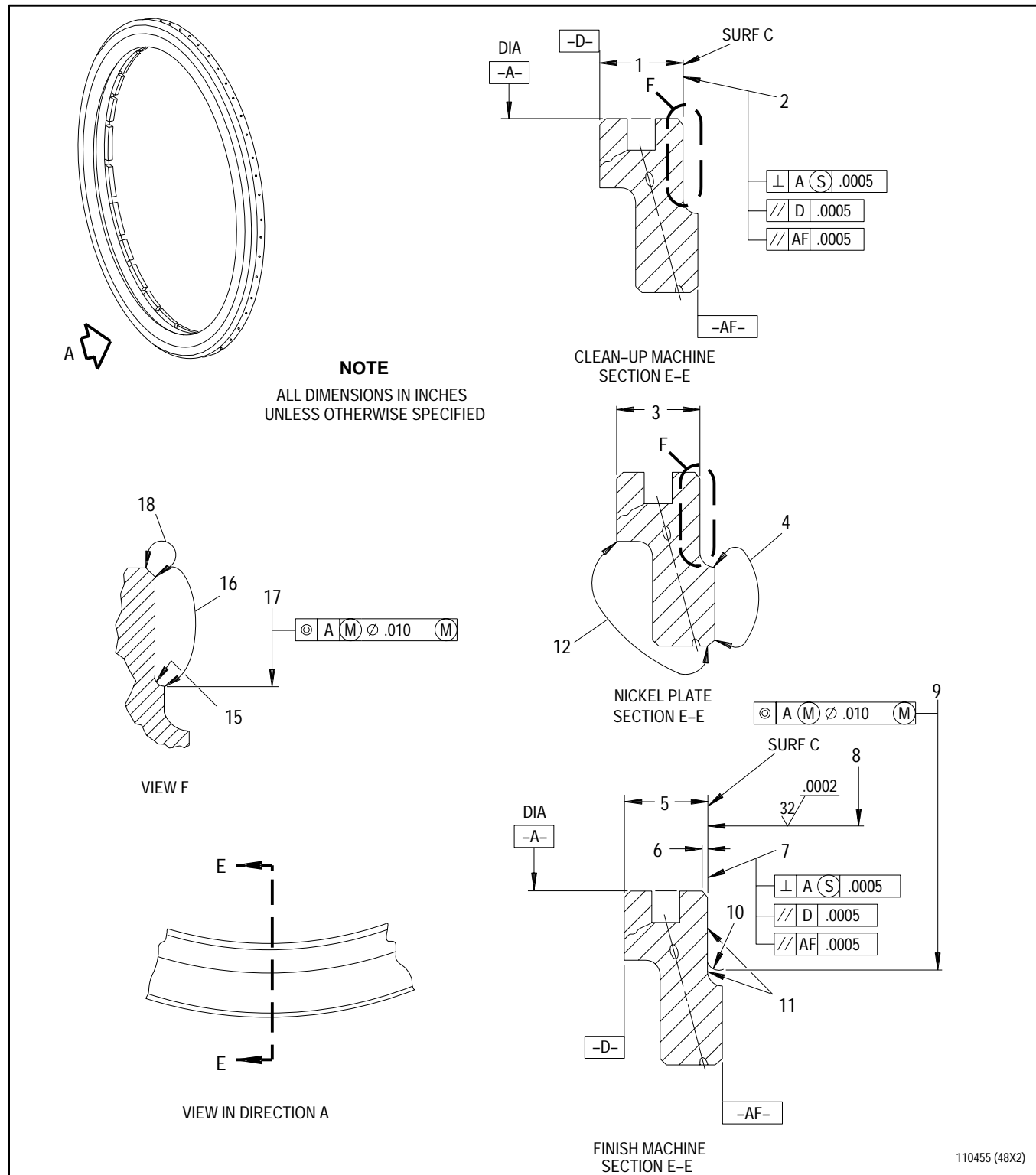


Figure 35. No. 4 Bearing Rear Seal Seat (PN 4083144) - Nickel Plate Rear Inner Face Repair

Legend for figure 35

1. 0.321 to 0.326 inch before plate
2. This surface shall be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size and shall be parallel with Surfaces D and AF within 0.0005 inch. For distance(17).
3. 0.336 inch minimum after plate
4. Mask this area prior to repair
5. 0.329 to 0.331 inch after finish
6. Chamfer 0.015 to 0.025 inch x 45°±5°
7. This surface shall be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size and shall be parallel with Surfaces D and AF within 0.0005 inch. For distance(9).
8. For distance(9)
9. 7.070 to 7.080 inches diameter tangent to modified radius concentric with Diameter A within 0.010 inch diameter Maximum Material Condition.
10. 0.005 to 0.020 inch modified radius
11. 0.000 to 0.005 inch mismatch permissible after finish.
12. Electrical contact points permissible in this area only.
13. Deleted
14. Deleted
15. 0.005 to 0.020 inch modified radius
16. Nickel Plate area
17. 7.030 to 7.040 inches diameter tangent to modified radius and concentric to Diameter A within 0.010 inch diameter Maximum Material condition.
18. Plate optional and may be incomplete

30. Deleted.

Figure 36. Deleted.

WORK PACKAGE**TECHNICAL PROCEDURES****SUPPORT ASSEMBLY, NO. 3 BEARING SEAL -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 24

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	31	5 - 7	16	12 - 13	20
2A - 2B Added	31	8	20	14	16
3	31	9 - 11	16	15 - 22 Added	31
4	20				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures - Marking, General - - - - -	WP 023 00
General Repair Procedures - Grinding, Machine, Titanium Parts (SPOP 530) - - - - -	SWP 091 03
General Repair Procedures - Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
General Repair Procedures - Compound, Antigalling (PWA 550) Application (SPOP 156) - - - - -	SWP 098 03
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Support Assembly, No. 3 Bearing Seal - Inspection - - - -	WP 307 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 JUL 95	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ACETONE (PMC 9008)	O-A-51
ALCOHOL, ISOPROPYL (PMC 9094)	TT-I-735
COMPOUND, ANTIGALLING (PWA 550-3)	HI-T 650 OR LUBRI-BOND HT
DRY ICE	-
MARKER, TEMPORARY	MARKS-A-LOT (CARTER)
SEALANT	PWA 36000-2 OR 36000-3
TAPE, MASKING, PLASTIC (YELLOW) (PMC 4134)	SCOTCH #484 OR #470 (3M CO.); SC-1 (SEQUOIA CORP.); PT 106B (J. B. PRATA LTD.); TESA #7469 (TTI); P-35 (PERMACEL)

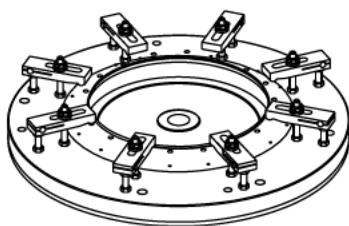
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
RIVET	AN123320	AR

APPLICABLE SUPPORT EQUIPMENT

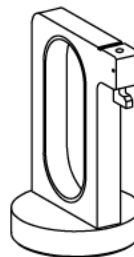
Paragraph	Function - Tool Nomenclature	Tool Number
8	NO. 3 BEARING SEAL SUPPORT ASSEMBLY - ABRADABLE SEAL RING REPLACEMENT	
	FIXTURE, MACHINE, NO. 3 BEARING SEAL SUPPORT - - - - -	PWA 71763
	GAGE, FLUSH PIN, FIXTURE, NO. 3 BEARING SEAL SUPPORT - - - - -	PWA 71764
	DRILL JIG, TRANSFER, RIVET HOLES, NO. 3 BEARING SUPPORT - - - - -	PWA 71767
	GAGE, FLUSH PIN, FIXTURE, NO. 3 BEARING SEAL SUPPORT - - - - -	PWA 71769
	GAGE, FLUSH PIN, FIXTURE, NO. 3 BEARING SEAL SUPPORT - - - - -	PWA 71770

ILLUSTRATED SUPPORT EQUIPMENT



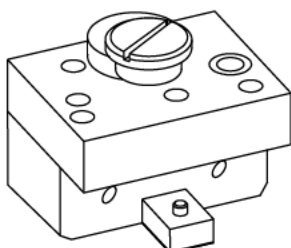
PWA 71763 -C

Figure T1. PWA 71763 FIXTURE



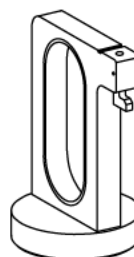
PWA 71764 -C

Figure T2. PWA 71764 GAGE



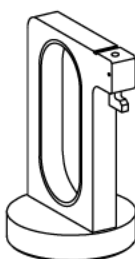
PWA 71767 -C

Figure T3. PWA 71767 DRILL JIG



PWA 71769 -C

Figure T4. PWA 71769 GAGE



PWA 71770 -C

Figure T5. PWA 71770 GAGE

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 3 bearing seal support assembly.
- b. Following repairs are contained in this work package:
 - Blend repair
 - Heat shield snap diameter repair
 - Heat shield (short) (PN 4061533) replacement
 - Antigalling compound application
 - Seal ring groove repair
 - Pin replacement
 - Abradable seal ring replacement

**2. NO. 3 BEARING SEAL SUPPORT ASSEMBLY
- BLEND REPAIR.**

(See Figure 1.)

- a. Blend repair Diameter C as follows:

- (1) Use fine stone.
- (2) Remove raised metal.
- (3) Blend repair nicks, dents, and scoring to 0.015 inch maximum depth, with maximum of 15 places for nicks and dents.
- (4) Surface finish of blended areas shall be as smooth or smoother than adjacent unblended area.
- (5) Blend width to depth ratio shall be 15 to 1 or greater.
- (6) After blending, fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

- b. Blend repair Surface D as follows:

- (1) Use fine stone.
- (2) Remove raised metal.
- (3) Blend repair nicks, dents, and scoring to 0.010 inch maximum depth.
- (4) Surface finish of blended areas shall be as smooth or smoother than adjacent unblended area.
- (5) Blend width to depth ratio shall be 15 to 1 or greater.
- (6) After blending, fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

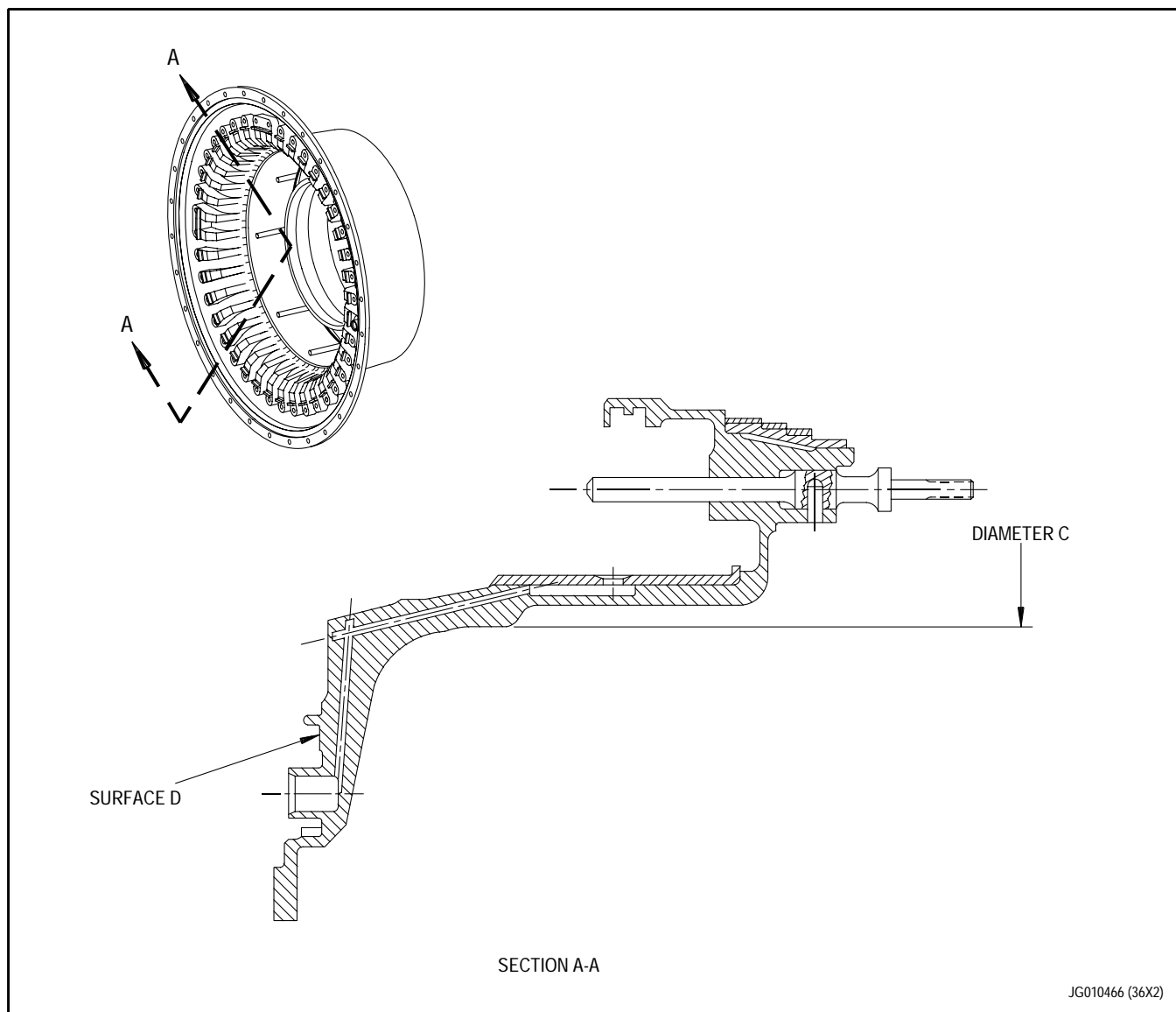


Figure 1. No. 3 Bearing Seal Support Assembly - Blend Repair

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**3. NO. 3 BEARING SEAL SUPPORT
ASSEMBLY - HEAT SHIELD SNAP DIAMETER
REPAIR.**

(See Figure 2.)

- a. Machine diameter per figure 2.
Grinding if used is per SPOP
530. Refer to T.O.
2J-F100-53-1, SWP 091 03.
- b. Fluorescent penetrant inspect
machined surface. Refer to T.O.
2J-F100-9. No cracks allowed.
- c. Plasma coat area(7) per PWA
53-37. Refer to 2J-F100-53-1,
WP 096 00.
- d. Finish machine per figure 2.
Break edges as required, 0.003
to 0.015 inch.

Legend for figure 2

- 1. 10.894 to 10.906 inch diameter before plasma spray.
Maintain minimum dimension.
- 2. True position of this diameter is ± 0.005 inch in
relation to Surface D and Diameter A at Maximum
Material Condition.
- 3. 0.060 to 0.080 inch modification radius.
- 4. 1.425 to 1.435 inch.
- 5. Plasma spray optional and may be incomplete.
- 6. 10.938 inch diameter minimum after plasma spray.
- 7. Plasma spray per text.
- 8. Grit blast and plasma spray not allowed.
- 9. 1.515 to 1.535 inch.
- 10. $30^\circ \pm 5^\circ$
- 11. 10.912 to 10.918 inch diameter final machine.
- 12. 0.040 to 0.060 inch.
- 13. 0.688 to 0.812 inch modification radius.
- 14. 1.425 to 1.435 inch.

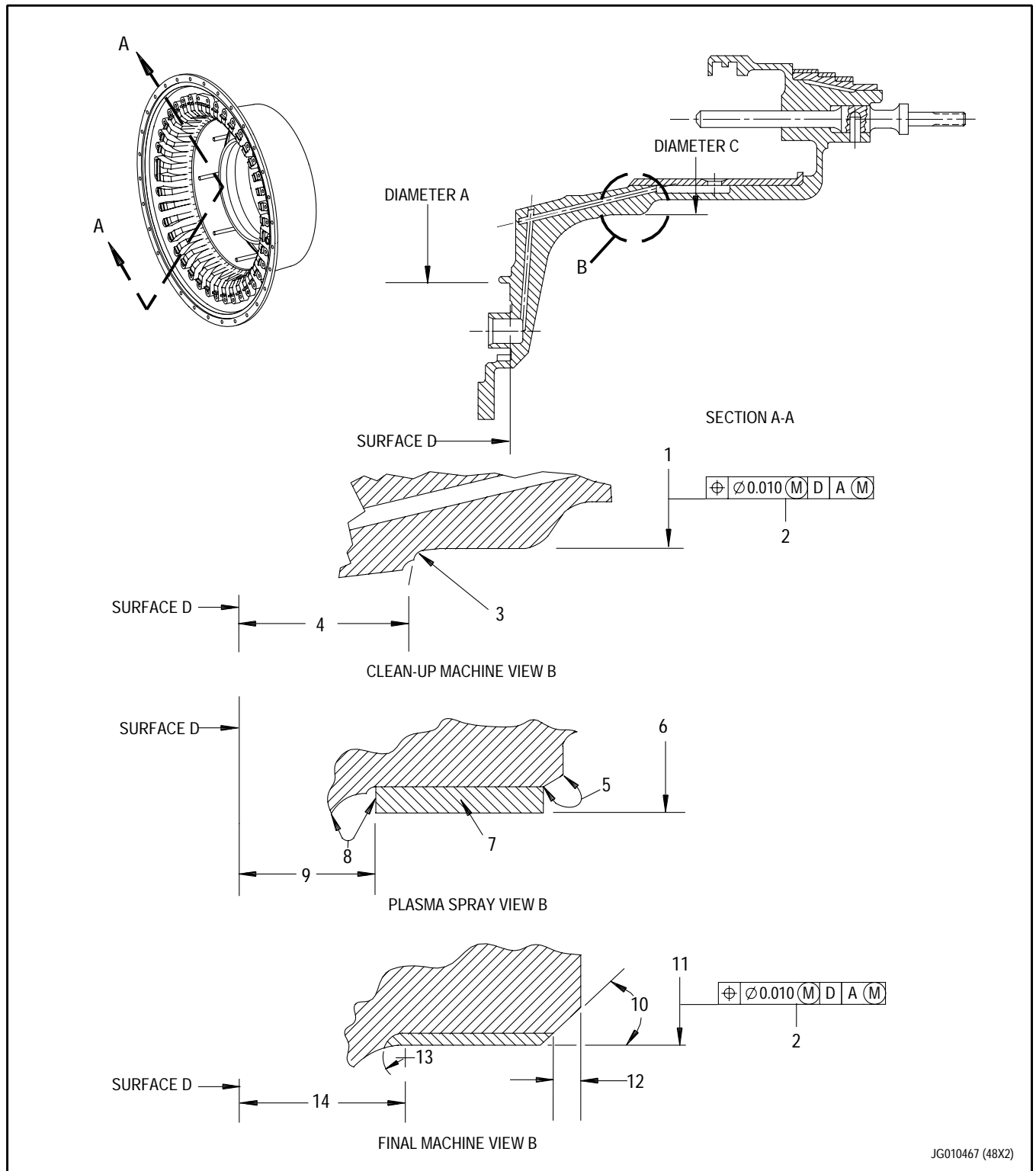


Figure 2. No. 3 Bearing Seal Support Assembly - Heat Shield Snap Diameter Repair

**4. NO. 3 BEARING SEAL SUPPORT ASSEMBLY
- HEAT SHIELD (SHORT) (PN 4061533)
REPLACEMENT.**

(See Figure 3.)



Failure to use care during grinding operations may cause damage to seal support.

- a. Grind off heads of rivets on heat shield side at 18 places. Use care not to grind through heat shield and damage seal support. See figure 3.



Failure to use care while prying off outer heat shield may cause damage to seal support.

- b. Remove outer heat shield. If necessary, heat shield may be pried off.
- c. Inspect seal support heat shield mating surfaces for damage per WP 307 00. All damage shall be within specified serviceable limits prior to installing new heat shield.

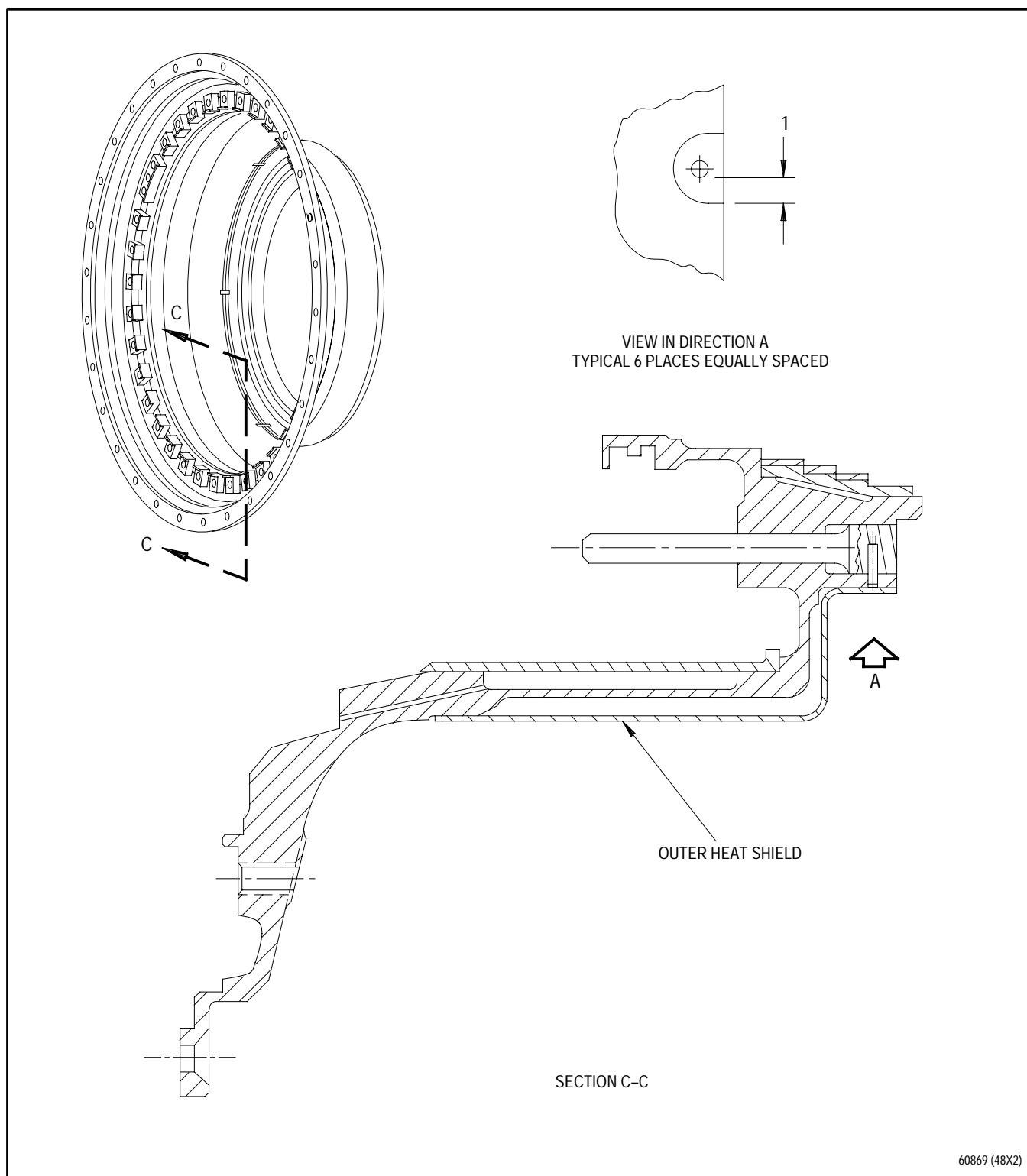
- d. Install outer heat shield as follows:

- (1) Position heat shield on seal support so that six equally spaced slots are located as shown in View A. If necessary, heat shield may be heated to 700°F (371°C) maximum to aid installation.
- (2) Identify rivet hole locations at 18 places on heat shield.
- (3) Remove heat shield from support and using a carbide drill bit, transfer drill 18, 0.064 to 0.068 inch rivet holes from support to heat shield.
- (4) Install heat shield per figure 3.

**5. NO. 3 BEARING SEAL SUPPORT ASSEMBLY
- ANTIGALLING COMPOUND APPLICATION.**

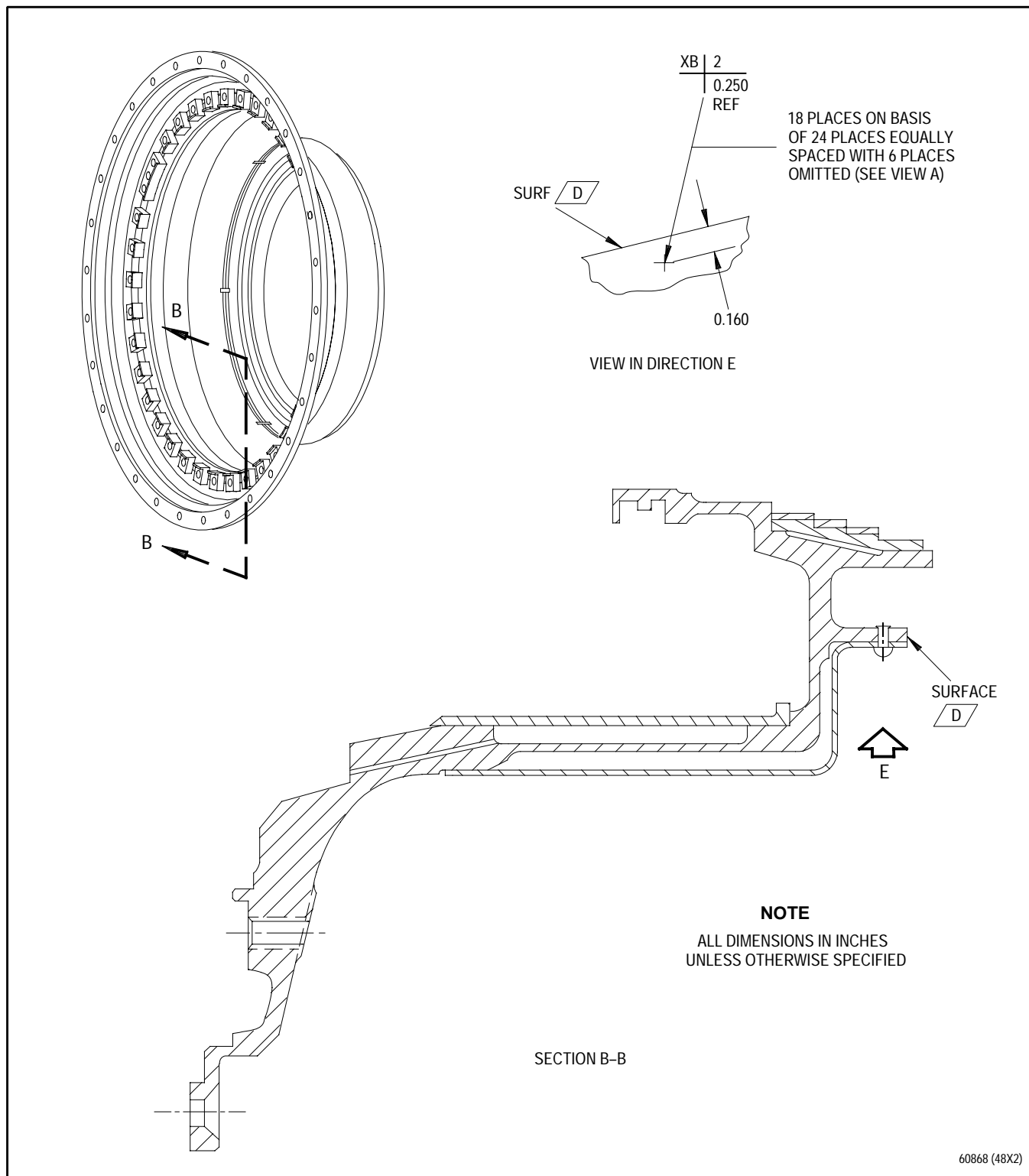
(See Figure 4.)

- a. Apply antigalling compound to areas shown per PWA 550-3. Refer to T.O. 2J-F100-53-1, SWP 098 03.

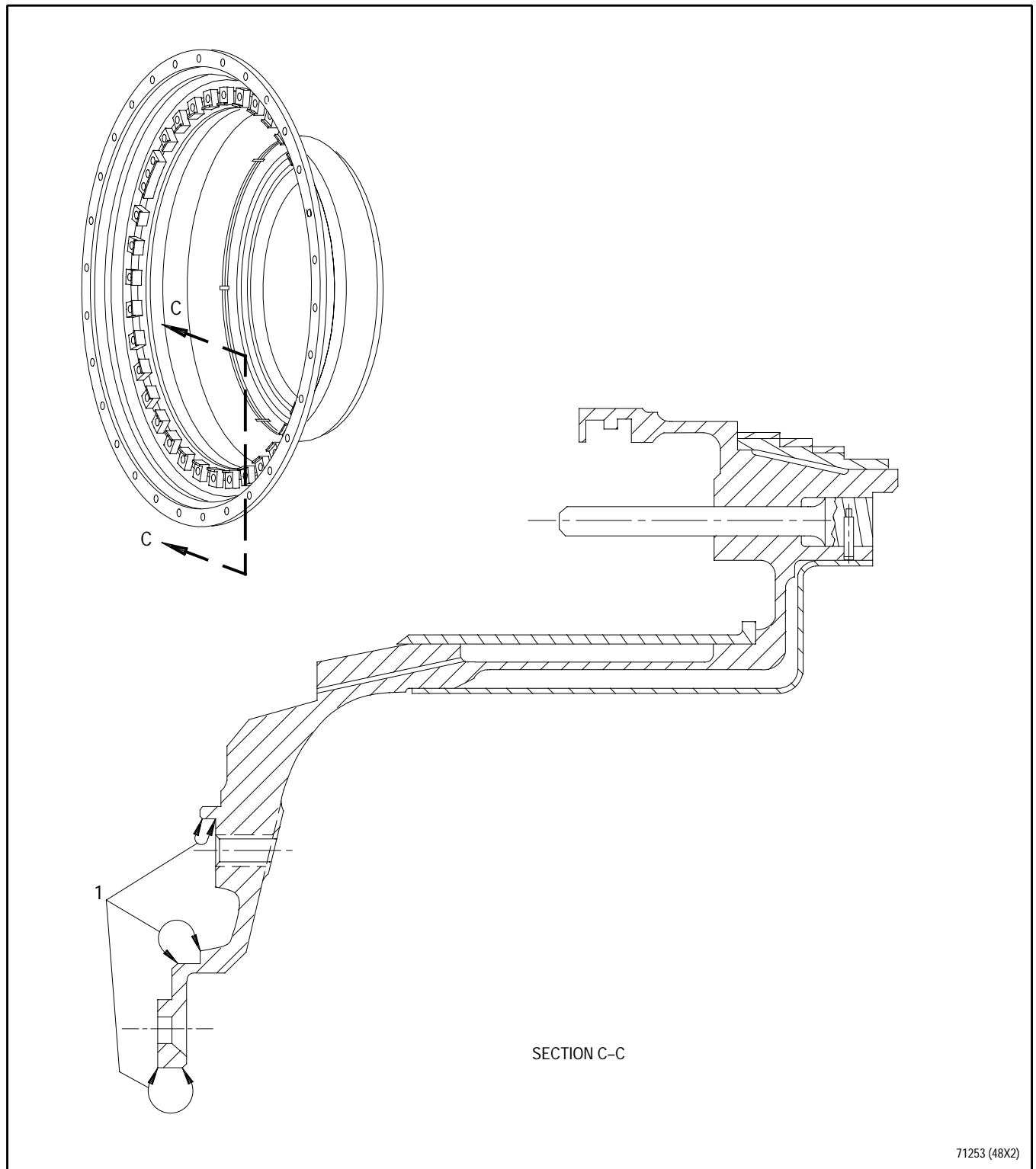


1. 0.125 inch minimum

**No. 3 Bearing Seal Support Assembly - Heat Shield (Short)
(PN 4061533) Replacement**



**Figure 3. No. 3 Bearing Seal Support Assembly - Heat Shield (Short)
(PN 4061533) Replacement (Sheet 2 of 2)**



1. Coat area with antigalling compound per text.

Figure 4. No. 3 Bearing Seal Support Assembly - Antigalling Compound Application

**6. NO. 3 BEARING SEAL RING HOLDER
ASSEMBLY (PN 4036991) - SEAL RING GROOVE
REPAIR.**

(See Figure 5.)

NOTE

Pins do not have to be removed if SAALC 8441811 special cutting tool is used.

- a. Remove pins per paragraph 7.
- b. Clean shroud assembly using clean unsized cheesecloth, moistened with isopropyl alcohol, or equivalent.
- c. Machine Surfaces K and L as follows: (See figure 5.)
 - (1) Grind per SPOP 530, if applicable. Refer to T.O. 2J-F100-53-1, SWP 091 03.
 - (2) Remove only enough material to remove all evidence of steps or wear. Maintain dimensions for oversize seal ring grooves per Chart X in figure 2.
 - (3) Measure and record resulting Dimension A.

- d. Fluorescent penetrant inspect reworked area. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

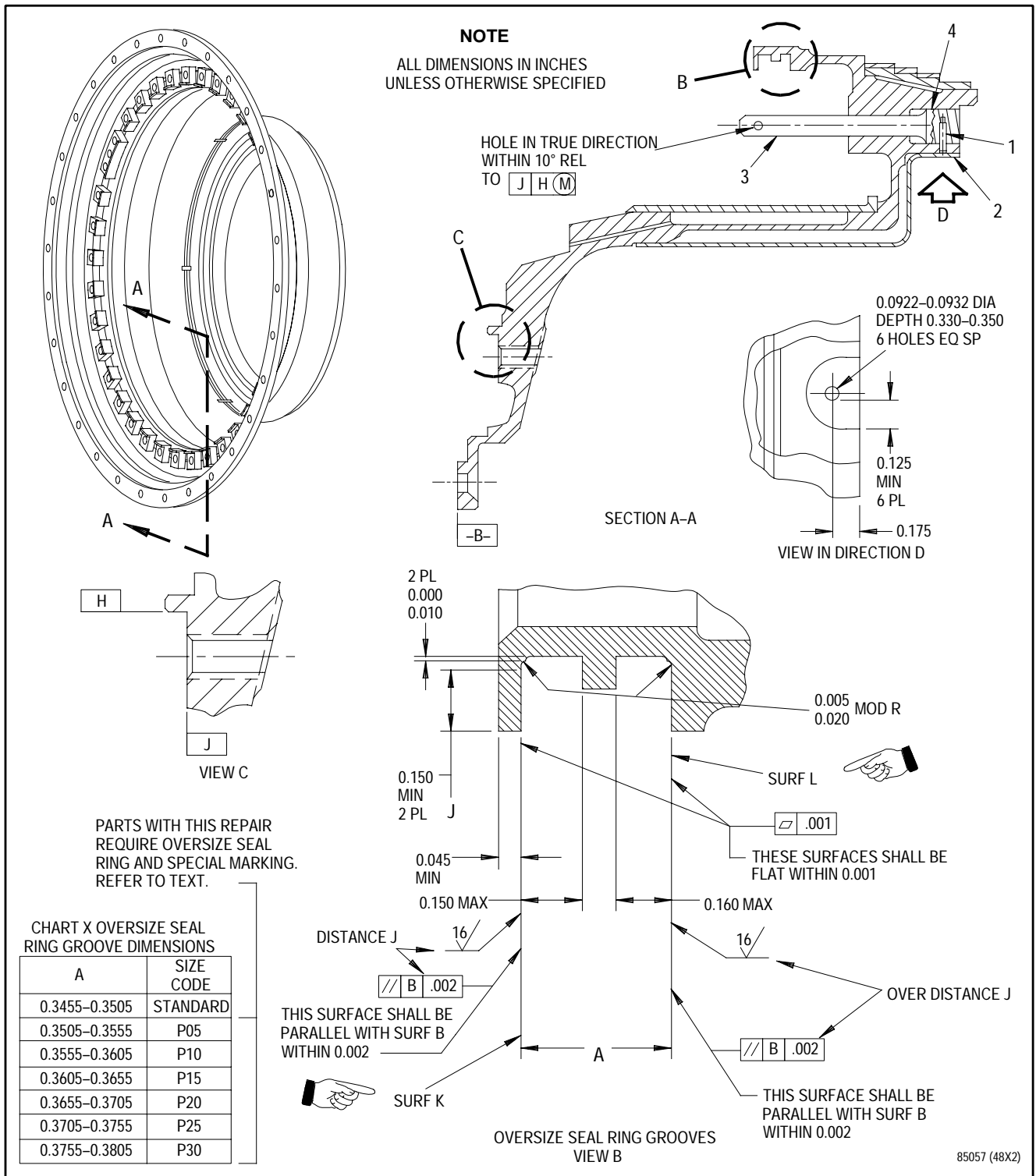
- e. Install pins per paragraph 7.

NOTE

- It is permissible to machine seal ring groove 0.0035 inch oversize and still use standard size seal rings.
 - If groove is enlarged in future repair, mark out old size code and replace with new size code.
- f. Mark USE OVERSIZE RING with appropriate size code, in area adjacent to part number marking. Use measurement recorded in step c.(3) to determine size code. Refer to T.O. 2J-F100-53-1, WP 023 00 for marking procedures, use shallow electrolytic etch.

Example: Measurement from step c.(3) of 0.362 inch will require the following part marking: USE OVERSIZE RING P15.

- g. Apply antigalling compound per paragraph 5.



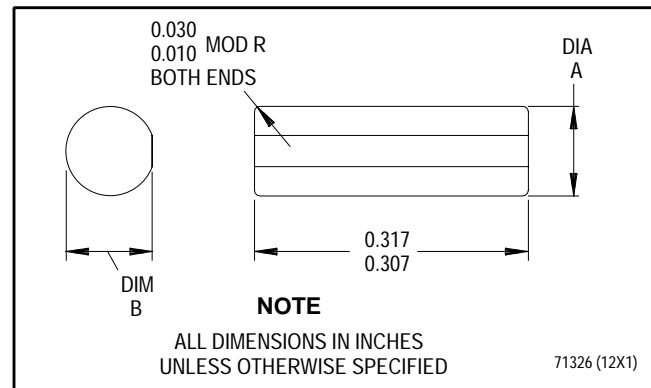
1. Pin PN 4036990 6 places (See figure 6.)
2. Heat shield PN 4061533
3. Pins PN 4061534 (3 each) and PN 4061535 (3 each)
4. Sealant PWA 36000-2 or PWA 36000-3

Figure 5. No. 3 Bearing Seal Ring Holder Assembly (PN 4036991) - Seal Ring Groove Repair

7. NO. 3 BEARING SEAL RING HOLDER ASSEMBLY (PN 4068182) - PIN REPLACEMENT.

(See Figure 5 and 6.)

- a. Mark location of each long pin PN 4061534 and short pin PN 4061535 on support assembly. (See figure 5.)
- b. Drill out headless straight pin PN 4036990 six places.
- c. Press out No. 3 bearing seal pins six places. Do not hammer out pins to remove. Discard pins.
- d. Chill three long and three short seal pins for thirty minutes.
- e. Apply PWA 36000-2 or PWA 36000-3 sealant. (See figure 5.)
- f. Install No. 3 bearing seal pin, three long and three short into support assembly.
- g. Line drill through drilled out holes in support assembly into long and short seal pins to a depth of 0.330 to 0.350 inch.
- h. Replace headless straight pins with over sized pins as required by measuring drilled out hole in support assembly. (See figure 6.)



PART NUMBER		DIAMETER A	DIMENSION B
4036990		0.0932	0.083
		to	to
4036990	P05	0.0933	0.090
		to	to
4036990	P10	0.0982	0.088
		to	to
4036990	P15	0.1032	0.093
		to	to
4036990	P20	0.1033	0.100
		to	to
4036990	P25	0.1082	0.098
		to	to
4036990		0.1083	0.105
		to	to
4036990		0.1132	0.103
		to	to
4036990		0.1133	0.110
		to	to
4036990		0.1182	0.108
		to	to
4036990		0.1183	0.115
		to	to

Figure 6. Headless Straight Pin - Replacement

8. NO. 3 BEARING SEAL SUPPORT ASSEMBLY - ABRADABLE SEAL RING REPLACEMENT.

(See Figures 7, 8, and 9 and Table 1.)

- a. Clean seal support assembly by wiping per SPOP 208, method A. Refer to T.O. 2-1-111.
- b. Mask holes, slots and any openings to internal cavities to prevent fluids, machining chips or debris from entering passages and becoming entrapped. See Figure 7. Use PMC 4134 masking tape per SPOP 36. Refer to T.O. 2-1-111.
- c. Remove long and short pins per paragraph 7. Remove heat shield per paragraph 4. Discard heat shield.
- d. Remove unserviceable abrasible seal ring assembly as follows:



Failure to use care during grinding or machining operations can cause damage to seal support assembly.

- (1) Grind off heads of rivets on ID side of abrasible seal ring at 12 places. See figure 7. Use care not to damage seal support assembly. Damage to ID of abrasible seal ring assembly is acceptable. Use drift punch to drive out rivets. If required for removal of rivets, use 0.078 inch diameter drill. Remove all 12 rivets. Refer to T.O. 2-1-111.
- (2) Clean per SPOP 208 to remove any grinding dust or debris and any machining chips. Refer to T.O. 2-1-111.

NOTE

Seal ring material is AMS 5627 SST.

- (3) Install seal support assembly in PWA 71763 fixture. Machine out unserviceable abrasible seal ring assembly. Machine diameter(1, figure 8) first then machine diameter(2). Do not exceed indicated dimensions.
- (4) Use needle nose pliers or other suitable tool to remove all abrasible seal ring material. Do not damage seal support assembly. Discard seal ring.
- (5) Wipe clean machined area using acetone or alcohol per SPOP 208. Refer to T.O. 2-1-111.
- (6) Dimensionally inspect diameters(7 and 8). If beyond limits, replace part. Dimensionally inspect dimension(5) using PWA 71764 gage. If beyond limits, replace part. Dimensionally inspect rivet hole diameters(9). If required, next size larger rivet may be used. Refer to T.O. 2-1-111.
- (7) Visually inspect for raised material. If found, blend flush with adjacent surfaces.

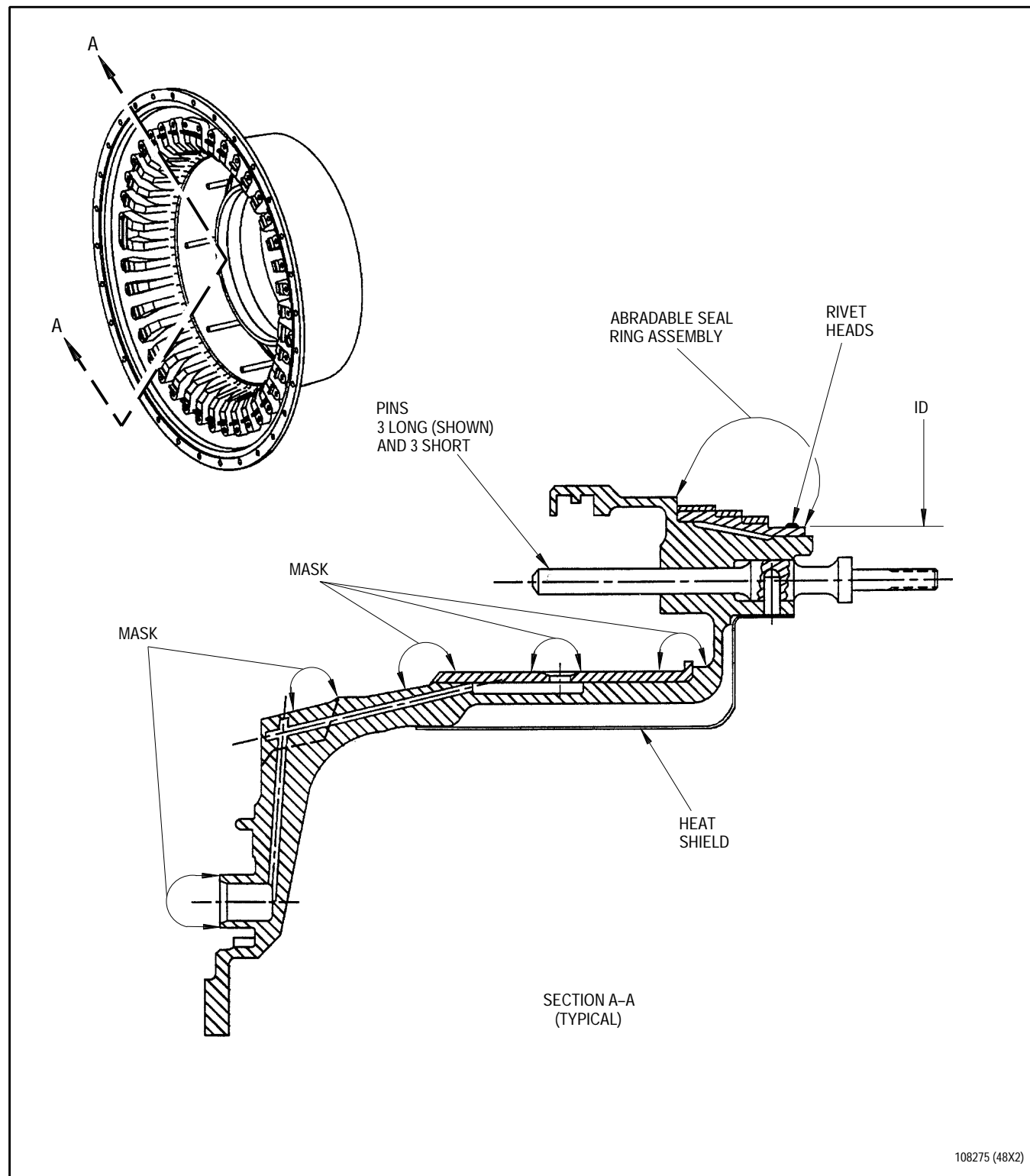


Figure 7. No. 3 Bearing Seal Support Assembly - Masking Application

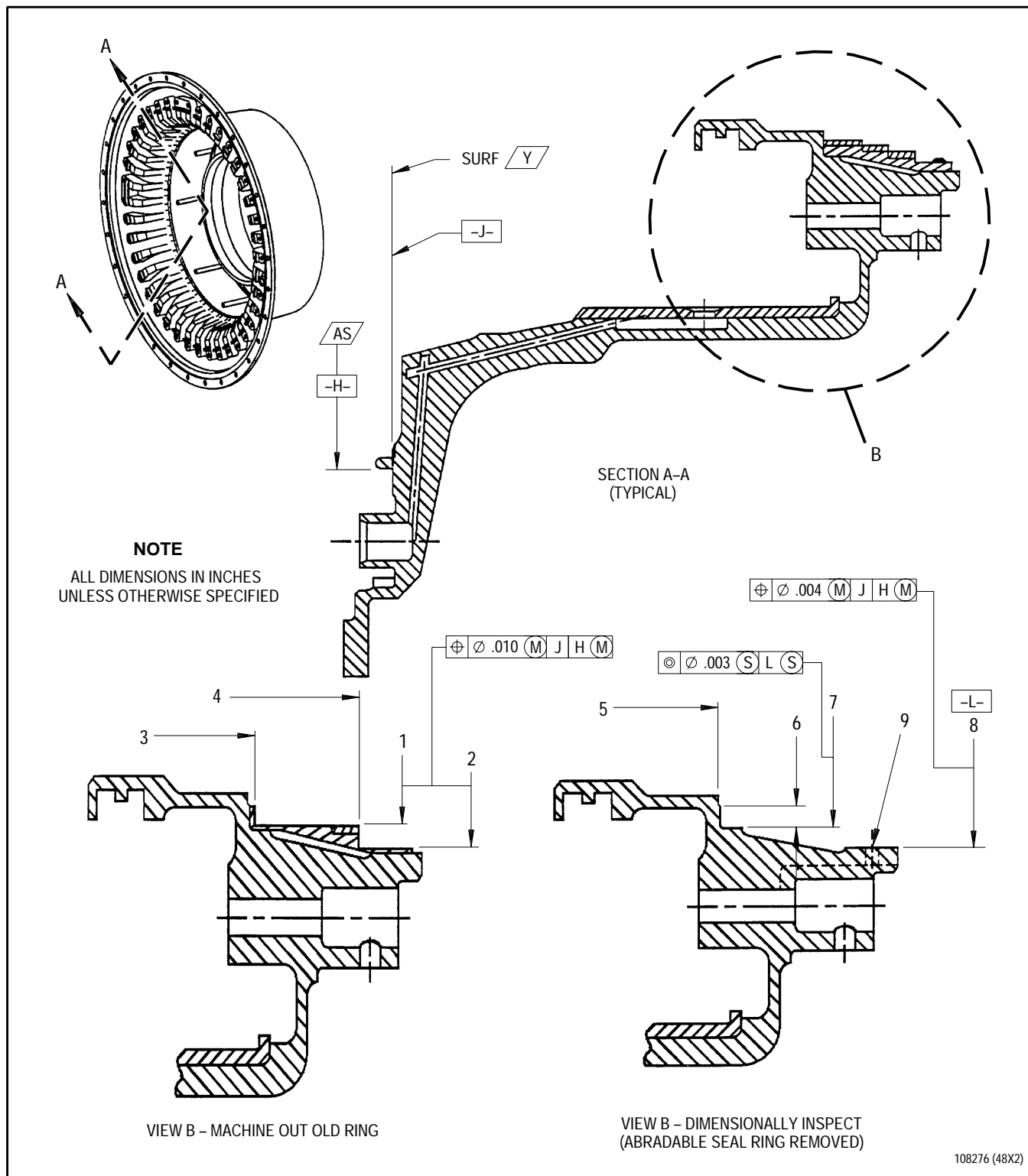


Figure 8. No. 3 Bearing Seal Support Assembly - Abradable Seal Ring Assembly Removal

Legend for figure 8

- Unless otherwise specified all dimensions apply when Surface Y is flat within 0.001 inch and Diameter AS maintains clearance envelope of 12.785 inches diameter in free state or constrained. Contact allowed on Surface Y and Diameter AS.
 - In free state, Surface Y is flat within 0.005 inch and Diameter AS is 12.778 to 12.786 inches diameter.
1. 7.224 inches diameter maximum
 2. 7.479 inches diameter maximum
 3. 3.932 inches minimum to Datum -J-
 4. 4.446 inches minimum to Datum -J-
 5. 3.862 to 3.882 inches to Datum -J-
 6. 0.080 to 0.120 inch
 7. 7.244 to 7.247 inches diameter
 8. 7.499 to 7.502 inches diameter
 9. 0.096 to 0.100 inch diameter (12 rivet holes)

- (8) Fluorescent penetrant inspect diameters (7 and 8) per SPOP 70 (high sensitivity penetrant). Refer to T.O. 2-1-111. Inspect per SFPS-M. No cracks allowed.

- (9) Wipe seal support assembly clean using acetone or alcohol per SPOP 208 to remove fluorescent penetrant residue. Refer to T.O. 2-1-111.

e. Install new PN 4061536 abradable seal ring assembly as follows:

- (1) Chill new abradable seal ring assembly using dry ice for 30 to 45 minutes prior to installation. Press seal ring assembly to seat into seal support assembly.
- (2) Verify abradable seal ring assembly is properly seated by checking dimension (3, figure 9).

NOTE

Enlarged or otherwise damaged rivet holes may be corrected by installation of replacement rivet one size larger in diameter. Refer to T.O. 2-1-111. It is permissible to index circumferentially provided 0.170 inch edge distance is maintained, drill jig has clearance for drilling and there is clearance for rivet anvil. Maximum number of rivet holes corrected by indexing circumferentially is six per seal support assembly with only one replacement rivet allowed per slot arc section. See figure 9.

f. Transfer drill new rivet holes as follows:

- (1) Transfer drill 12 rivet holes using existing holes in seal support assembly and PWA 71767 drill jig. Use No. 41 drill. Deburr holes as required but do not remove new abradable seal ring assembly to deburr holes. Refer to T.O. 2-1-111.

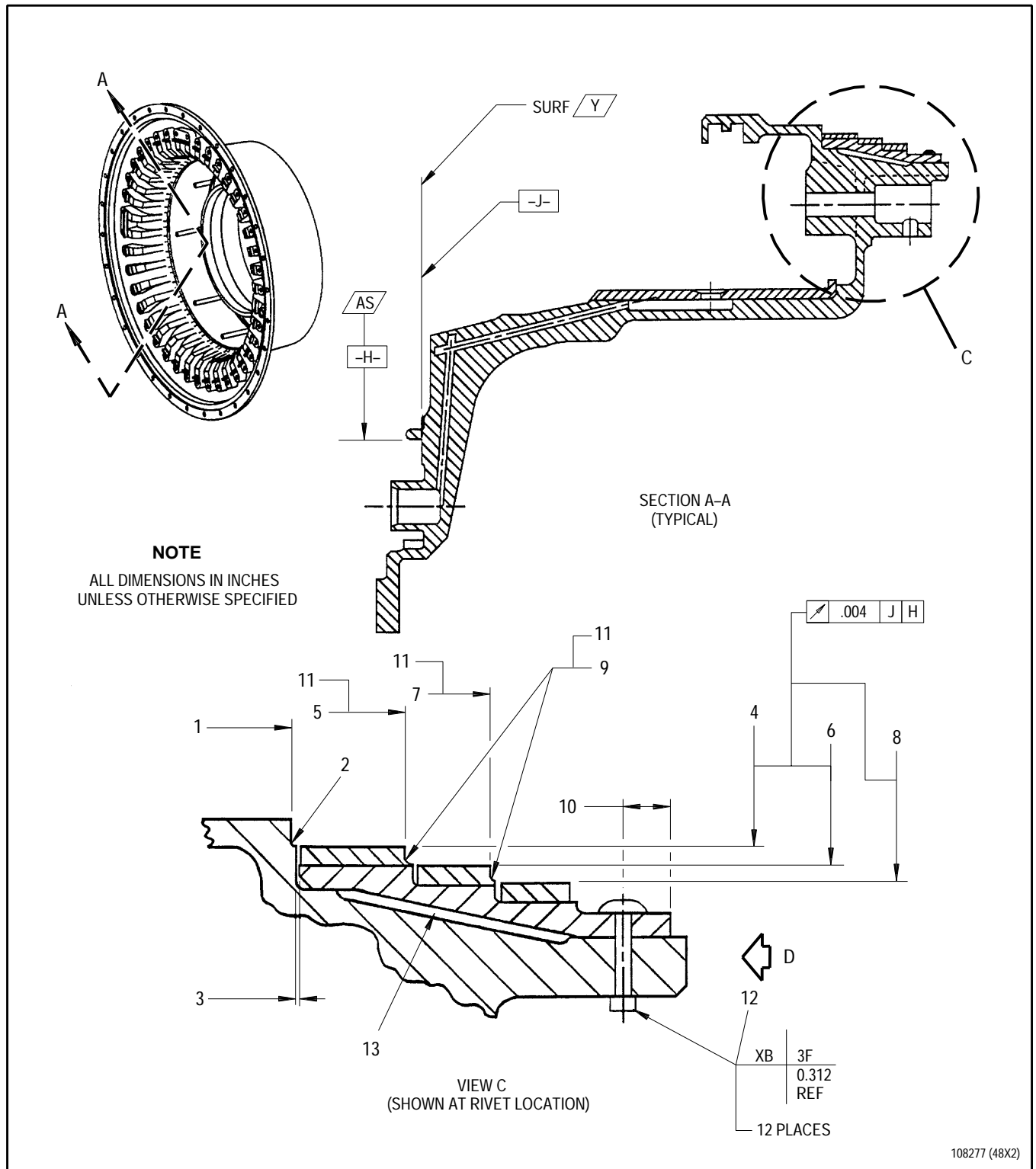
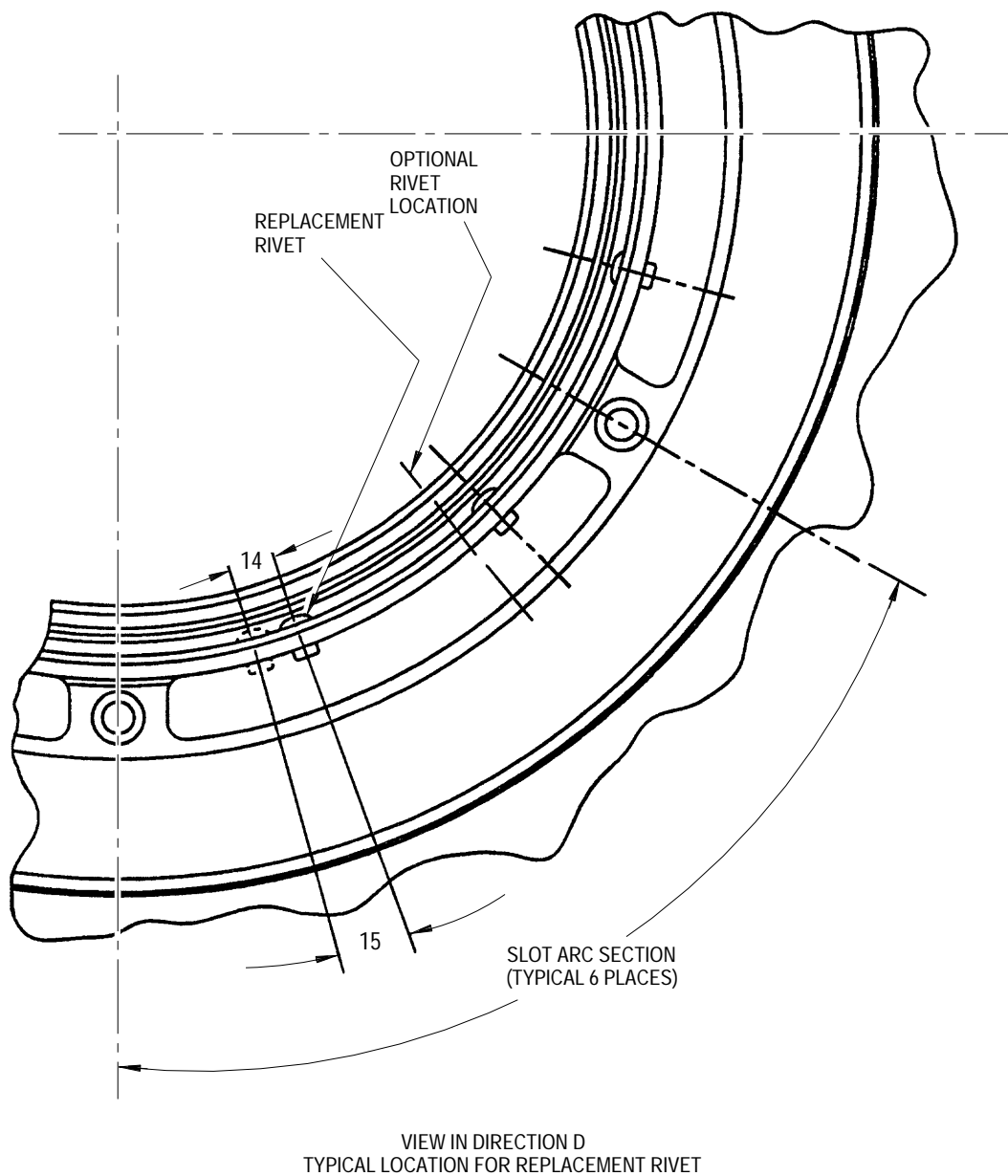


Figure 9. No. 3 Bearing Seal Support Assembly - Abradable Seal Ring Assembly Installation (Sheet 1 of 2)



108278 (48X2)

Figure 9. No. 3 Bearing Seal Support Assembly - Abradable Seal Ring Assembly Installation (Sheet 2 of 2)

Legend for figure 9

- Unless otherwise specified all dimensions apply when Surface Y is flat within 0.001 inch and Diameter AS maintains clearance envelope of 12.785 inches diameter in free state or constrained. Contact allowed on Surface Y and Diameter AS.
 - In free state, Surface Y is flat within 0.005 inch and Diameter AS is 12.778 to 12.786 inches diameter.
1. 3.862 to 3.882 inches to Datum -J-
 2. 0.016 to 0.031 inch modified radius
 3. 0.005 inch maximum gap
 4. 6.994 to 6.997 inches diameter
 5. 4.222 to 4.232 inches to Datum -J-
 6. 7.094 to 7.097 inches diameter
 7. 4.462 to 4.472 inches to Datum -J-
 8. 7.194 to 7.197 inches diameter
 9. 0.020 inch modified radius maximum
 10. 0.170 inch reference, 12 places
 11. Maintain clearance to this dimension, machine if required.
 12. Rivet PN AN123320, 12 places
 13. PN 4061536 abradable seal ring assembly
 14. 0.385 inch (one location per slot arc section)
 15. 6° reference

- (2) Dimensionally inspect rivet holes per dimension(9, figure 8).
 - (3) Wipe support assembly clean using acetone or alcohol per SPOP 208 to remove all machining chips. Refer to T.O. 2-1-111.
 - (4) Install rivets per figure 9 except minimum edge distance is waived. Refer to T.O. 2-1-111.
- g. Machine new seal lands on seal support assembly as follows:
- (1) Install seal support assembly in PWA 71763 fixture.
 - (2) Machine seal lands as shown in figure 9. Use PWA 71769 gage to inspect dimension(7) and PWA 71770 gage to inspect dimension(5).
 - (3) Visually inspect machined abradable surfaces for chipped areas. Chipped areas are acceptable to limits shown in table 1. If any parts do not meet these requirements, replace part.
- h. Clean seal support assembly as follows:
- (1) Clean per SPOP 208 to remove all masking material and all machining chips. Refer to T.O. 2-1-111.
 - (2) Power flush with clean fresh water. Chloride content of final rinse water prior to use shall be no greater than 25 ppm. Thoroughly rinse cavities of any and all substances. Rinse abradable seal lands to clean.
 - (3) Bake seal support assembly to dry at 250°F (121°C) for 60 minutes minimum.
- i. Install long and short pins per paragraph 7. Install heat shield per paragraph 4.
- j. Apply antigalling compound per paragraph 5.

Table 1. Abradable Seal Surfaces - Acceptable Chip Limits

Location	Total Quantity per Seal Land or Shroud Diameter	Maximum Length (Circumferential)	Maximum Width (Axial)	Maximum Depth	Minimum Separation
Edges	2	1 inch	7/64 inch	Full (a)	1 inch
All remaining surfaces	2	1/4 inch	1/4 inch	3/64 inch	1 inch
(a) Full depth of seal land or shroud abradable					

WORK PACKAGE

TECHNICAL PROCEDURES

TUBE ASSEMBLY, NO. 2 AND 3 BEARING OUTER, INTERNAL PRESSURE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the No. 2 and 3 bearing outer internal pressure tube assembly.

2. NO. 2 AND 3 BEARING PRESSURE INTERNAL TUBE ASSEMBLY - BLEND REPAIR.

- a. Blending requirements are as follows:
 - (1) All local blending shall extend to a distance of at least 15 times the depth of the damage from the center of the blend.
 - (2) Surface finish of all blends shall be as smooth or smoother than original finish.
- b. Blend repair unserviceable scratches and pits with depth more than 0.002 inch as follows:
 - (1) Use fine stone.
 - (2) Remove raised metal, sharp edges, and blend corners with less than 0.060 inch radius as required.
 - (3) Maximum depth of blend shall be 0.004 inch.

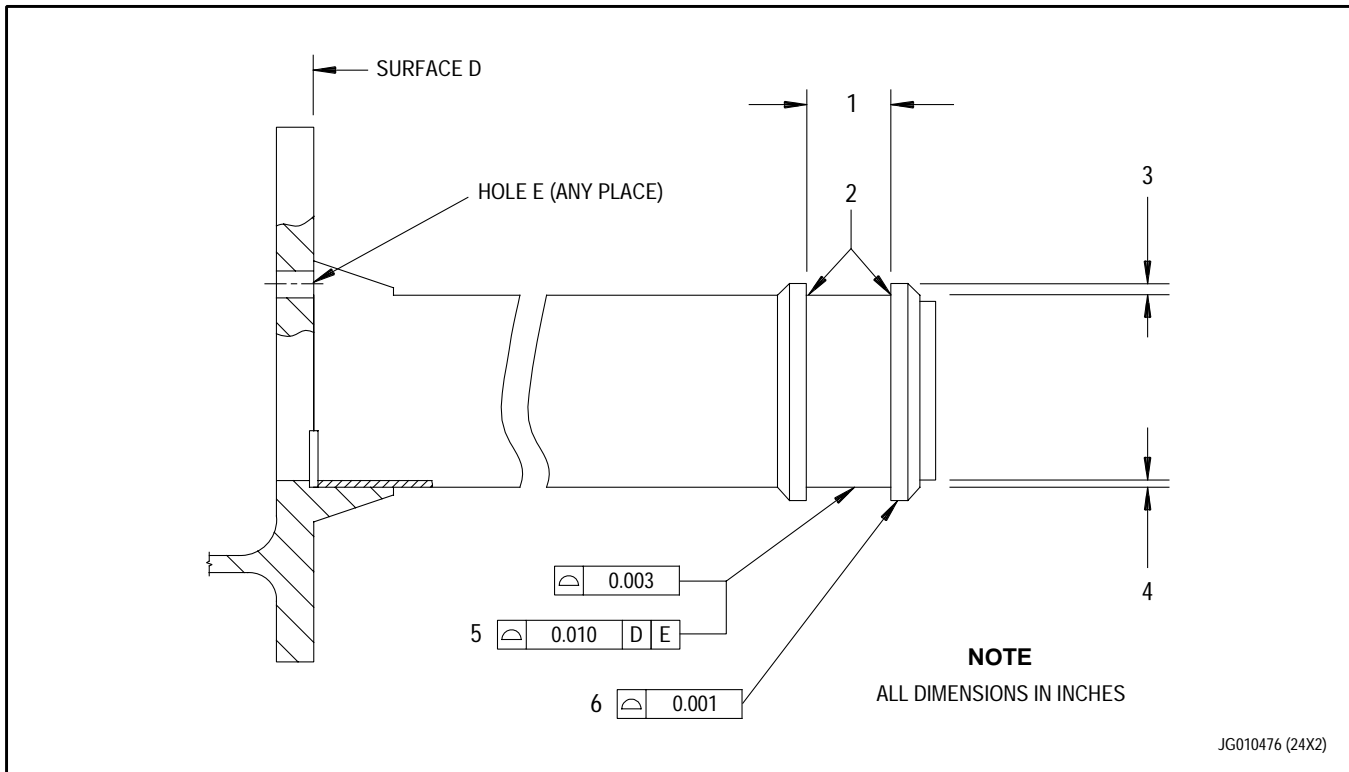
- c. Blend repair unserviceable nicks, gouges, and chafing as follows:

- (1) Use fine stone.
- (2) Remove raised metal, sharp edges, and blend corners with less than 0.060 inch radius as required.
- (3) Maximum depth of blend shall be 0.005 inch.

3. NO. 2 AND 3 BEARING PRESSURE INTERNAL TUBE ASSEMBLY - OVAL RACETRACK REPAIR.

(See Figure 1.)

- a. Lap or polish ring groove to remove sharp edges and a raised metal until as smooth or smoother than surrounding material. Remove minimum amount of material.
- b. Maintain dimensions shown in figure 1.



1. 0.090 to 0.100 inch
2. 0.005 to 0.015 inch modification radius
3. 0.052 maximum
4. 0.005 minimum
5. Profile of this surface to be ± 0.0015 inch all around. Profile of this surface to be ± 0.005 inch in relation to Surface D and the diameter of Hole E.
6. Profile of this surface to be ± 0.0005 inch.

Figure 1. No. 2 and 3 Bearing Pressure Internal Tube Assembly - Oval Racetrack Repair

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 2 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	26	5 - 8 Added	26		

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE, CROCUS	P-C-458
DRY ICE	-

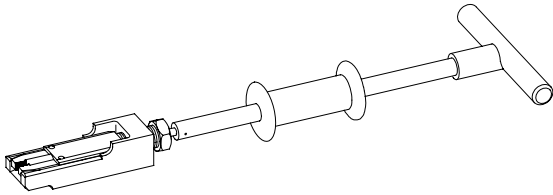
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
PIN, STRAIGHT, HEADLESS, DRILLED	4018610	3
PIN, STRAIGHT, HEADLESS	4023734	3
PIN, STRAIGHT, HEADLESS	4044206	6

APPLICABLE SUPPORT EQUIPMENT

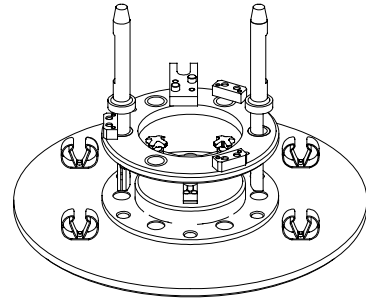
Paragraph	Function - Tool Nomenclature	Tool Number
3	NO. 2 BEARING SUPPORT ASSEMBLY - HEADLESS STRAIGHT PIN REPLACEMENT	
	FIXTURE, ALIGNMENT, NO. 2 BEARING, SUPPORT - - - - -	PWA 71549
	ADAPTER, PULLER, UNIVERSAL - - - - -	PWA 71537

ILLUSTRATED SUPPORT EQUIPMENT



PWA 71537 -C

Figure T1. PWA 71537 ADAPTER



PWA 71549 -C

Figure T2. PWA 71549 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 2 bearing support assembly.

2. NO. 2 BEARING SUPPORT ASSEMBLY - HEADLESS STRAIGHT PIN REPAIR.

- a. Blend repair wear marks, scratches, and nicks by polishing with fine crocus cloth, P-C-458, in a lengthwise direction with respect to pin. The following blending requirements apply:
 - (1) All local blending shall extend a distance of at least 15 times depth of damage.
 - (2) Surface finish of all blends shall be as smooth or smoother than original finish.
 - (3) Pin diameter shall not be reduced more than 0.002 inch with blend repair.

3. NO. 2 BEARING SUPPORT ASSEMBLY - HEADLESS STRAIGHT PIN REPLACEMENT.

(See Figures 1 and 2.)

NOTE

No. 2 bearing support assembly contains three short and three long headless straight pins in an alternating pattern. Long pins have cross-drilled holes in one end.

- a. Identify locations of short pins(1, figure 1) and long pins(10) if more than one pin requires replacement.

- b. Install support assembly into PWA 71549 fixture as follows:

- (1) Place fixture base(9, figure 2) on clean flat work surface. Remove two drifts(1 and 2) and top plate(4) from fixture.
- (2) Loosen three hand knobs(10) and rotate clamps(11) to side.
- (3) Install support assembly(7), front end down, onto fixture base(9) with ID of support assembly centered over pilot diameter of fixture base.
- (4) Rotate clamps(11) to radial position to engage support assembly and secure using hand knobs(10).

- c. Remove staked headless straight pin(7, figure 1) as follows:



Failure to use care when drilling staked pin can result in damage to support assembly.

- (1) Drill out staked pin with a No. 43 drill (0.089 inch diameter). Drill 0.205 to 0.225 inch deep. Be careful not to damage support assembly parent material.
- (2) Remove remaining part of staked pin using standard extractor type tool.

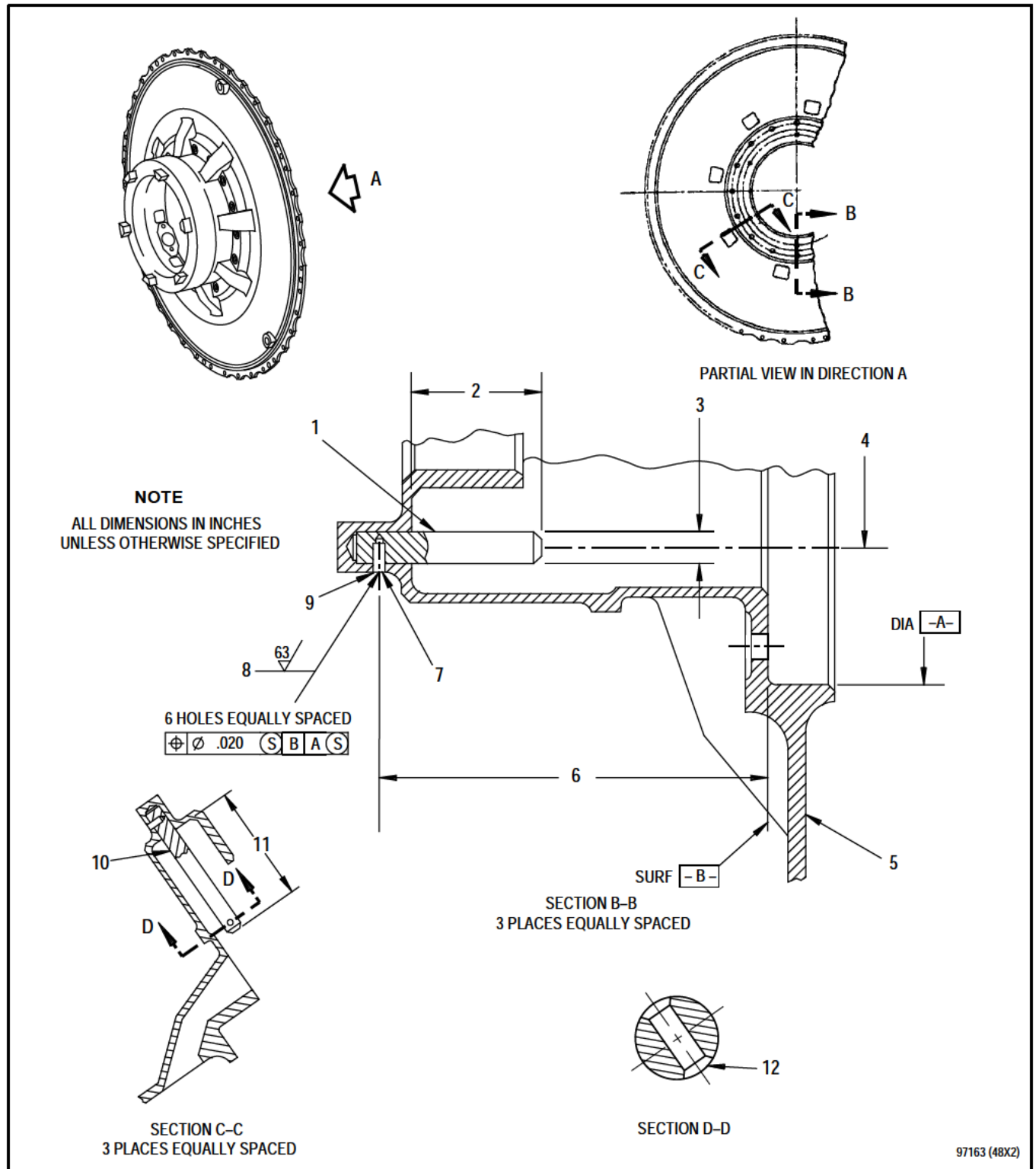


Figure 1. No. 2 Bearing Support Assembly - Headless Straight Pin Replacement

Legend for figure 1

1. PN 4023734 headless straight pin (short), 3 places equally spaced
2. 0.890 inch maximum
3. 0.232 inch diameter clearance envelope, 6 places relative to Diameter A and Surface B
4. 6.220 inches diameter
5. No. 2 bearing support assembly PN 4072840 (reference)
6. 2.680 inches
7. PN 4044206 headless straight pin, 6 places
8. 0.0922 to 0.0932 inch diameter to depth of 0.205 to 0.225 inch, 6 places equally spaced
9. Stake 2 places 180° apart, 6 places equally spaced
10. PN 4018610 headless straight pin (long), 3 places equally spaced
11. 1.570 inches maximum
12. Hole in true direction within 10° relative to Surface B and Diameter A Regardless of Feature Size

d. Remove unserviceable pins(1 or 10) using PWA 71537 adapter(16, figure 2) as follows:

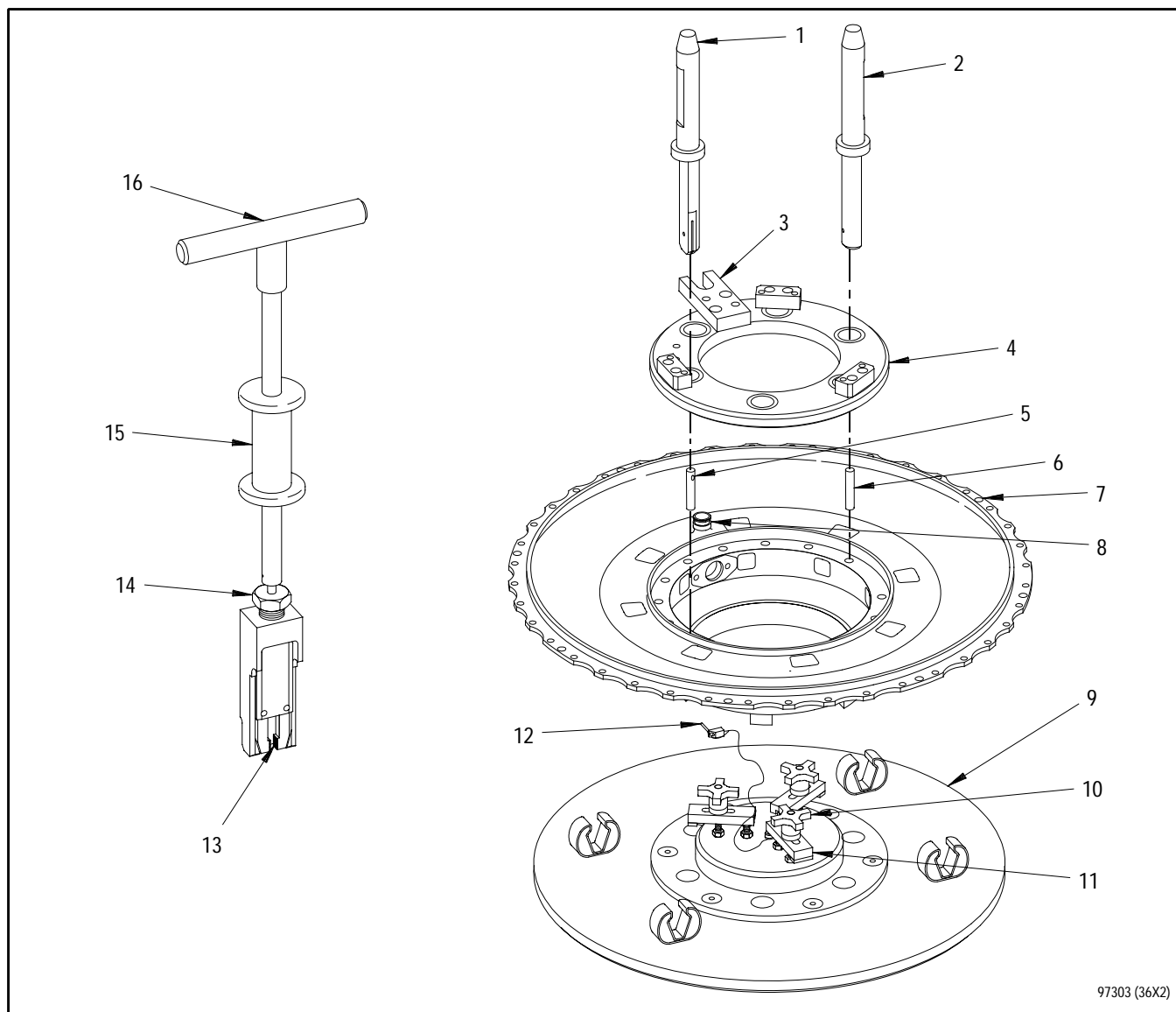
- (1) Rotate plunger(14) counterclockwise to open jaws(13).
- (2) Install adapter over pin so that pin fits inside jaws. Rotate plunger(14) clockwise to clamp jaws onto pin.
- (3) Remove pin from support assembly using slide hammer(15).
- (4) Rotate plunger(14) counterclockwise to open jaws(13). Remove pin from adapter. Discard pin.
- (5) Repeat steps (1) through (4) to remove remaining pins.

e. Install new pins(5 or 6) in previously marked locations as follows:

- (1) Install PWA 71549 fixture top plate(4) into ID of support assembly(7), aligning timing fork(3) with oil port boss(8) on support assembly.
- (2) Chill pins in dry ice for 20 minutes minimum.

NOTE

- Drifts(1 and 2) and top plate(4) are marked by pin part number for installing short and long pins in correct location.
 - Drifts are designed to install pins to correct depth.
- (3) Install PN 4023734 short pins(6) as follows:
- (a) Install chilled pin into hole in end of drift(2) until pin is bottomed and held in place by ball plunger.



1. Drift for PN 4018610 headless straight pin
2. Drift for PN 4023734 headless straight pin
3. Timing fork
4. PWA 71549 fixture top plate
5. PN 4018610 headless straight pin (long)
6. PN 4023734 headless straight pin (short)
7. No. 2 bearing support assembly
8. Oil port boss
9. PWA 71549 fixture base
10. Hand knob
11. Clamp
12. Locating slide pin
13. Jaws
14. Plunger
15. Slide hammer
16. PWA 71537 adapter

**Figure 2. No. 2 Bearing Support Assembly - Headless Straight Pin Replacement
Using PWA 71537 Adapter and PWA 71549 Fixture**

- (b) Insert drift through bushing in top plate marked INSTALL PIN 4023734. Install pin to bottom in support assembly using standard arbor press or mallet.
- (c) Allow pin temperature to normalize with support assembly and remove drift.
- (d) Repeat steps (a) through (c) for remaining two pins.
- (4) Install PN 4018610 long pins(5) as follows:
 - (a) Install locating slide pin(12) through cross-drilled hole in chilled pin(5).
 - (b) Align locating slide pin(12) with slot in end of drift(1) and install pin(5) into hole in end of drift until pin is bottomed and held in place by ball plunger.
 - (c) Remove locating slide pin(12).
 - (d) Insert drift through bushing in top plate marked INSTALL PIN 4018610. Install pin to bottom in support assembly using standard arbor press or mallet.
 - (e) Allow pin temperature to normalize with support assembly and remove drift.
 - (f) Repeat steps (a) through (e) for remaining two pins.

- (5) Remove top plate(4).
- (6) Verify installed lengths(2 and 11, figure 1) of pins(1 and 10) using standard measuring equipment. Verify position of cross-drilled hole(12) in long pins(10).

f. Install new staked pins(7) as follows:



Failure to use care when drilling pin hole can result in damage to support assembly.

- (1) Transfer drill 0.0922 to 0.0932 inch diameter pin hole(8) into short or long pin(1 or 10) using existing hole in support assembly as a guide. Drill 0.205 to 0.255 inch deep. Be careful not to damage support assembly parent material.
 - (2) Chill pins(7) in dry ice for 20 minutes minimum.
 - (3) Install pins using brass mallet.
 - (4) Stake(9) each pin two places 180 degrees apart using center punch and hammer.
- g. Remove support assembly from PWA 71549 fixture.

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, GEARBOX DRIVE BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Plasma and Flame Spray Coating Procedures, General - - - - -	WP 096 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the gearbox drive bearing housing.

**2. GEARBOX DRIVE BEARING HOUSING -
SNAP DIAMETER REPAIR.**

(See Figure 1.)

- a. Clean up machine Diameter A to 4.140 to 4.152 inches. Hold to minimum value.
- b. Clean up machine Diameter C to 5.260 to 5.275 inches. Hold to maximum value.
- c. Fluorescent penetrant inspect housing. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Plasma coat area(4, figure 1) of Diameter A or Diameter C, as required, per PWA 53-37 to 4.123 inches maximum (Diameter A) and 5.292 inches minimum (Diameter C). Refer to T.O. 2J-F100-53-1, WP 096 00.
- e. Finish machine Diameter A to 4.1335 to 4.1340 inches. Maintain 0.002 inch minimum coating thickness.
- f. Finish machine Diameter C to 5.281 to 5.282 inches. Maintain 0.002 inch minimum coating thickness.

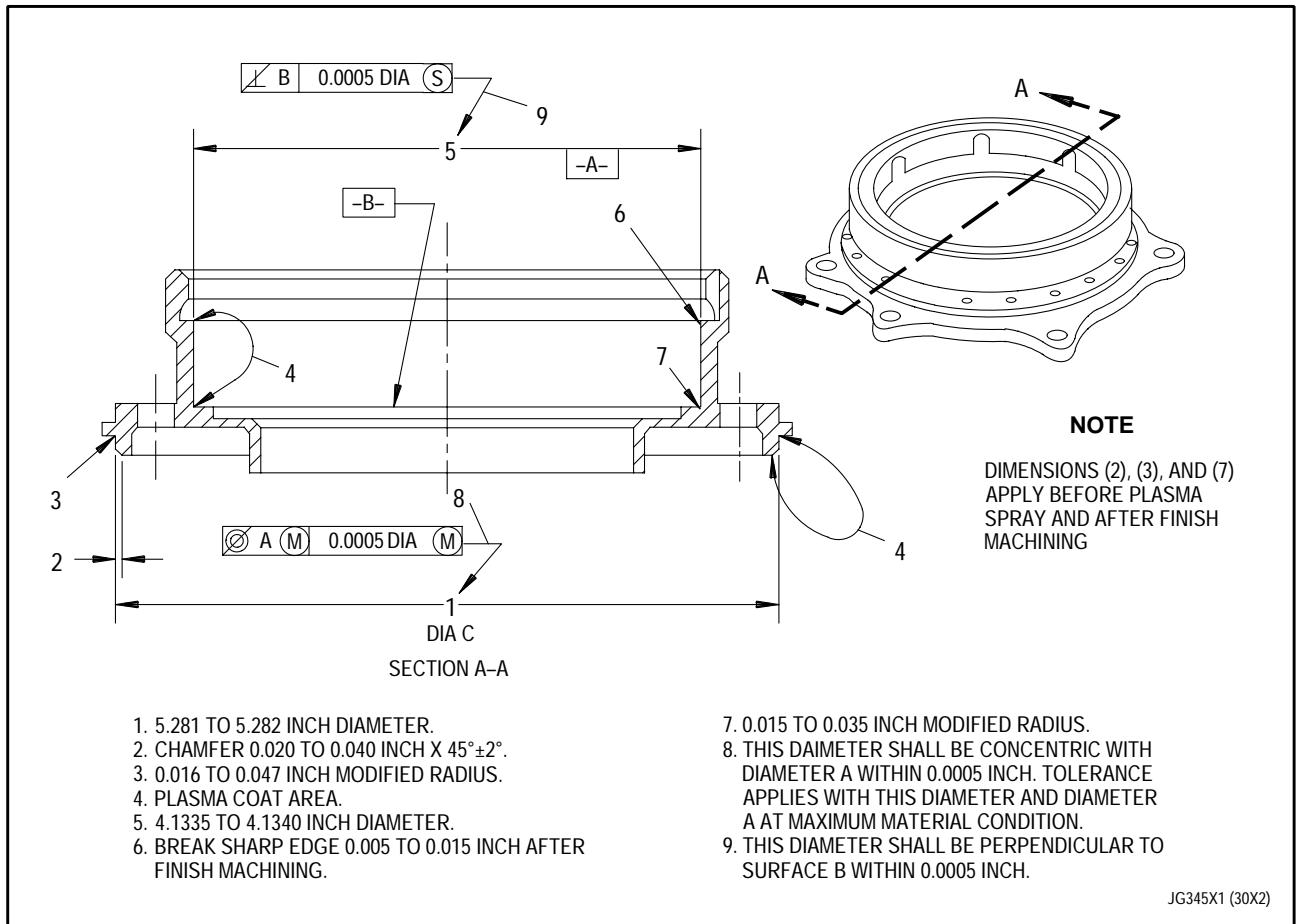


Figure 1. Gearbox Drive Bearing Housing - Snap Diameter Repair

WORK PACKAGE

TECHNICAL PROCEDURES

GEAR AND GEARSHAFT, BEVEL, GEARBOX DRIVE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 12	0

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Peening, Steel Shot (SPOP 501) - - - - -	SWP 091 08
Plating, Chromium, On Steel, Nickel, or Cobalt (SPOP 22) - - -	SWP 092 06
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Shot, steel, cast, Size 110	MIL-S-13165/SAE110
Shot, steel, cast, Size 170	MIL-S-13165/SAE170

EXPENDABLE ITEMS

None

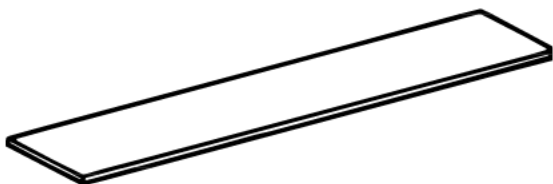
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	Gearbox Drive Bevel Gearshaft (38 Teeth) - Bearing Journal Repair	
	Test Strip, Almen - - - - -	PWA 32704
	Fixture, Machining - Gearbox drive bevel gearshaft, Diameter A - - - - -	SAALC 7944975
	Fixture, Machining - Gearbox drive bevel gearshaft, Diameter B - - - - -	SAALC 7944976
	Fixture, Shotpeen - Gearbox drive bevel gearshaft -	SAALC 7944977
	Holder, Almen Test Strip - Gearbox drive bevel gearshaft - - - - -	SAALC 7944978
	Cover, Shotpeen - Gearbox drive bevel gearshaft, Diameter A, inner - - - - -	SAALC 7944979

APPLICABLE SUPPORT EQUIPMENT (continued)

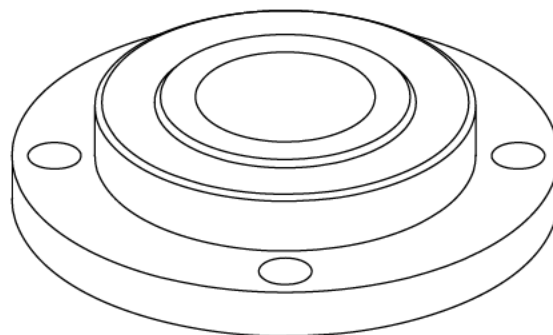
Paragraph	Function - Tool Nomenclature	Tool Number
3	Gearbox Drive Bevel Gearshaft (38 Teeth) - Bearing Journal Repair (continued)	
	Cover, Shotpeen - Gearbox drive bevel gearshaft, Diameter A, outer - - - - -	SAALC 7944980
	Cover, Shotpeen - Gearbox drive bevel gearshaft, Diameter B, inner - - - - -	SAALC 7944981
	Cover, Shotpeen - Gearbox drive bevel gearshaft, Diameter B, outer - - - - -	SAALC 7944982
	Fixture, Plating - Gearbox drive bevel gearshaft -	SAALC 7944983
	Ring set master - - - - -	SAALC 8041592
	Plug set master - - - - -	SAALC 8041593

ILLUSTRATED SUPPORT EQUIPMENT



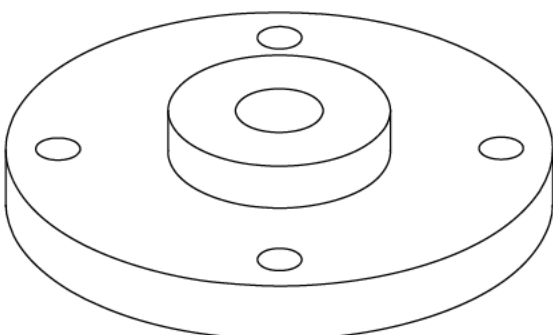
PWA 32704 -C

Figure T1. PWA 32704 Test Strip



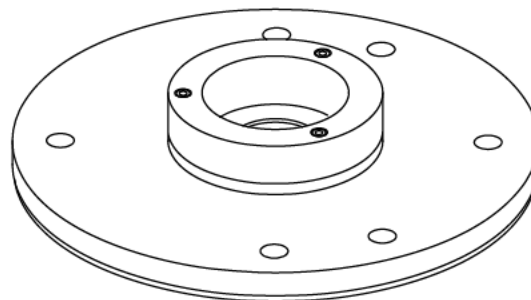
SAALC 7944975 -C

Figure T2. SAALC 7944975 Fixture



SAALC 7944976 -C

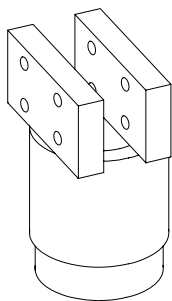
Figure T3. SAALC 7944976 Fixture



SAALC 7944977 -C

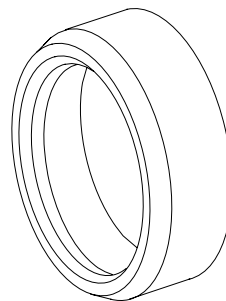
Figure T4. SAALC 7944977 Fixture

ILLUSTRATED SUPPORT EQUIPMENT (continued)



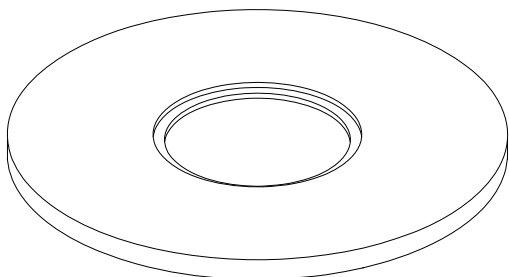
SAALC 7944978 -C

Figure T5. SAALC 7944978 Holder



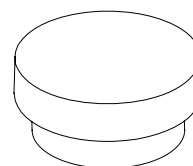
SAALC 7944979 -C

Figure T6. SAALC 7944979 Cover



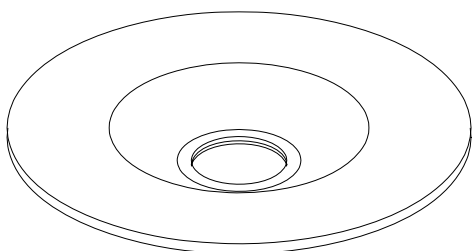
SAALC 7944980 -C

Figure T7. SAALC 7944980 Cover



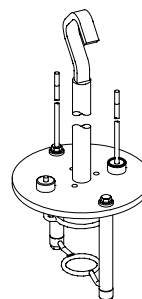
SAALC 7944981 -C

Figure T8. SAALC 7944981 Cover



SAALC 7944982 -C

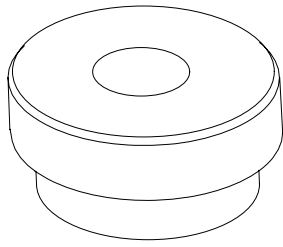
Figure T9. SAALC 7944982 Cover



SAALC 7944983 -C

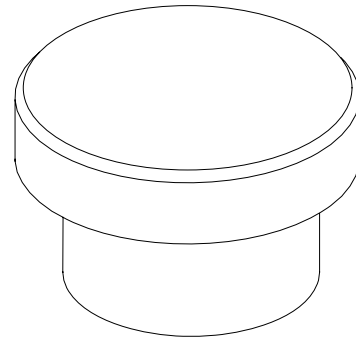
Figure T10. SAALC 7944983 Fixture

ILLUSTRATED SUPPORT EQUIPMENT (continued)



SAALC 8041592 -C

Figure T11. SAALC 8041592 Ring



SAALC 8041593 -C

Figure T12. SAALC 8041593 Plug

T.O. 2J-F100-53-7

WP 411 00

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the gearbox drive bevel gear and gearshaft.

2. GEARBOX DRIVE BEVEL GEARSHAFT (38 TEETH) - GEARTEETH REPAIR.

(See Figure 1.)

NOTE

- It is not necessary to polish repair after high spots are removed.
- Do not attempt to remove entire damaged area.
 - a. Remove minor surface damage to gearteeth(3, figure 1) by stoning high spots.
 - b. Break all sharp edges.

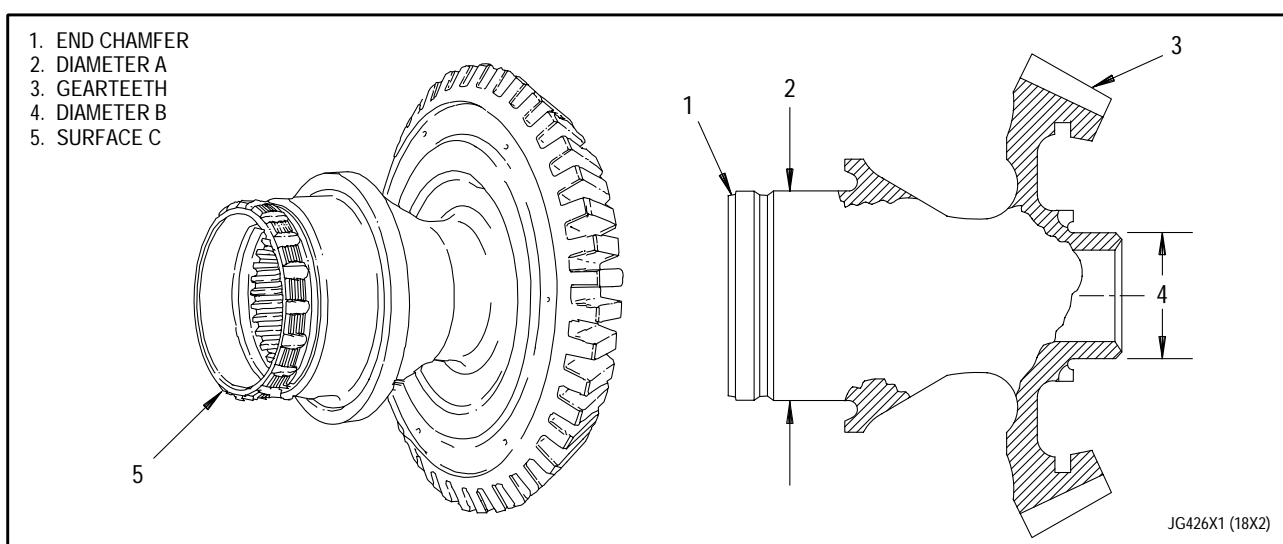


Figure 1. Gearbox Drive Bevel Gearshaft (38 Teeth) - Gearteeth Repair

**3. GEARBOX DRIVE BEVEL GEARSHAFT
(38 Teeth) - BLENDING.**

(See Figure 1.)

- a. Blend nicks and gouges on Diameters A and B(2 and 4, figure 1) up to 0.030 inch depth and Surface C(5) up to 0.010 inch depth.
- b. Blend using fine stones. Remove raised metal.

**4. GEARBOX DRIVE BEVEL GEARSHAFT
(38 Teeth) - BEARING JOURNAL REPAIR.**

(See Figure 2.)

NOTE

- Parent material is AMS 6260 steel and is case hardened to Rockwell C60 to 67.
 - Gearshaft is carburized.
- a. Magnetic particle inspect. Refer to T.O. 2J-F100-9. No cracks allowed.
 - b. Clean up machine diameter(s) as follows:
 - (1) Lightly secure fixture to grinding machine face plate with four bolts and nuts, large end against face plate.
 - (a) To repair Diameter A, use SAALC 7944976 fixture.
 - (b) To repair Diameter B, use SAALC 7944975 fixture.

(2) Centralize fixture as follows:

- (a) Use SAALC 8041592 ring set master for SAALC 7944975 machining fixture.
- (b) Use SAALC 8041593 plug set master for SAALC 7944976 machining fixture.
- (c) Install appropriate set master on locating diameter of fixture. Actuate hydraulic fixture to secure set master in place.
- (d) Take runout on set master to centralize fixture. (See figure 2.)
- (e) Centralize fixture by tapping with phenolic or rawhide mallet.
- (f) When desired runout has been obtained, secure fixture to machine table by tightening nuts.
- (g) Deactivate fixture and remove set master.

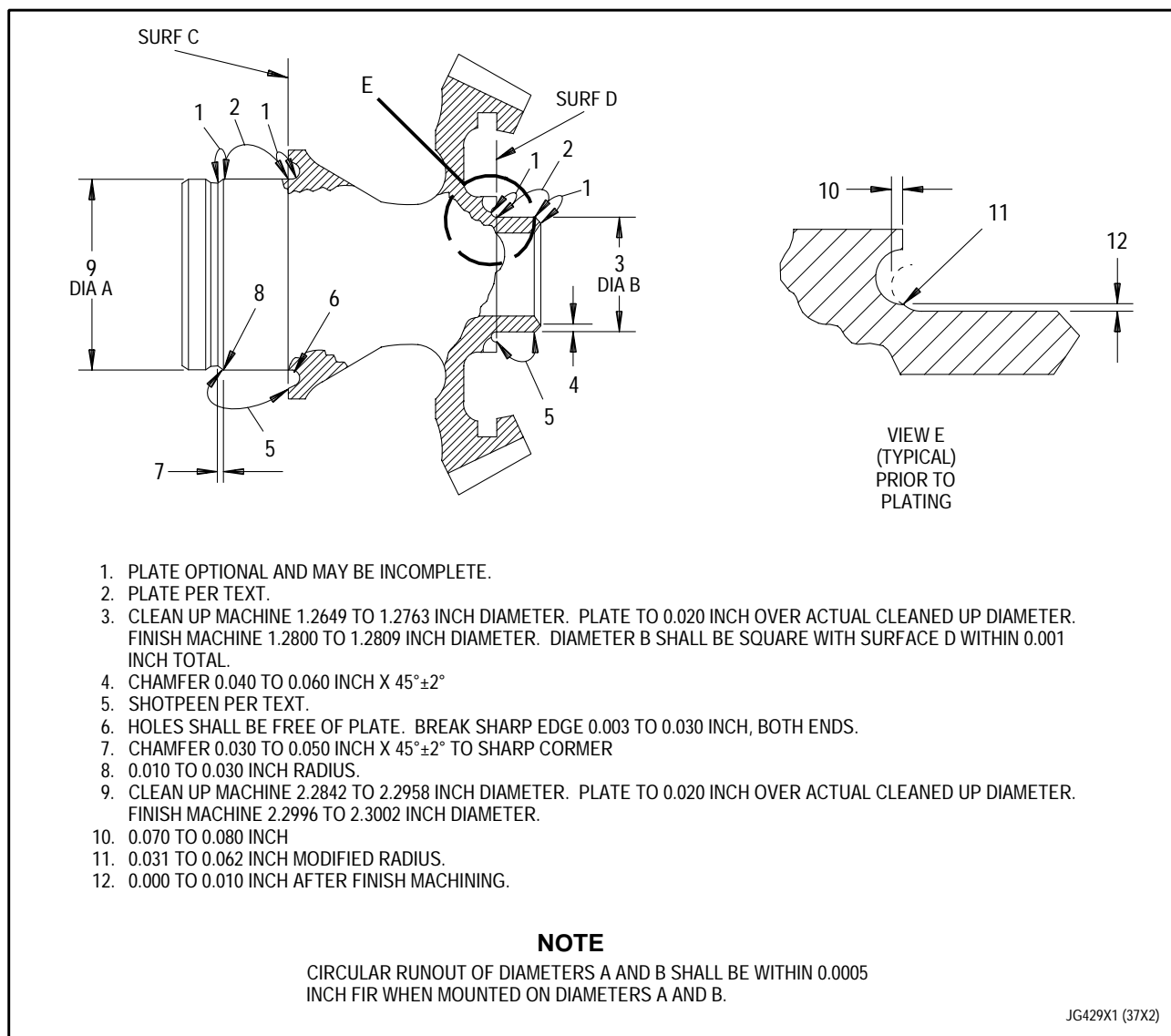


Figure 2. Gearbox Drive Bevel Gearshaft (38 Teeth) - Bearing Journal Repair



Make sure that all locating diameters and surfaces on fixture and gearshaft are clean. Imperfections on these surfaces may cause incorrect machining of part.

NOTE

It may be necessary to tap gearshaft using phenolic or rawhide mallet to ensure proper contact between fixture and gearshaft.

- (3) Position gearshaft in fixture, gear end toward fixture to machine Diameter A(9) or gear end out to machine Diameter B(3). Secure gearshaft in place by actuating expansion bolt.

- (4) Check repair surface for runout. (See figure 2.)

- (5) Clean up machine diameters to dimensions(9 and 3).

- (6) Remove gearshaft from fixture.

c. Shotpeen gearshaft as follows:

- (1) Secure SAALC 7944977 fixture to shotpeen table, large end down, and install SAALC 7944978 holder into center opening.

- (2) Install PWA 32704 test strip to holder and secure with screws.

- (3) Shotpeen test strip, adjusting gun until intensity equivalent to 10 to 13A is obtained. Measure intensity with almen gage.

- (4) Remove test strip and holder from fixture.

- (5) To shotpeen Diameter A(5), proceed as follows:

- (a) Position gearshaft in fixture, gear end down.

- (b) Install SAALC 7944980 cover around shoulder adjacent to journal.

- (c) Install SAALC 7944979 cover at end of large journal.

- (d) Shotpeen Diameter A(5) to 10 to 13A intensity. Use SAE 110 maximum cast steel shot. Use of SAE 170 shot is permissible if required to meet intensity requirement. Refer to T.O. 2J-F100-53-1, SWP 091 08 (SPOP 501).

- (e) Remove covers from gearshaft and remove gearshaft from fixture.

(6) To shotpeen Diameter B(5), proceed as follows:

(a) Position gearshaft in fixture, gear end up.

(b) Install SAALC 7944981 cover at end of small journal.

(c) Install SAALC 7944982 cover on gearteeth.

(d) Shotpeen areas shown per T.O. 2J-F100-53-1, SWP 091 08 (SPOP 501) with intensity of 10A to 13A using SAE 110 maximum cast steel shot. Use of SAE 170 shot is permissible, if required to meet intensity.

(e) Remove covers from gearshaft and remove gearshaft from fixture.

d. Chromium plate repair diameter(3 and 9) as follows:

(1) Remove two capscrews securing anode to posts of SAALC 7944983 fixture. Remove anode.

(2) Place gearshaft threaded end through inner anode assembly, engaging threads of holder.

(3) Replace anode and secure to posts using two capscrews.

(4) Lower assembly into plating tank and attach anode leads.



Do not bake gearshafts before or after plating. Carburized parts may be adversely affected by bake temperature.

(5) Chromium plate per T.O. 2J-F100-53-1, SWP 092 06 (SPOP 22), except omit baking before and after plating. Remove gearshaft from fixture.

e. Finish machine plated areas(3 and 9) as follows:

(1) Set up gearshaft for machining per steps b.(1) through b.(4).

(2) Finish machine gearshaft plated areas.

(3) Remove gearshaft from fixture.

f. Magnetic particle inspect. Refer to T.O. 2J-F100-9. No cracks allowed.

**5. GEARBOX DRIVE BEVEL GEAR
(73 Teeth) - JOURNAL BLEND REPAIR.**

(See Figure 3.)

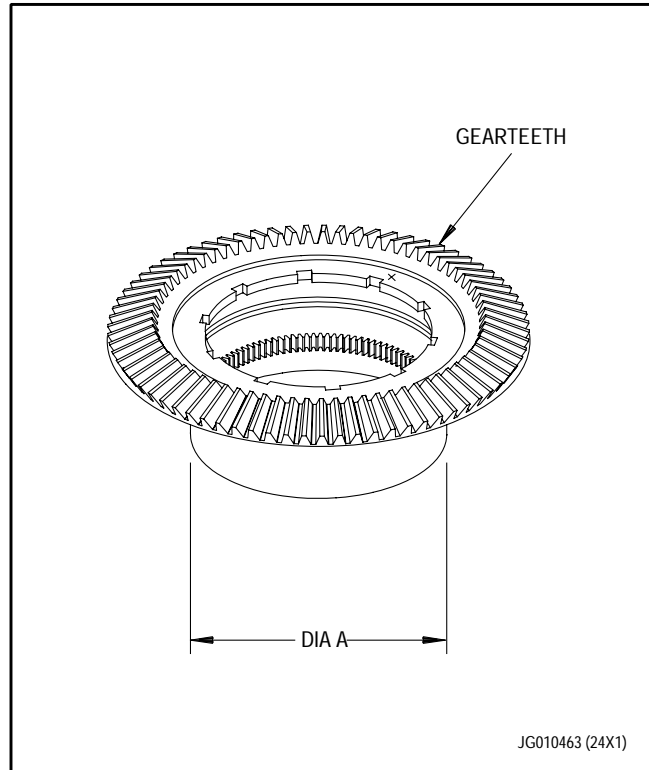
- a. Blend nicks and scratches on Diameter A contact area up to 0.010 inch deep.
- b. Blend using fine stones. Remove raised metal.

**6. GEARBOX DRIVE BEVEL GEAR -
GEARTEETH REPAIR.**

(See figure 3.)

NOTE

- It is not necessary to polish repair after high spots are removed.
 - Do not attempt to remove entire damaged area.
- a. Remove minor surface damage by stoning high spots. Maximum depth 0.002 inch deep.
 - b. Break all sharp edges.



**Figure 3. Gearbox Drive Bevel Gear (73 Teeth) -
Blending**

WORK PACKAGE

TECHNICAL PROCEDURES

COUPLING, TURBINE SHAFT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	1
2	-	3	.	.	0
4	1

T.O. 2J-F100-53-7

WP 412 00

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Compound, Antigalling (PWA 550) Application - - - - -	SWP 098 07

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Compound, antigalling (PWA 550)	Hi-T 650 or Lubri-Bond HT

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of the turbine shaft coupling.

2. TURBINE SHAFT COUPLING - BLEND REPAIR.

- a. Blending requirements are as follows:

- (1) All local blending shall extend to a distance of at least 15 times the depth of the damage.
- (2) Surface finish of all blends shall be as smooth or smoother than original finish.

- b. Blend repair unserviceable nicks, scratches, and gouges all over turbine shaft coupling as follows:

- (1) Use fine stone.

- (2) Remove raised metal as required.

- (3) Blend damage all over up to a maximum of 0.008 inch in depth.

- c. Blend repair unserviceable pits, nicks, and dents in all splined areas as follows:

- (1) Use fine stone.

- (2) Remove raised metal as required.

- (3) Blend spline damage up to a maximum of 0.007 inch in depth.

- d. Blend repair unserviceable galling on all threads as follows:

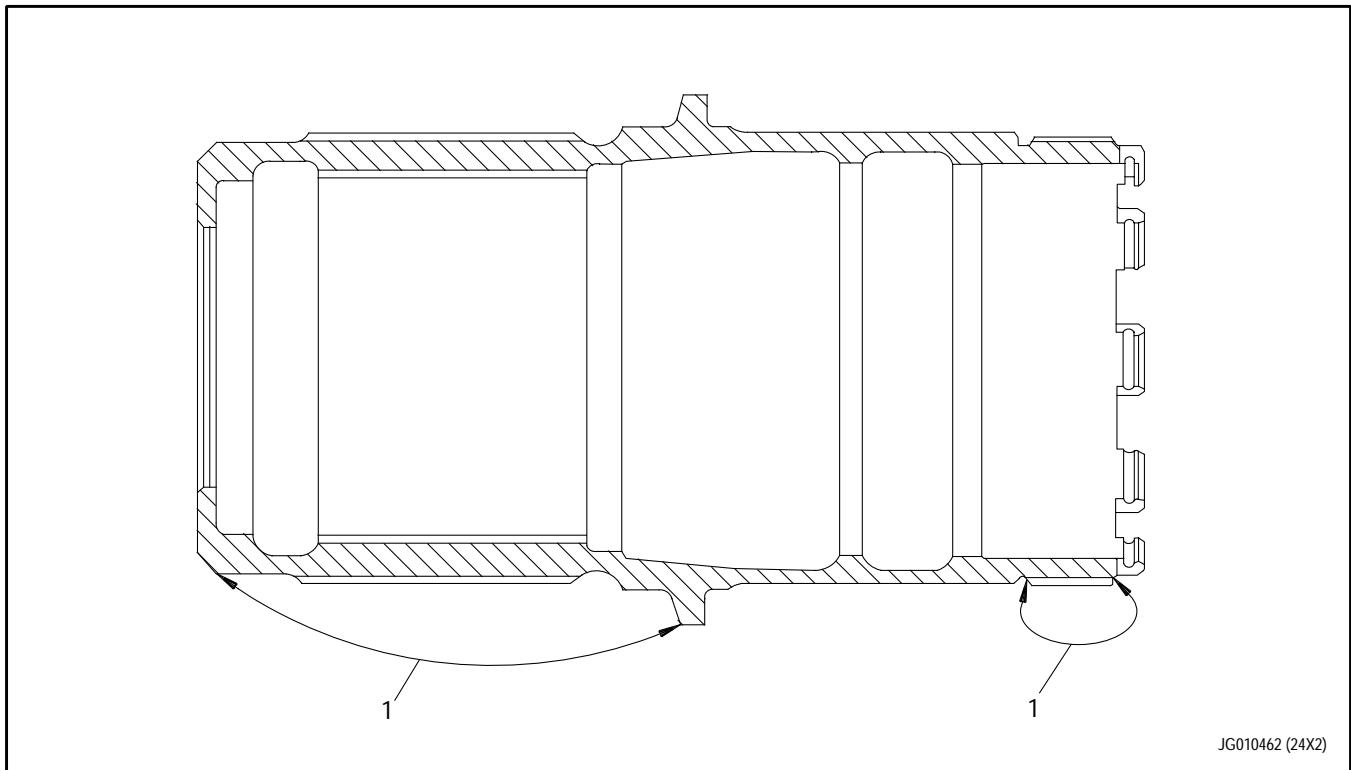
- (1) Use fine stone.

- (2) Remove raised metal and pickup as required.

**3. TURBINE SHAFT COUPLING -
ANTIGALLING COMPOUND APPLICATION.**

(See Figure 1.)

- a. Apply PWA 36545 antigalling compound to area(1). Refer to T.O.2J-F100-53-1, SWP 098 07 (SPOP 748). Surface preparation is not permitted.



1. Apply antigalling compound per text.

Figure 1. Turbine Shaft Coupling - Antigalling Compound Application

WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP ASSEMBLY, NO. 2 BEARING, FRONT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 9					0
10 Blank					0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures - Marking, General - - - - -	WP 023 00
Lapping of Main Bearing Carbon Seals, Seal Plates, and Spacers - - - - -	SWP 091 05
Plating, Nickel, on Stainless Steel, Nickel, or Cobalt - - - -	SWP 092 10

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the No. 2 bearing front scoop assembly.

**2. NO. 2 BEARING FRONT SCOOP
ASSEMBLY - BLEND REPAIR.**

- a. Blending requirements are as follows:
 - (1) All local blending shall extend to a distance of at least 15 times the depth of the damage.

- (2) Surface finish of all blends shall be as smooth or smoother than original finish.

- b. Blend repair unserviceable scratches, dents, and nicks as follows:

- (1) Use fine stone.
 - (2) Remove raised metal as required.

3. NO. 2 BEARING FRONT SCOOP ASSEMBLY - LAPPING REPAIR.

(See Figures 1 and 2.)

- a. If surface with pin requires lapping, remove pin per paragraph 4.
- b. Lap repair scoop assembly as follows:
 - (1) During lapping do not reduce Dimension X below 0.691 inch minimum thickness.
(See figure 1.)
 - (2) Lap sealing surface to obtain required surface finish specified in figure 1.

(3) Lapping equipment shall be properly maintained. Refer to T.O. 2J-F100-53-1, SWP 091 05.

(4) Follow manufacture's instructions.

(5) Check flatness of lap surface frequently.

- c. If previously removed, install pin per paragraph 4.
(See figure 2.)

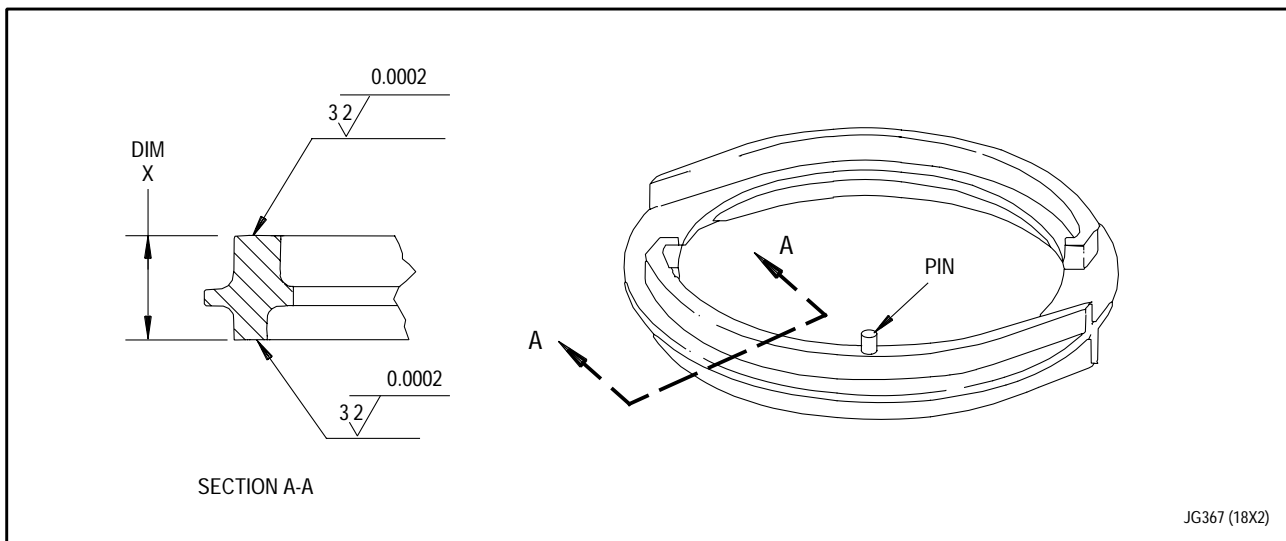


Figure 1. No. 2 Bearing Front Scoop Assembly - Repair

4. NO. 2 BEARING FRONT SCOOP ASSEMBLY - PIN REPLACEMENT.

(See figure 2.)

- a. Remove unserviceable pin(3, figure 2). Refer to T.O. 2-1-111.
- b. Install replacement pin to projection length(4) as shown.

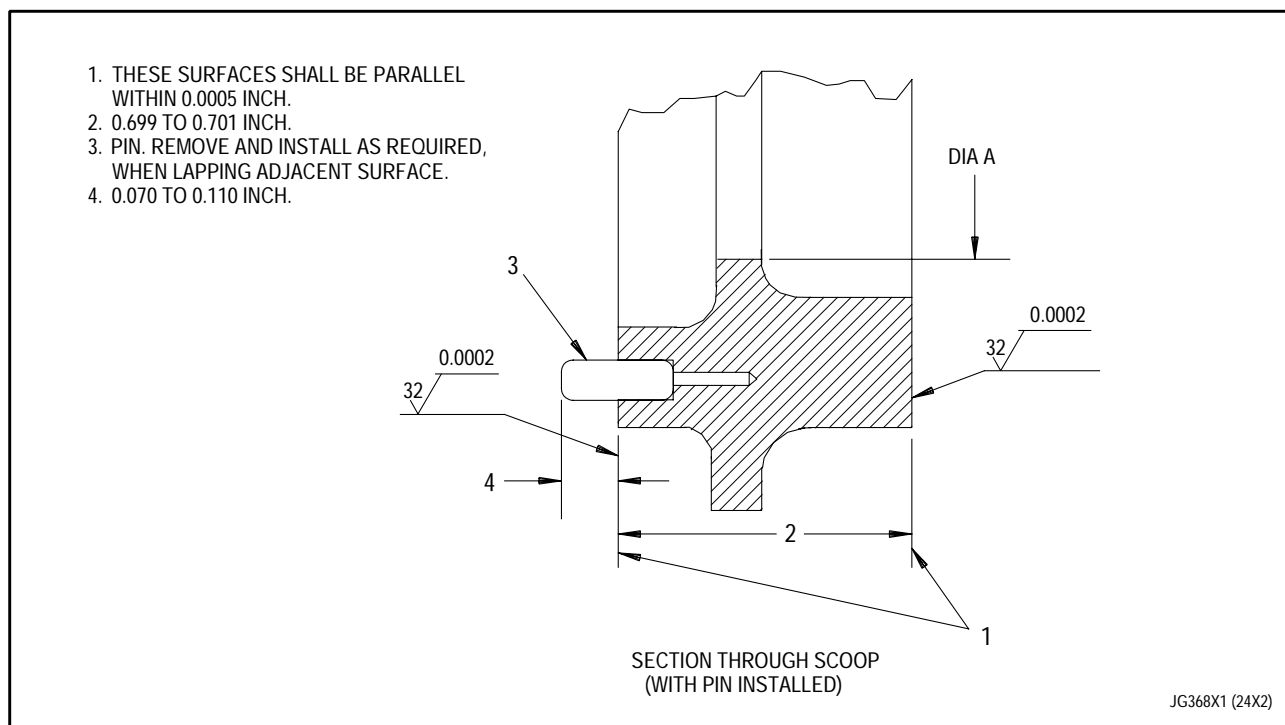


Figure 2. No. 2 Bearing Front Scoop Assembly - Lapping and Pin Replacement

**5. NO. 2 BEARING FRONT SCOOP
ASSEMBLY - PLATING REPAIR.**

(See Figure 3.)

NOTE

- Critical dimensions can be restored by nickel plating either Surface A or B(2, figure 3), or both surfaces if required.
 - If both surfaces need repair, one surface shall be machined, plated, and finish machined before proceeding with the opposite surface.
 - Parent material is AMS 6322 steel with hardness of Rockwell C30 to 38, or equivalent.
- a. Remove pins per paragraph 4.
- b. Machine Surface A and B to dimensions(1).

NOTE

- No plating permitted in pinhole(5).
- Plate enclosed areas(2) shown only. Plating outside area shown is permissible, but such excess shall be removed.
- c. Nickel plate per AMS 2424 to dimensions shown. Refer to T.O. 2J-F100-53-1, SWP 092 10.
- d. After plating, bake at 375° ±10°F (191° ±5.6°C) for three hours.
- e. Finish machine to dimensions(1).
- f. Mark part with beehive symbol per T.O. 2J-F100-53-1, WP 023 00.

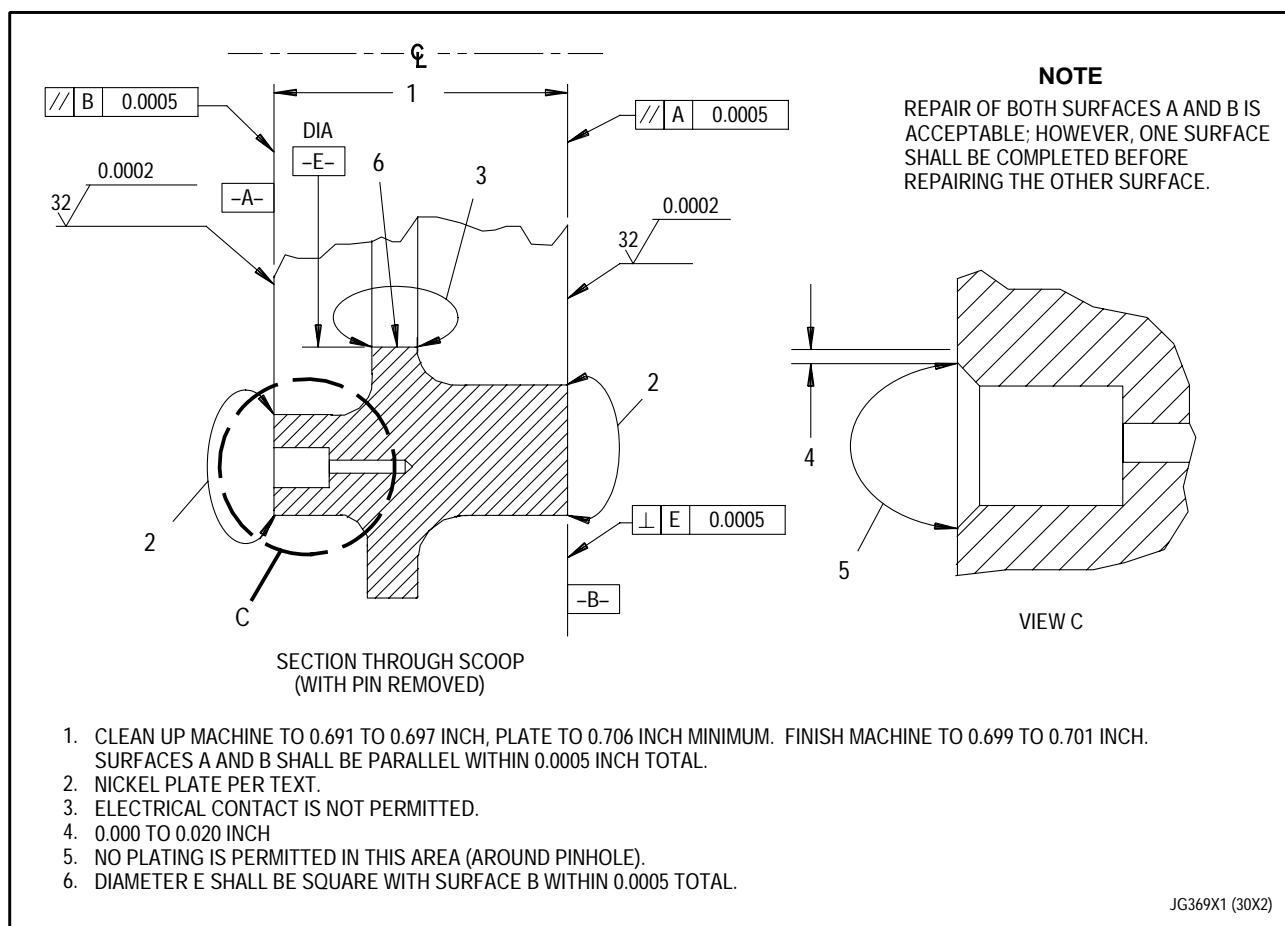


Figure 3. No. 2 Bearing Front Scoop Assembly - Plating Repair

**6. NO. 2 BEARING FRONT SCOOP
ASSEMBLY - MACHINING NEW PINHOLE.**

(See Figure 4.)

NOTE

This repair only allowed once
per part.

- a. Leave existing worn pinhole
unfilled. (See figure 4.)

- b. Remove loose pin.
- c. If required, lap sealing
surfaces per paragraph 3.
- d. Machine new pinhole opposite
existing hole.
- e. Install new pin per paragraph 4.

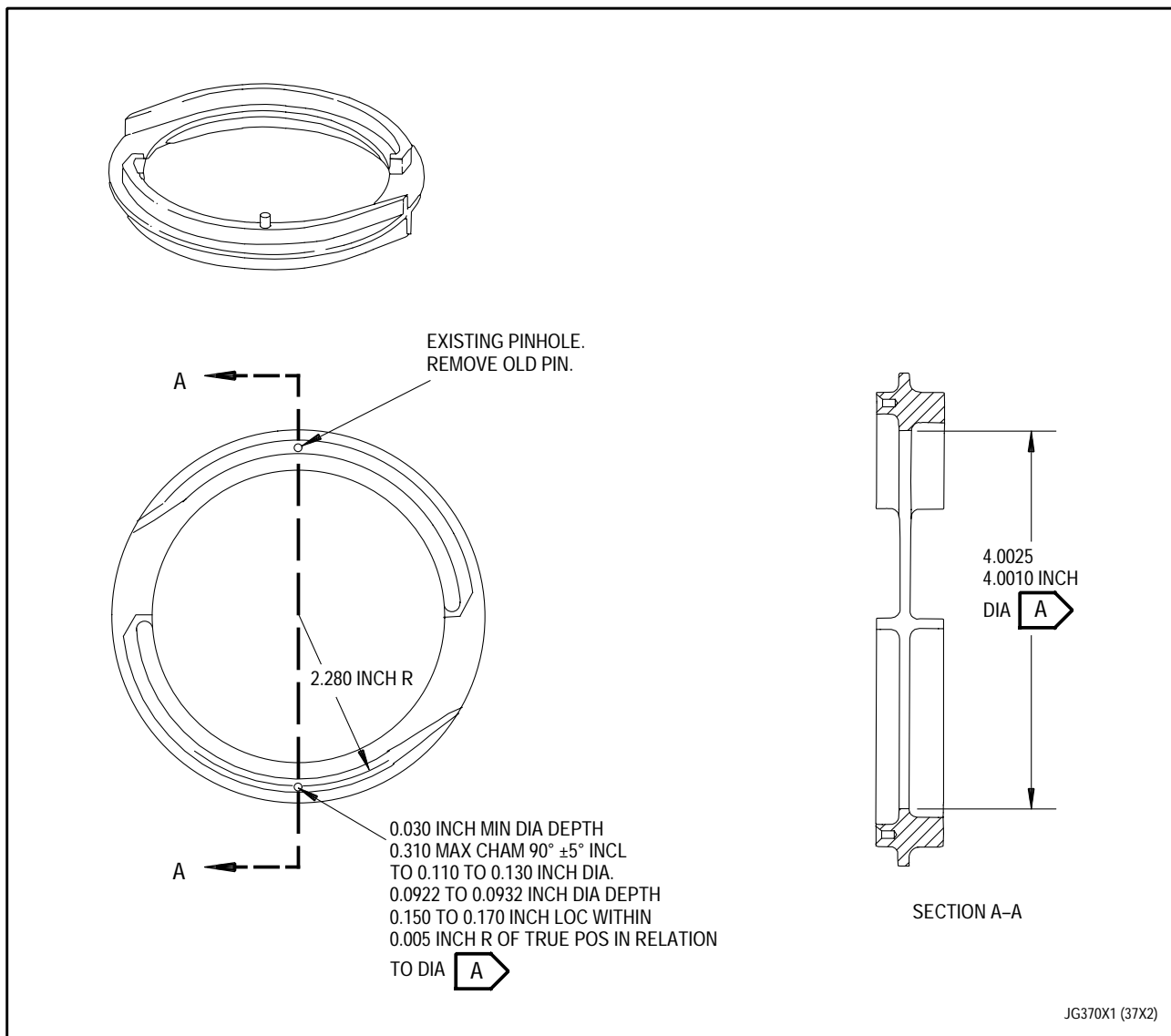


Figure 4. No. 2 Bearing Front Scoop Assembly - Machining New Pinhole

WORK PACKAGE**TECHNICAL PROCEDURES****SCOOP, NO. 2 BEARING, REAR -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3					
4 Blank					

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the No. 2 bearing rear scoop.

2. NO. 2 BEARING REAR SCOOP - BLEND REPAIR.

(See Figure 1.)

- a. Blending requirements are as follows:

- (1) All local blending shall extend to a distance of at least 15 times the depth of the damage from the center of the blend.

- (2) Surface finish of all blends shall be as smooth or smoother than original finish.

- b. Blend repair unserviceable scratches, dents and nicks in the contact areas as follows:

- (1) Use fine stone.
(2) Remove raised metal as required.

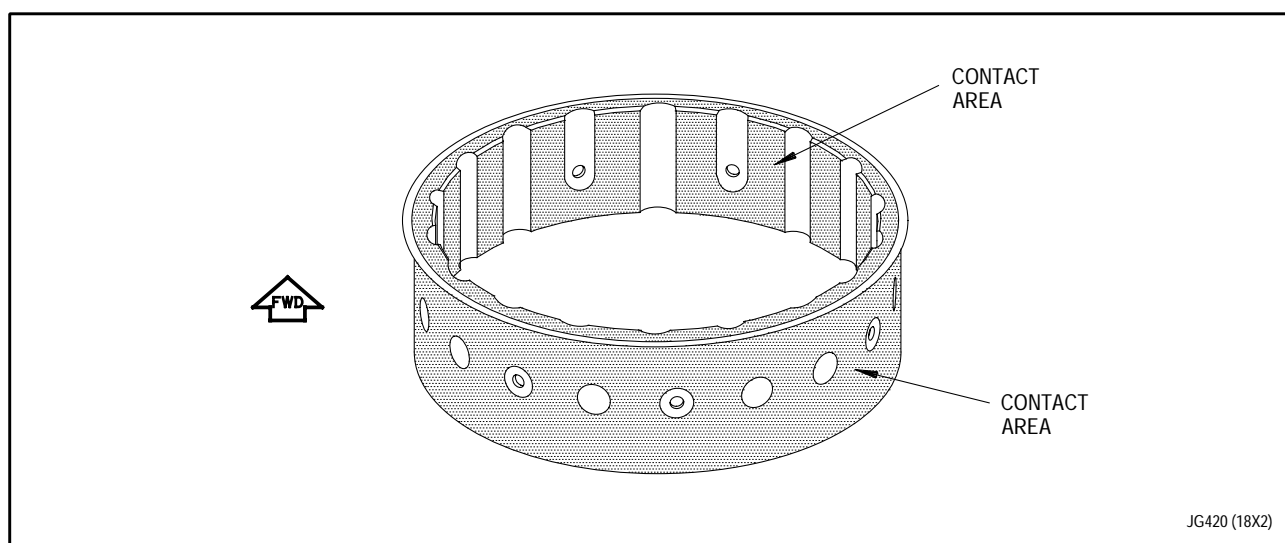


Figure 1. No. 2 Bearing Rear Scoop - Repair

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING ASSEMBLY, NO. 2 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 11	0				
12 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Cleaning, Vapor Degreaser (SPOP 3) - - - - -	SWP 031 02
Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Compound, stopoff	Metco Antibond
Tape, heat reflective (PMC 4235)	Fluoroglas 2925-7 or Lamart 390 or 3M Co. 363

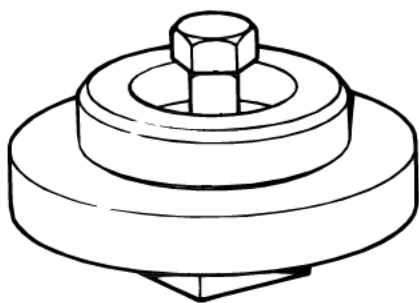
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

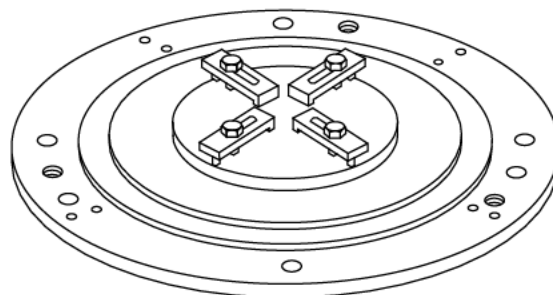
Paragraph	Function - Tool Nomenclature	Tool Number
3	No. 2 Bearing Housing Assembly - Snap Diameter Repair	
	Spool Set, Rear compressor air seals, plasma spray	SAALC 7744900
	Fixture, Machining, No. 2 bearing housing assembly	SAALC 7745063
	Mask, No. 2 bearing housing assembly, grit blast/ plasma spray, Surface J - - - - -	SAALC 7745064
	Mask, No. 2 bearing housing assembly, grit blast/ plasma spray, Diameter F - - - - -	SAALC 7745065
	Mask, No. 2 bearing housing assembly, grit blast/ plasma spray, Surface G - - - - -	SAALC 7745066
	Mask, No. 2 bearing housing assembly, grit blast/ plasma spray - - - - -	SAALC 7745067

ILLUSTRATED SUPPORT EQUIPMENT



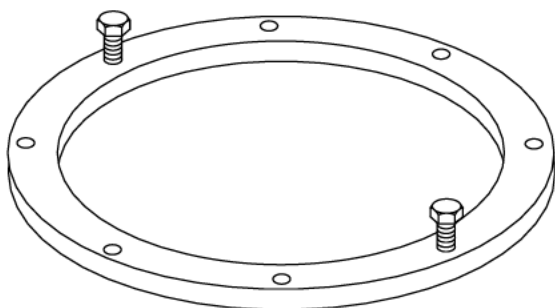
SAALC 7744900 -C

Figure T1. SAALC 7744900 Spool Set



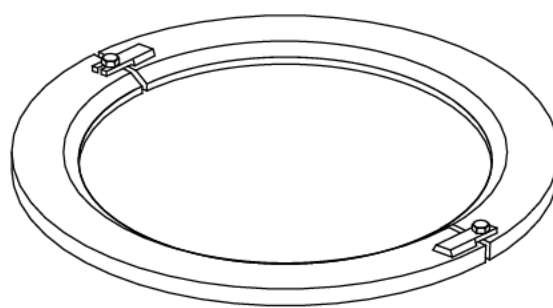
SAALC 7745063 -C

Figure T2. SAALC 7745063 Fixture



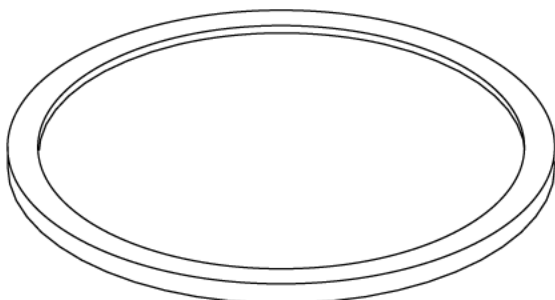
SAALC 7745064 -C

Figure T3. SAALC 7745064 Mask



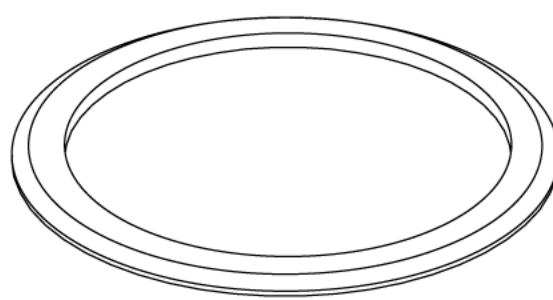
SAALC 7745065 -C

Figure T4. SAALC 7745065 Mask



SAALC 7745066 -C

Figure T5. SAALC 7745066 Mask



SAALC 7745067 -C

Figure T6. SAALC 7745067 Mask

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the No. 2 bearing housing assembly.

2. NO. 2 BEARING HOUSING ASSEMBLY - BLEND REPAIR.

- a. Blend nicks, dents, and scratches on nonmachined surfaces up to 0.010 inch depth.
- b. Blend using fine stones. Remove raised metal.

3. NO. 2 BEARING HOUSING ASSEMBLY - SNAP DIAMETER REPAIR.

(See Figures 1 and 2.)

- a. Clean up machine area to be repaired as follows:

- (1) Position SAALC 7745063 fixture on machine table. Centralize fixture, taking runout on housing locating diameter.
- (2) Set up to machine housing front snap Diameter F or V (See figure 1.) as follows:
 - (a) Loosen four hex head screws of SAALC 7745063 fixture and slide four clamps back.
 - (b) Wipe middle (12.537 inch) locating diameter on fixture base clean and place housing on fixture, rear snap down, engaging fixture locating diameter.
 - (c) Using a rawhide or phenolic mallet, tap housing to ensure proper contact between housing and fixture.



Do not overtighten screws.

- (d) Position four clamps over rear flange of housing and secure with four screws threaded into the middle (15.625 inch) diameter bolt circle.

- (3) Set up to machine housing rear snap Diameter D (See figure 1.) as follows:
 - (a) Loosen four hex head screws of SAALC 7745063 fixture and slide four clamps back.
 - (b) Wipe inner (4.625 inch) locating diameter on fixture base clean. Place housing on fixture, front end down, engaging fixture locating diameter.
 - (c) Using a rawhide or phenolic mallet, tap housing to ensure proper contact between housing and fixture.
 - (d) Position four clamps over rear flange of housing and secure with four screws threaded into the inner (4.625 inch) diameter bolt circle.
- (4) Clean up machine worn Diameter D. (See figure 1 and 2.) Remove housing from fixture.

- b. Fluorescent penetrant inspect repair area. Refer to T.O. 2J-F100-9. No indications permitted.
- c. Grit blast repair area as follows:
 - (1) When repairing front Diameter F, install masks as follows:
 - (a) Position both halves of SAALC 7745065 mask onto Diameter F of housing, ensuring detail-3 mask half is located over boss.
 - (b) Tighten hex head screws in two places.
 - (c) Apply PMC 4235 heat reflective tape over screws and split areas.
 - (d) Position SAALC 7745064 mask on housing front face after removing four hex head screws.
 - (e) Secure mask in place with hex head screws.
 - (f) Apply PMC 4235 heat reflective tape over threaded areas and hex head screws.
 - (2) When repairing front Diameter V, install masks as follows:
 - (a) Position SAALC 7745064 mask on housing front face after removing four hex head screws.
 - (b) Secure mask in place with hex head screws.
 - (c) Apply PMC 4235 heat reflective tape over threaded areas and hex head screws.
 - (3) When repairing rear Diameter D, install masks as follows:
 - (a) Position SAALC 7745067 mask on housing, using pins to locate on rear flange ID.
 - (b) Position SAALC 7745066 mask on housing rear flange rear face.
 - (4) When repairing any of the other areas shown in figure 2, mask off repair area using PMC 4235 heat reflective tape.
 - (5) Grit blast repair area. Refer to T.O. 2J-F100-53-1, WP 096 00.
 - (6) Remove tooling or masking from housing. Clean masks and housing. Refer to T.O. 2J-F100-53-1, SWP 031 02.

d. Plasma spray application as follows:

- (1) Mask off repair area per applicable step c.(1) through (4).
- (2) Install SAALC 7744900 spool set on Metco plasma spray table or equivalent.
- (3) Place housing onto spool set with repair surface up and with spool set contacting housing ID.
- (4) Plasma spray areas shown per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00. Spray deposition outside enclosed area as permissible, but such excess spray shall be removed.

e. Finish machine housing as follows:

- (1) Set up housing for machining per applicable step a.(1) through (3) above.
- (2) Finish machine housing to dimension. (See figure 1 or 2.)
- (3) Remove housing from machining setup.

4. NO. 2 BEARING HOUSING ASSEMBLY - NUT PLATE REPLACEMENT.

- a. Grind off rivet heads to remove unserviceable nut plate. Remove rivets and nut plate.
- b. Position new nut plate into housing, ensuring that thread pitch of nut plate is concentric with boltholes within 0.010 inch diameter FIR.
- c. Transfer drill 0.096 to 0.100 inch diameter rivet holes.
- d. Install rivets. Manufactured heads shall be countersunk, flush to 0.010 inch below surface of support flange.
- e. Flare rivets to secure. Refer to T.O. 2-1-111.

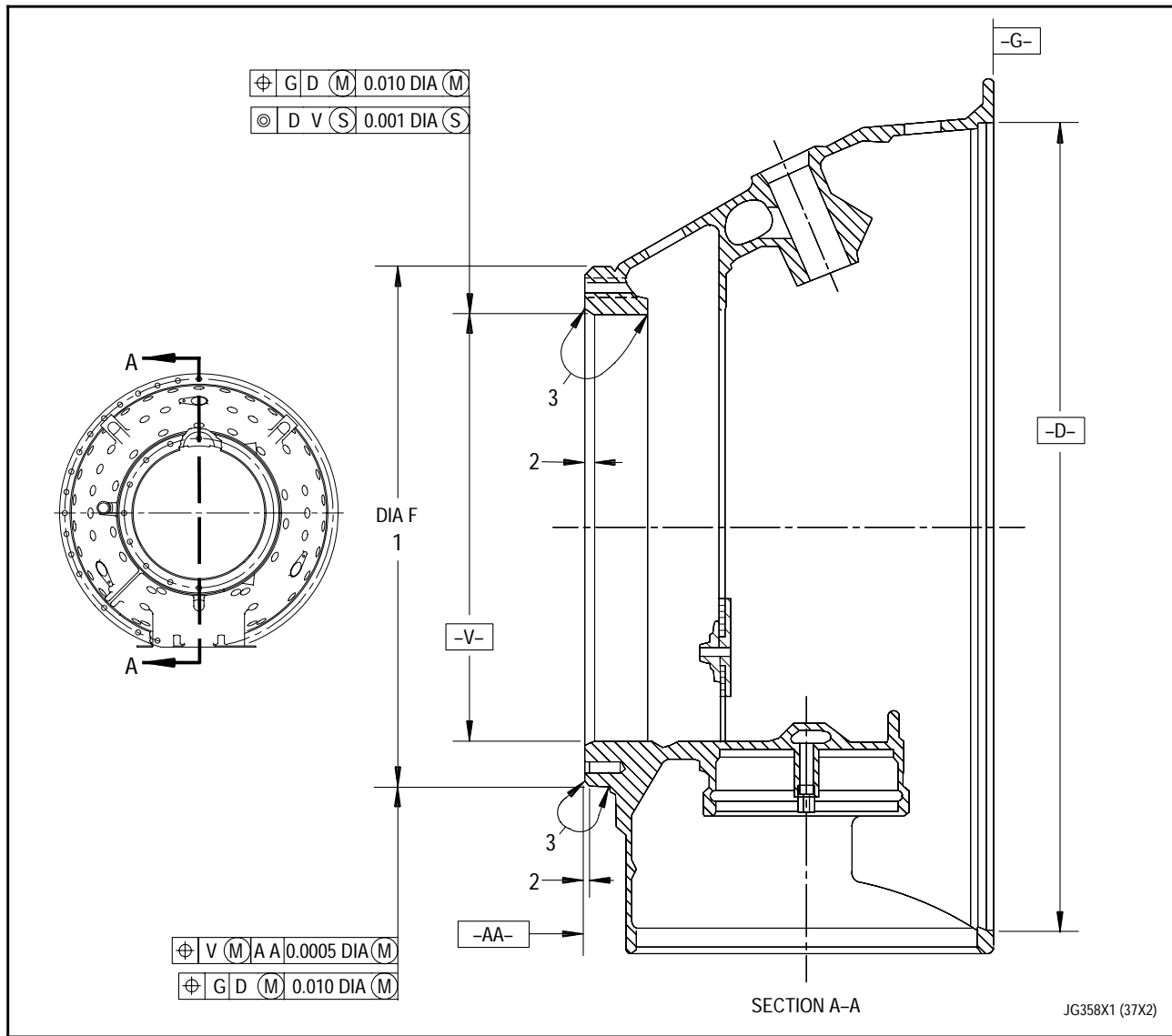


Figure 1. No. 2 Bearing Housing Assembly - Snap Diameter Repair

Legend for figure 1

1. Machine to 7.999 to 8.013 inch diameter. Hold to maximum. Plasma spray to 8.031 inch diameter minimum. Finish machine to 8.019 to 8.021 inch diameter. Diameter F at Maximum Material Condition shall be located within 0.0005 inch diameter of true position in relation to Diameter V at Maximum Material Condition and Surface AA. Diameter F at Maximum Material Condition shall be located within 0.010 inch diameter of true position in relation to Surface G and Diameter D with Diameter D at Maximum Material Condition.
2. Chamfer 0.060 to 0.080 inch x 45° ±2°.
3. Plasma spray areas per text.



Legend for figure 2

1. 12.548 to 12.562 inch diameter before plasma spray. Hold to minimum value. 12.528 inch diameter maximum after spray. 12.538 to 12.542 inch finish diameter. Diameter D at Maximum Material Condition shall be located within 0.020 inch diameter of true position in relation to Planes A, B, and C. Diameter D Regardless of Feature Size shall be concentric with the centerline of Diameters D-V Regardless of Feature Size of Diameters D-V.
2. 6.489 to 6.493 inches before plasma spray. Hold to maximum value. 6.506 inches minimum after plasma spray. 6.499 to 6.501 finish dimension.
3. Plasma spray optional and may be incomplete in this area.
4. Plasma spray area.
5. 0.025 to 0.040 inch
6. 2.8895 to 2.8965 inches before plasma spray. Hold to maximum value. 2.9055 inches minimum after plasma spray. 2.8995 to 2.9005 inches finish dimension.
7. 0.085 inch minimum wall before plasma spray.
8. No spray permitted on holes.
9. 5.287 to 5.301 inch diameter before plasma spray. Hold to minimum value. 5.269 inch diameter maximum after plasma spray. 5.279 to 5.281 inch finish diameter. Diameter E shall be perpendicular to the centerline of Diameters D-V within 0.001 inch Regardless of Feature Size of the diameters.
10. 2.8407 to 2.8547 inch diameter before plasma spray. Hold to minimum value. 2.8242 inch diameter maximum after plasma spray. 2.8342 to 2.8347 inch finish diameter. Diameter 10 Regardless of Feature Size shall be concentric with Diameter E within 0.0005 inch Regardless of Feature Size of Diameter E.
11. No spray permitted in holes.
12. 6.2845 to 6.2965 inches before plasma spray. Hold to maximum value. 6.2995 to 6.3005 inches finish dimension.
13. 0.040 to 0.055 inch
14. 0.152 inch maximum
15. 0.060 inch minimum
16. 0.030 to 0.040 inch radius
17. Chamfer 0.050 to 0.070 inch x 45° ±2° after plasma spray

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLIES, FACE, NO. 2 BEARING, FRONT AND REAR -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 24

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 23	19	24 Blank	19		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Cleaning Procedures - Cleaning, Vapor Degreasing (SPOP 3) - - - - -	SWP 031 01
Qualified Repair Source List (QRSL) Core Engine Module -	WP 603 00
Nondestructive Inspection Methods - - - - -	T.O. 33B-1-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
OIL, LUBRICATING, GAS TURBINE, AIRCRAFT (PWA 521, TYPE I) OR (PWA 521, TYPE II)	MIL-L-7808J OR LATER REVISION OR MIL-L-23699C OR LATER REVISION

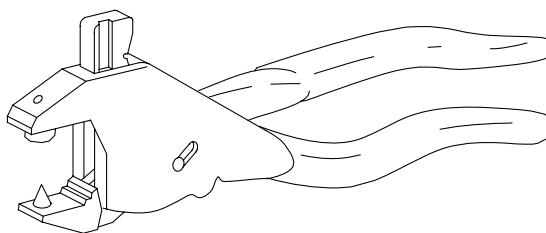
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
RIVET, TUBULAR, UNIVERSAL	2150048	3
SEAT, HELICAL COMPRESSION SPRING	4032083	3

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 2 BEARING REAR FACE SEAL ASSEMBLY (PN 4033283 or 4033284) - SPRING SEAT OR RIVET REPLACEMENT	
	RIVETER, FLARE HOLLOW RIVETS 60 DEGREES - - - - -	PWA 26523
3	NO. 2 BEARING FRONT FACE SEAL ASSEMBLY (PN 4072837 or 4072839) - SPRING SEAT OR RIVET REPLACEMENT	
	RIVETER, FLARE HOLLOW RIVETS 60 DEGREES - - - - -	PWA 26523

ILLUSTRATED SUPPORT EQUIPMENT



PWA 26523 -C

Figure T1. PWA 26523 RIVETER

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 2 bearing front and rear face seal assemblies.

2. NO. 2 BEARING REAR FACE SEAL ASSEMBLY (PN 4033283 or 4033284) - SPRING SEAT OR RIVET REPLACEMENT.

(See Figure 1.)

- a. Remove damaged spring seat(2) or rivet(3) as follows:



Failure to use extreme care when removing spring seat or rivet can cause damage to carbon element or positioning plate.

- (1) Use standard tooling to drill out flare of spring seat or rivet. Do not allow tooling to contact carbon element and do not cut into positioning plate.
- (2) Use pliers, if necessary, to remove damaged spring seat or rivet. Do not use punch and hammer which could cause damage to carbon element.

- b. Install replacement spring seat or rivet as follows:

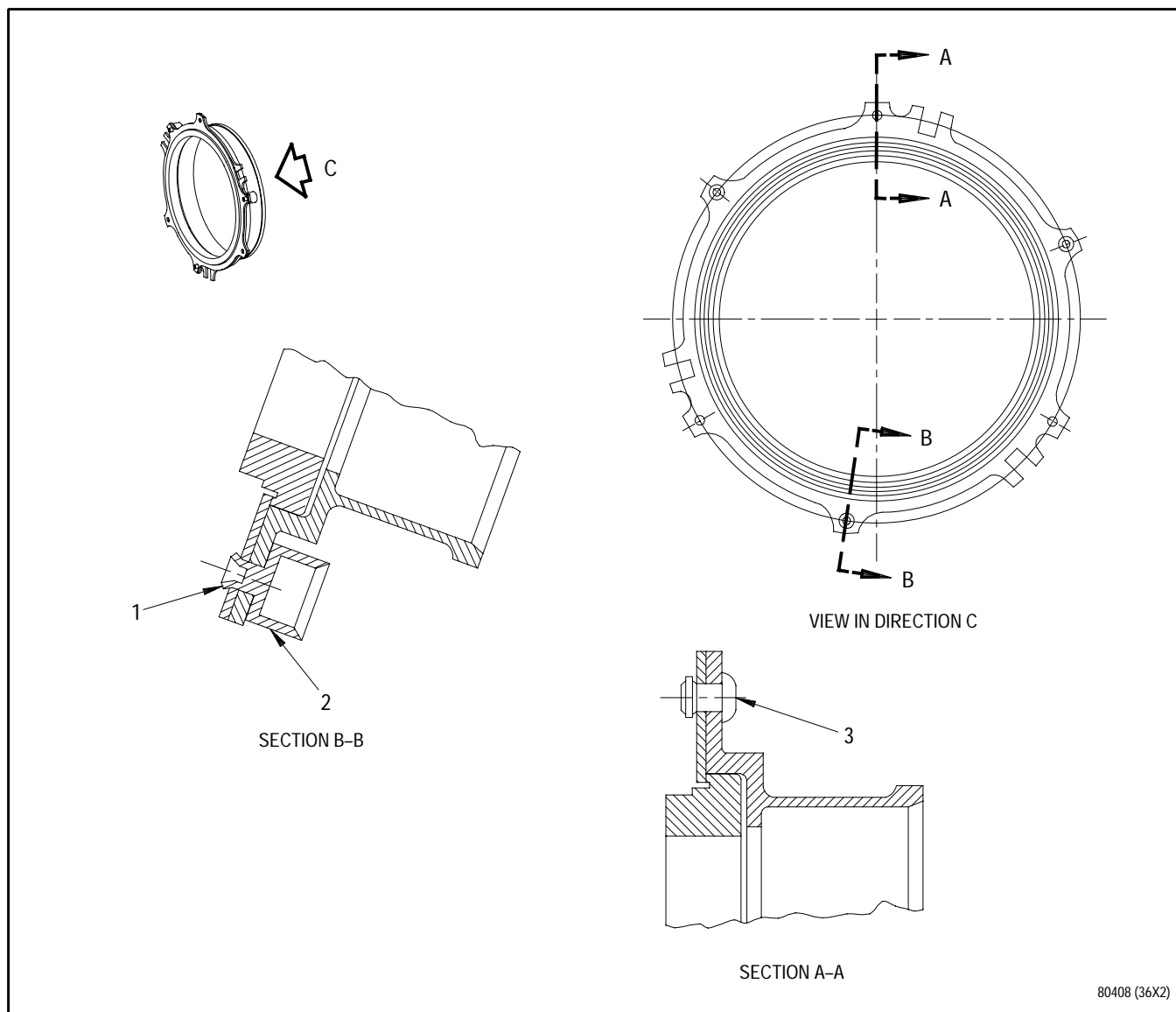
- (1) Ensure hole in positioning plate and housing is not blocked and is free of metal burrs.
- (2) Lightly lubricate hole in shank of spring seat or rivet with engine oil.
- (3) Install spring seat or rivet through hole from housing side.



Failure to use aluminum sheet stock protector when flaring spring seat can cause damage to spring seat.

- (4) Use PWA 26523 riveter to flare spring seat or rivet shank. Refer to T.O. 2-1-111. When flaring spring seat, insert a piece of soft aluminum sheet stock between riveter button and wide mouth of spring seat to provide continuous bearing surface for riveter and to prevent damage to spring seat.

- c. Repeat steps a. and b., as necessary, to replace damaged parts.



1. Flare by spinning or squeezing, six places. Do not hammer.
2. Spring seat, three required
3. Rivet, three required

Figure 1. No. 2 Bearing Rear Face Seal Assembly - Spring Seat or Rivet Replacement

**3. NO. 2 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4072837 or 4072839) - SPRING
SEAT OR RIVET REPLACEMENT.**

(See Figure 2.)

- a. Remove damaged spring seat(4) or rivet(1) as follows:



Failure to use extreme care when removing spring seat or rivet can cause damage to carbon element or positioning plate.

- (1) Use standard tooling to drill out flare of spring seat or rivet. Do not allow tooling to contact carbon element(6) and do not cut into positioning plate(2). (Reference hole size 0.164 to 0.168 inch)
- (2) Use pliers, if necessary, to remove damaged spring seat or rivet. Do not use punch and hammer which could cause damage to carbon element.

- b. Install replacement spring seat or rivet as follows:

- (1) Ensure hole in positioning plate and housing is not blocked and is free of metal burrs.

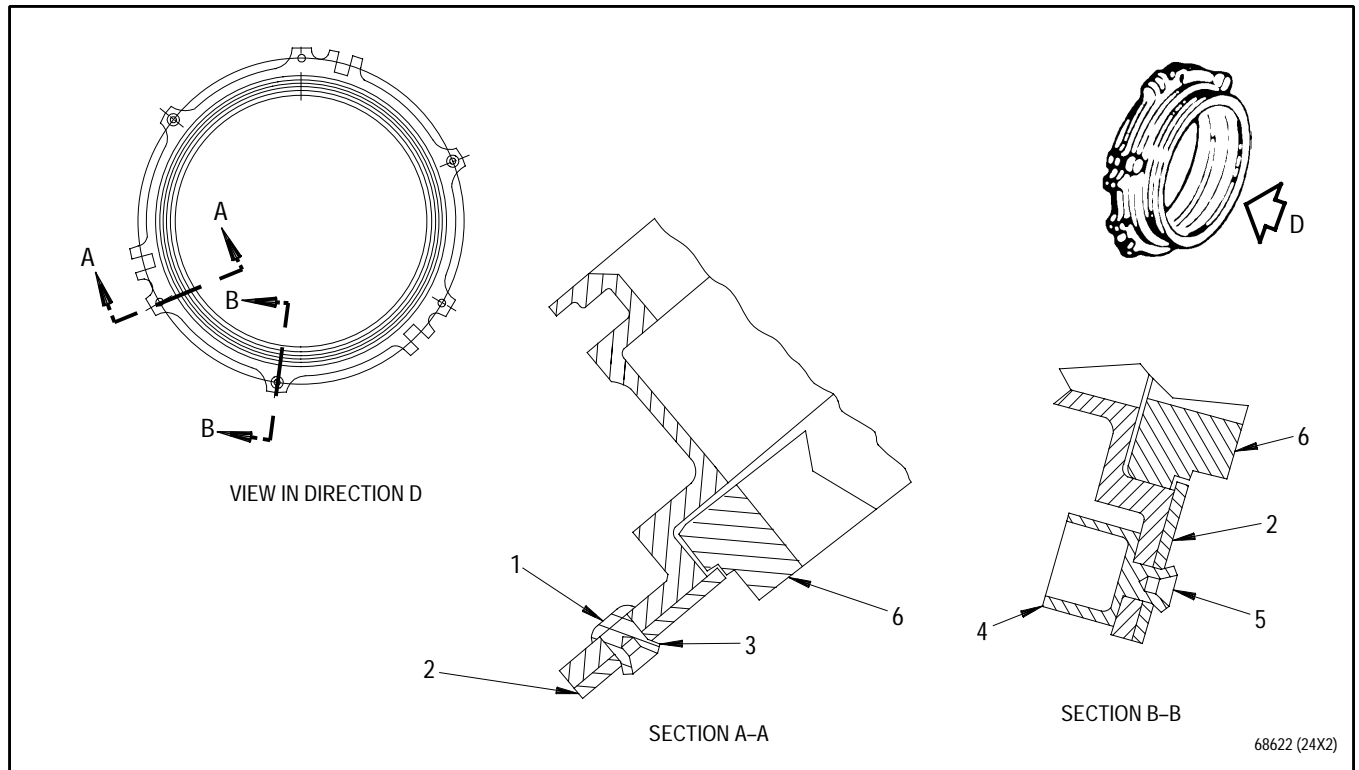
- (2) Lightly lubricate hole in shank of spring seat or rivet with engine oil.

- (3) Install spring seat or rivet through hole from housing side.



Failure to use aluminum sheet stock protector when flaring spring seat can cause damage to spring seat.

- (4) Use PWA 26523 riveter to flare spring seat or rivet shank. Refer to T.O. 2-1-111. When flaring spring seat, insert a piece of soft aluminum sheet stock between riveter button and wide mouth of spring seat to provide continuous bearing surface for riveter and to prevent damage to spring seat.
- c. Repeat steps a. and b., as necessary, to replace damaged parts.



1. Rivet PN 2150048, three required
2. Positioning plate
3. Flare by squeezing or spinning. Do not hammer.
4. Spring seat PN 4032083, three required
5. Flare by squeezing or spinning. Do not hammer.
6. Carbon element

Figure 2. No. 2 Bearing Front Face Seal Assembly - Spring Seat or Rivet Replacement

**4. NO. 2 BEARING REAR FACE SEAL
ASSEMBLY (PN 4033283 or 4033284) - FACE
SEAL (CARBON) ELEMENT REPLACEMENT.**

(See Figure 3.)

NOTE

Vendor repair procedures listed in the QRSL shall be kept current by incorporating all T.O. changes that affect the repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor shall notify SA-ALC/LPF of need for revision. SA-ALC/LPF will authorize Pratt & Whitney to coordinate directly with the vendor for review and update of procedure/revision listed in the QRSL.

- a. This is a vendor proprietary repair. Refer to T.O. 2J-F100-53-1, WP 603 00 for Qualified Repair Source List (QRSL) by distress code:

- JGDFGAC Carbon Element Replacement

- b. See figure 3 for dimensional requirements.

Legend for figure 3

1. 4.919 to 4.921 inches average diameter
2. 5.319 to 5.321 inches average diameter
3. May be 0.002 inch out of round
4. This diameter shall be located within 0.002 inch diameter of true position in relation to Surface C and Diameter A Regardless of Feature Size of this diameter and Diameter A.
5. This diameter shall be located within 0.010 inch diameter of true position in relation to Surface C and Diameter A Regardless of Feature Size of this diameter and Diameter A.
6. 5.388 to 5.398 inches average diameter
7. Break edge 0.000 to 0.003 inch
8. 0.120 to 0.130 inch
9. This surface shall be perpendicular to Diameter A within 0.0005 inch Regardless of Feature Size of Diameter A.
10. 1.290 to 1.300 inches
11. 0.002 inch maximum gap
12. 0.000 to 0.002 inch
13. 5.538 to 5.542 inches diameter shall be located within 0.010 inch diameter of true position in relation to Diameter A Regardless of Feature Size of this diameter and Diameter A.

Figure 3. No. 2 Bearing Rear Face Seal - Carbon Element Replacement

**5. NO. 2 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4072837 or 4072839) - FACE
SEAL (CARBON) ELEMENT REPLACEMENT.**

(See Figure 4.)

NOTE

Vendor repair procedures listed in the QRSL shall be kept current by incorporating all T.O. changes that affect the repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor shall notify SA-ALC/LPF of need for revision. SA-ALC/LPF will authorize Pratt & Whitney to coordinate directly with the vendor for review and update of procedure/revision listed in the QRSL.

- a. This is a vendor proprietary repair. Refer to T.O. 2J-F100-53-1, WP 603 00 for Qualified Repair Source List (QRSL) by distress code:

- JGDFGAC Carbon Element Replacement

- b. See figure 4 for dimensional requirements.

Legend for figure 4

1. Carbon element PN 4001518 (for assembly PN 4072837) or PN 4001532 (for assembly PN 4072839)
2. No. 2 bearing front seal housing
3. 0.002 inch maximum gap
4. 0.120 to 0.130 inch
5. 4.915 to 4.925 inches diameter
6. 5.315 to 5.325 inches diameter
7. These diameters shall be located within 0.010 inch diameter of true position in relation to Surface A and Diameter B when this diameter and Diameter B are at Maximum Material Condition.
8. 5.388 to 5.398 inches diameter
9. Break sharp edges 0.000 to 0.003 inch
10. This surface shall be perpendicular to Diameter B within 0.0005 inch Regardless of Feature Size of Diameter B, and flat within 0.00002 inch.
11. 0.000 to 0.002 inch
12. 5.538 to 5.540 inches diameter. This diameter shall be located within 0.010 inch diameter of true position in relation to Surface A and Diameter B when this diameter and Diameter B are at Maximum Material Condition. This diameter shall also be perpendicular to Surface A within 0.001 inch at Maximum Material Condition.



**6. NO. 2 BEARING REAR FACE SEAL
ASSEMBLY (PN 4033283 or 4033284) - FACE
SEAL ELEMENT LAPPING REPAIR.**

(See figure 3.)



Use of abrasive compounds to lap or polish carbon element seal face can cause abrasive particles to become embedded in carbon material and cause wear damage to seal during engine operation.

- a. Refer to T.O. 2-1-111 for lapping procedures.
- b. Lap repair face seal as follows:
 - (1) During lapping do not reduce overall width of seals below minimum dimension given for each seal.
 - (2) Lapping equipment shall be properly maintained.
 - (3) Check flatness of lap surface frequently.

- c. Lap repair unserviceable face seal chips, nicks, and scratches as follows:
 - (1) Lap seal to within serviceable limit.
 - (2) Maintain seal lip height within serviceable limit.
- d. Lap repair unserviceable face seal scratches extending across sealing face as follows:
 - (1) Scratches larger than serviceable limit may be partially removed by lapping to serviceable limit.
 - (2) Maintain seal lip height within serviceable limit.
- e. Lap repair unserviceable face seal squareness and surface finish per figure 3 as follows:
 - (1) Maintain seal lip height within serviceable limit.
 - (2) Check surface finish using optical flats. Refer to T.O. 2-1-111.

7. NO. 2 BEARING FRONT FACE SEAL ASSEMBLY (PN 4072837 or 4072839) - FACE SEAL ELEMENT LAPPING REPAIR.

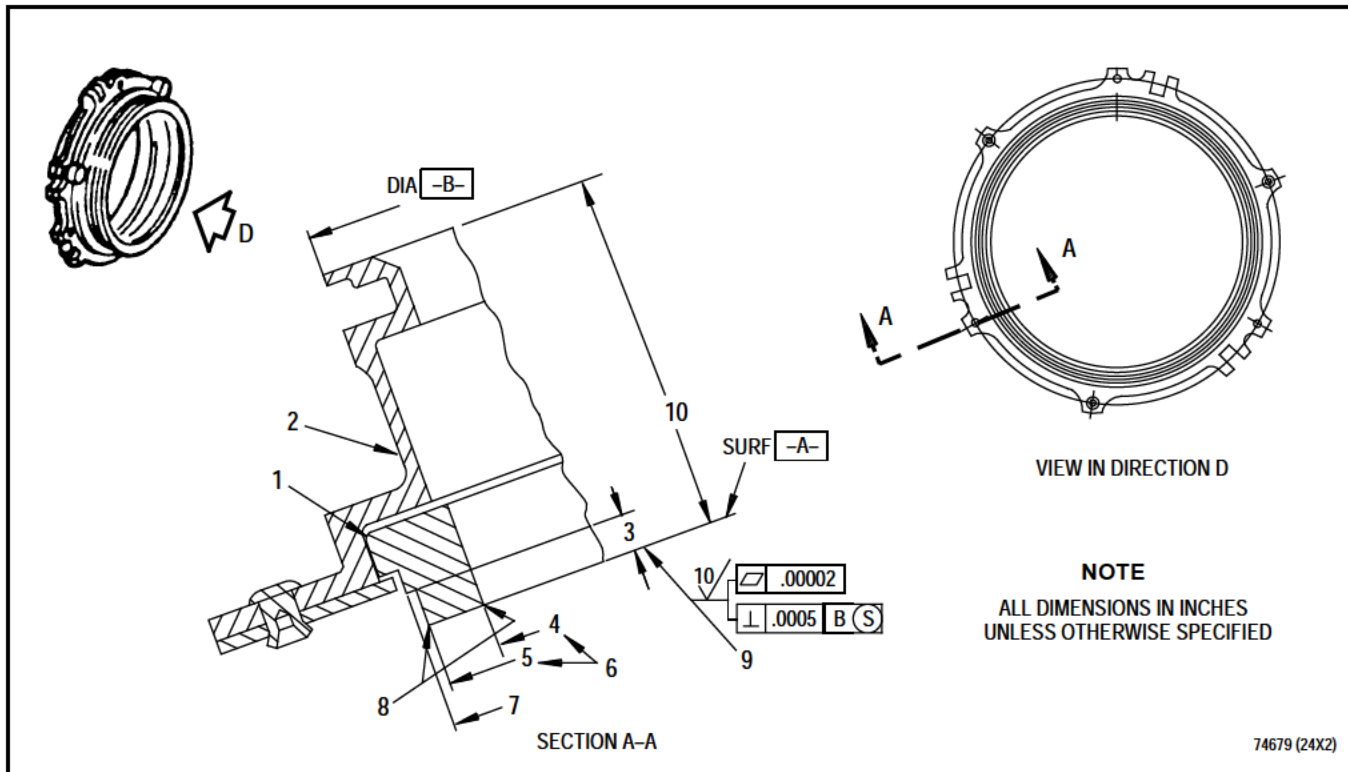
(See Figure 5.)



Use of abrasive compounds to lap or polish carbon element seal face can cause abrasive particles to become embedded in carbon material and cause wear damage to seal during engine operation.

- a. Refer to T.O. 2-1-111 for lapping procedures.
- b. Lap repair face seal as follows:
 - (1) During lapping do not reduce overall width of seals below minimum dimension given for each seal.
 - (2) Lapping equipment shall be properly maintained.
 - (3) Check flatness of lap surface frequently.

- c. Lap repair unserviceable face seal chips, nicks, and scratches as follows:
 - (1) Lap seal to within serviceable limit.
 - (2) Maintain seal lip height within serviceable limit.
- d. Lap repair unserviceable face seal scratches extending across sealing face as follows:
 - (1) Scratches larger than serviceable limit may be partially removed by lapping to serviceable limit.
 - (2) Maintain seal lip height within serviceable limit.
- e. Lap repair unserviceable face seal squareness and surface finish per figure 5 as follows:
 - (1) Maintain seal lip height within serviceable limit.
 - (2) Check surface finish using optical flats. Refer to T.O. 2-1-111.



1. Carbon element
2. No. 2 bearing front seal housing
3. 0.120 to 0.130 inch
4. 4.915 to 4.925 inches diameter reference
5. 5.315 to 5.325 inches diameter reference
6. These diameters shall be located within 0.010 inch diameter of true position in relation to Surface A and Diameter B when this diameter and Diameter B are at Maximum Material Condition.
7. 5.388 to 5.398 inches diameter reference
8. Break sharp edges 0.000 to 0.003 inch
9. This surface shall be perpendicular to Diameter B within 0.0005 inch Regardless of Feature Size of Diameter B, and flat within 0.00002 inch.
10. Seal lip height. Maintain within serviceable limit.

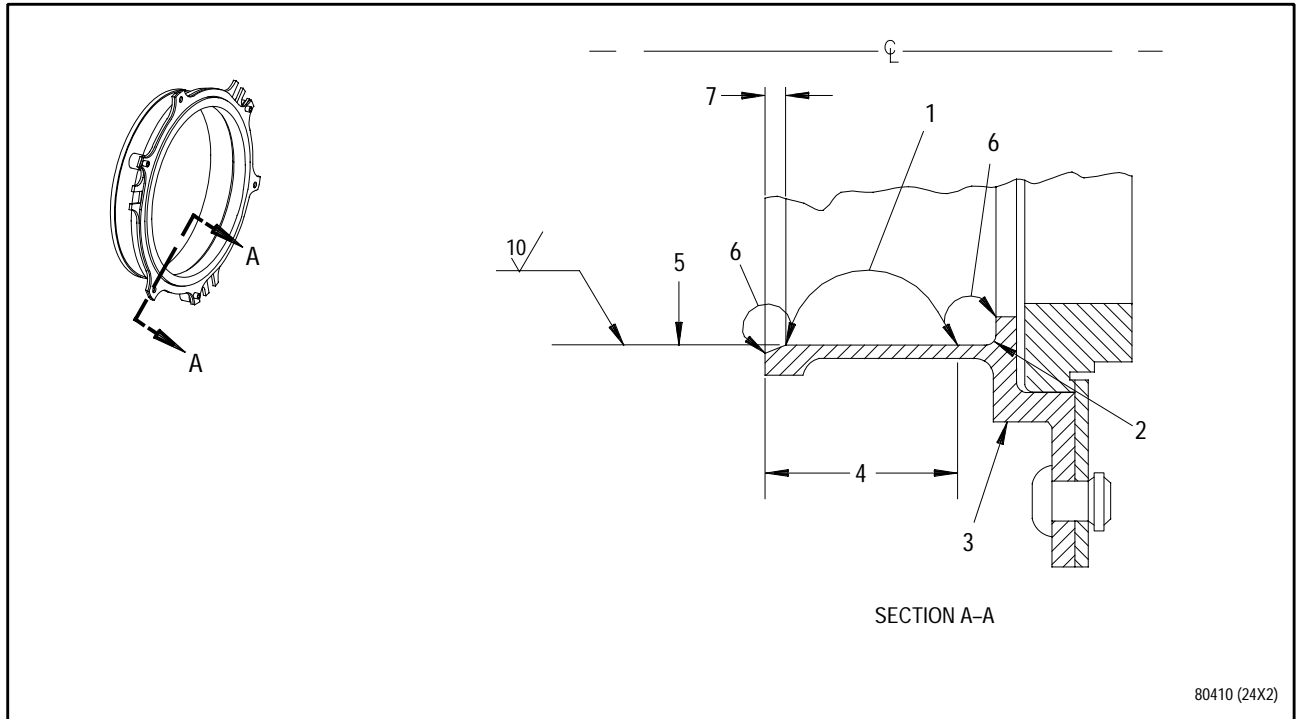
Figure 5. No. 2 Bearing Front Face Seal Assembly - Face Seal Element Lapping Repair

8. NO. 2 BEARING REAR FACE SEAL ASSEMBLY (PN 4033283 or 4033284) - FLAME DEPOSITION REPAIR.

(See Figure 6.)

- a. Remove rivets, spring seats, positioning plate, and carbon element per paragraphs 2 and 4. Discard carbon element, rivets and spring seats. Retain positioning plate.

- b. Remove existing flame deposition coating by chemical stripping. Refer to T.O. 2-1-111, machining, or grinding to dimensions(1, figure 6).
- c. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.



1. Hardface area. Clean up machine 5.185 to 5.193 inches diameter. Hold to minimum value.
2. 0.030 to 0.050 inch radius
3. No. 2 bearing rear seal housing
4. 0.660 inch minimum
5. Finish machine 5.179 to 5.182 inches average diameter which may be 0.002 inch out of round in excess of dimension given.
6. Hardface optional and may be incomplete
7. Chamfer 0.040 to 0.060 inch X $30^{\circ} \pm 2^{\circ}$

Figure 6. No. 2 Bearing Rear Face Seal Assembly - Flame Deposition Repair

- d. Apply flame deposition coating in area(1) per PWA 46. Refer to T.O. 2-1-111. Allow for a 0.002 to 0.007 inch thickness after machining.
- e. Finish machine to dimensions(5 and 7) shown in figure 6. Maintain surface finish as shown.
- f. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.
- g. Install new carbon element. Install old positioning plate with new rivets and spring seats. Machine carbon element. Refer to paragraphs 2 and 4 for procedures.
- h. Mark with beehive symbol in area near part number. Refer to T.O. 2-1-111, SPOP 401.

9. NO. 2 BEARING REAR FACE SEAL ASSEMBLY (PN 4033283 or 4033284) - GUIDE SLOT REPAIR.

(See Figure 7.)

- a. Remove carbon face seal element per paragraph 4.
- b. Machine slots to dimensions(1 through 5, figure 7). Hold to minimum value.
- c. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Clean by vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 01.

Legend for figure 7

- 1. 0.000 to 0.010 inch
- 2. 0.500 inch modified radius.
- 3. 0.804 to 0.816 inch
- 4. 0.000 to 0.010 inch
- 5. 0.348 to 0.350 inch
- 6. 0.010 inch maximum plate optional and may be incomplete.
- 7. 0.338 inch maximum
- 8. 0.045 inch maximum
- 9. Chromium plate area
- 10. 0.000 to 0.010 inch
- 11. 0.342 to 0.346 inch to be located within 0.004 inch of true position with Surface D and Diameter B at Maximum Material Condition.



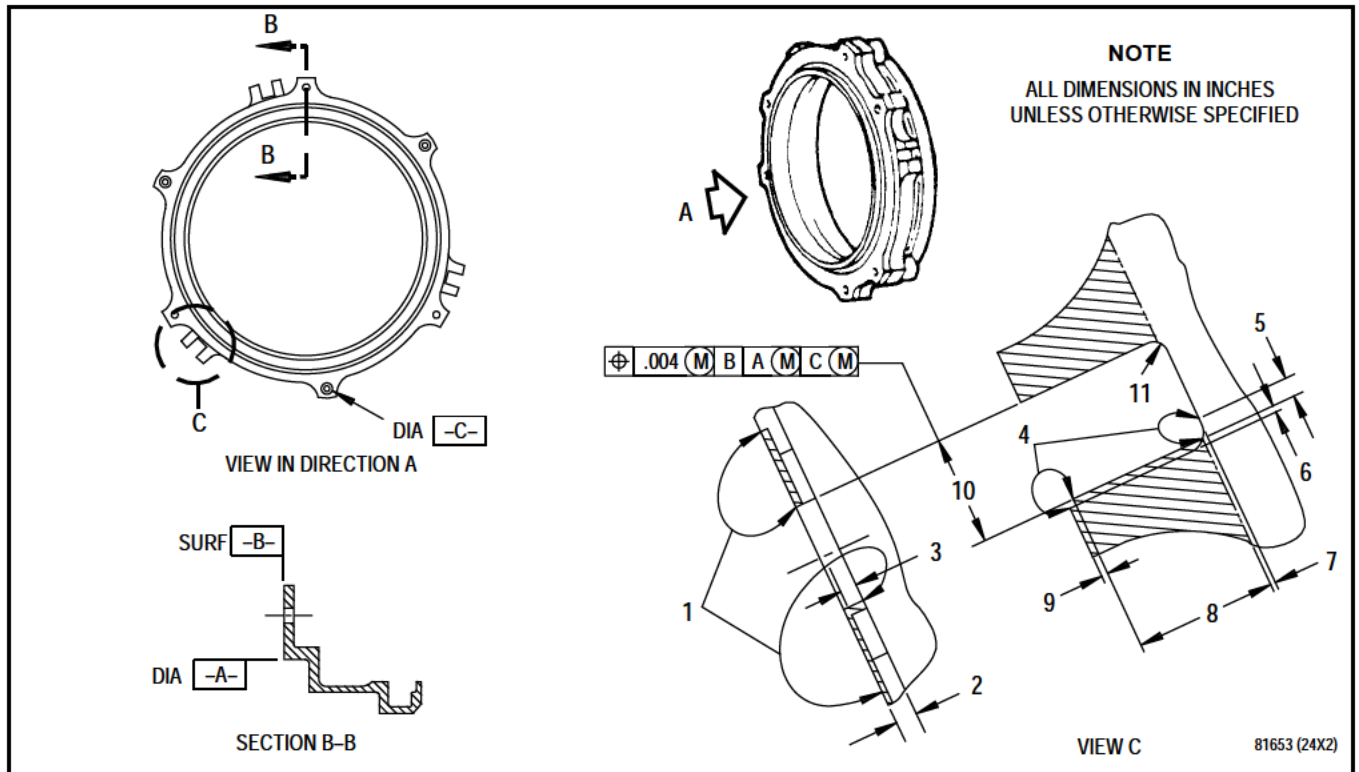
- e. Chromium plate enclosed area(9) to dimensions(7 and 8). Refer to T.O. 2-1-111, SPOP 22.
- f. Bake at 735° to 765°F (390° to 407°C) for two hours.
- g. Finish machine slots to dimensions(10 and 11).
- h. Install carbon face seal element per paragraph 4.
- i. Mark with beehive symbol in area near part number. Refer to T.O. 2-1-111, SPOP 401.

10. NO. 2 BEARING FRONT FACE SEAL ASSEMBLY (PN 4072837 or 4072839) - GUIDE SLOT REPAIR

(See Figure 8.)

- a. Remove carbon face seal element per paragraph 5.
- b. Machine area to be plated to limits shown in figure 8.
- c. Magnetic particle inspect. Refer to T.O. 2-1-111 and T.O. 33B-1-1. No cracks allowed.

- d. Chromium plate area(1) to dimensions shown. Refer to T.O. 2-1-111, SPOP 22. Dimensions specified are after plating.
- e. Bake at 735° to 765°F (390° to 407°C) for two hours.
- f. Finish machine to dimensions shown. Resulting mismatch between plated and unplated areas is acceptable. Break all plated edges 0.003 to 0.010 inch.
- g. Magnetic particle inspect repaired area. Refer to T.O. 2-1-111 and T.O. 33B-1-1. No cracks allowed.
- h. Permanently identify with beehive symbol using shallow etch in area near part number. Refer to T.O. 2-1-111, SPOP 401.
- i. Install new carbon face seal element per paragraph 5.



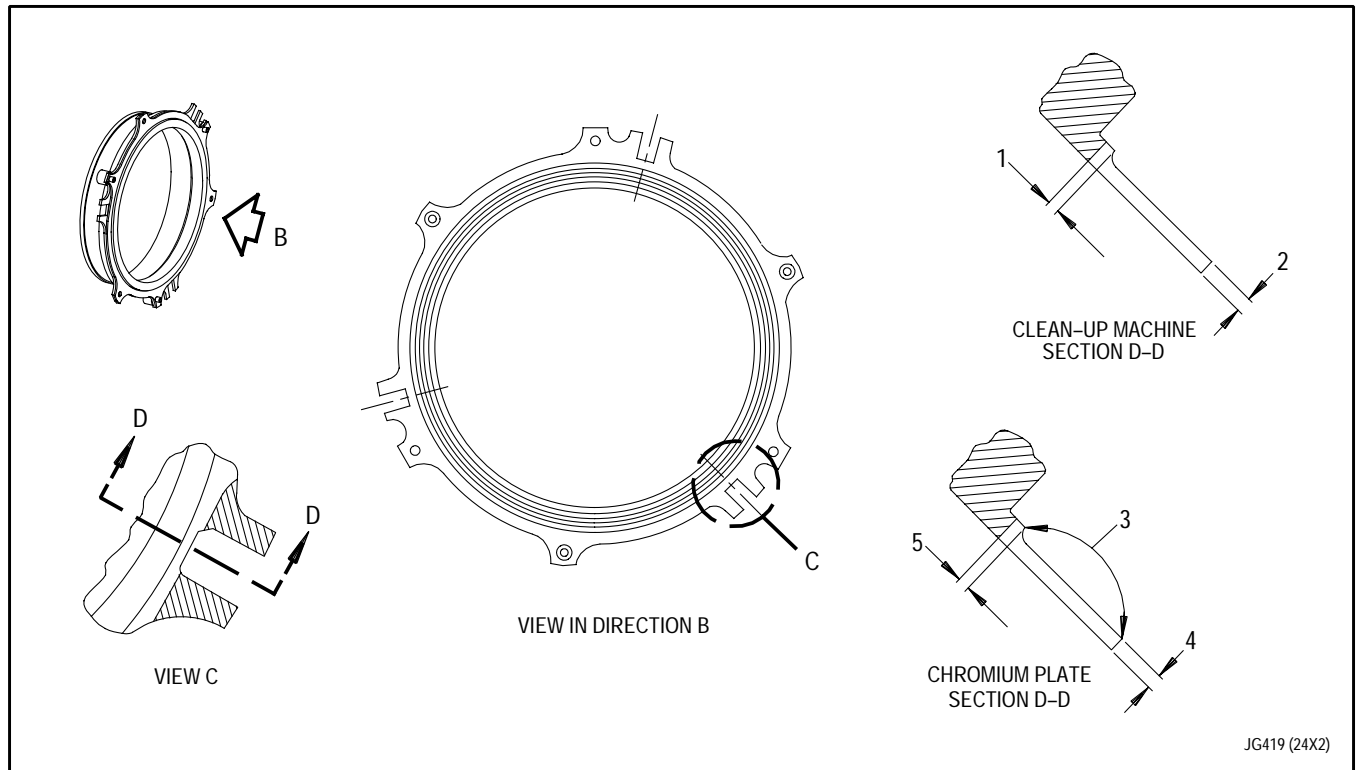
1. Plate to dimension(6) over distance(8).
2. 0.065 to 0.075 inch
3. 0.060 inch minimum
4. Plating optional and may be incomplete
5. 0.045 inch maximum
6. 0.002 to 0.008 inch
7. 0.010 inch maximum
8. Two places
9. 0.010 inch maximum
10. 0.342 to 0.346 inch located within 0.004 inch total of true position to Surface B, Diameter A and Diameter C, when Diameters A and C and this feature are at Maximum Material Condition
11. 0.010 to 0.030 inch modified radius both sides. Machine if necessary.

Figure 8. No. 2 Bearing Front Face Seal Assembly - Guide Slot Repair

**11. NO. 2 BEARING REAR FACE SEAL
ASSEMBLY (PN 4033283 or 4033284) - GUIDE
SLOT INTERFACES REPAIR.**

(See Figure 9.)

- a. Remove carbon face seal element per paragraph 4.
- b. Machine interface slots to dimensions(1 and 2, figure 9). Hold to maximum value.
- c. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.
- d. Clean by vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 01.
- e. Chromium plate enclosed area(3) to dimension(4). Refer to T.O. 2-1-111, SPOP 22.
- f. Bake at 750°F (399°C) for two hours.
- g. Finish machine slots, if required, to dimension(4).
- h. Install carbon face seal element per paragraph 4.
- i. Mark with beehive symbol in area near part number. Refer to T.O. 2-1-111, SPOP 401.



- 1 0.000 to 0.010 inch
2. 0.061 to 0.063 inch
3. Chromium plate area
4. 0.065 to 0.075 inch. Finish if required at plated areas only. Break all plated edges 0.003 to 0.010 inch.
5. 0.000 to 0.010 inch

Figure 9. No. 2 Bearing Rear Face Seal Assembly - Guide Slot Interfaces Repair

**12. NO. 2 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4072837 OR 4072839) -
OVERSIZE RING GROOVE REPAIR.**

(See Figure 10.)

- a. It is recommended that carbon element be removed before performing this repair. Handle carbon seals per T.O. 2-1-111.



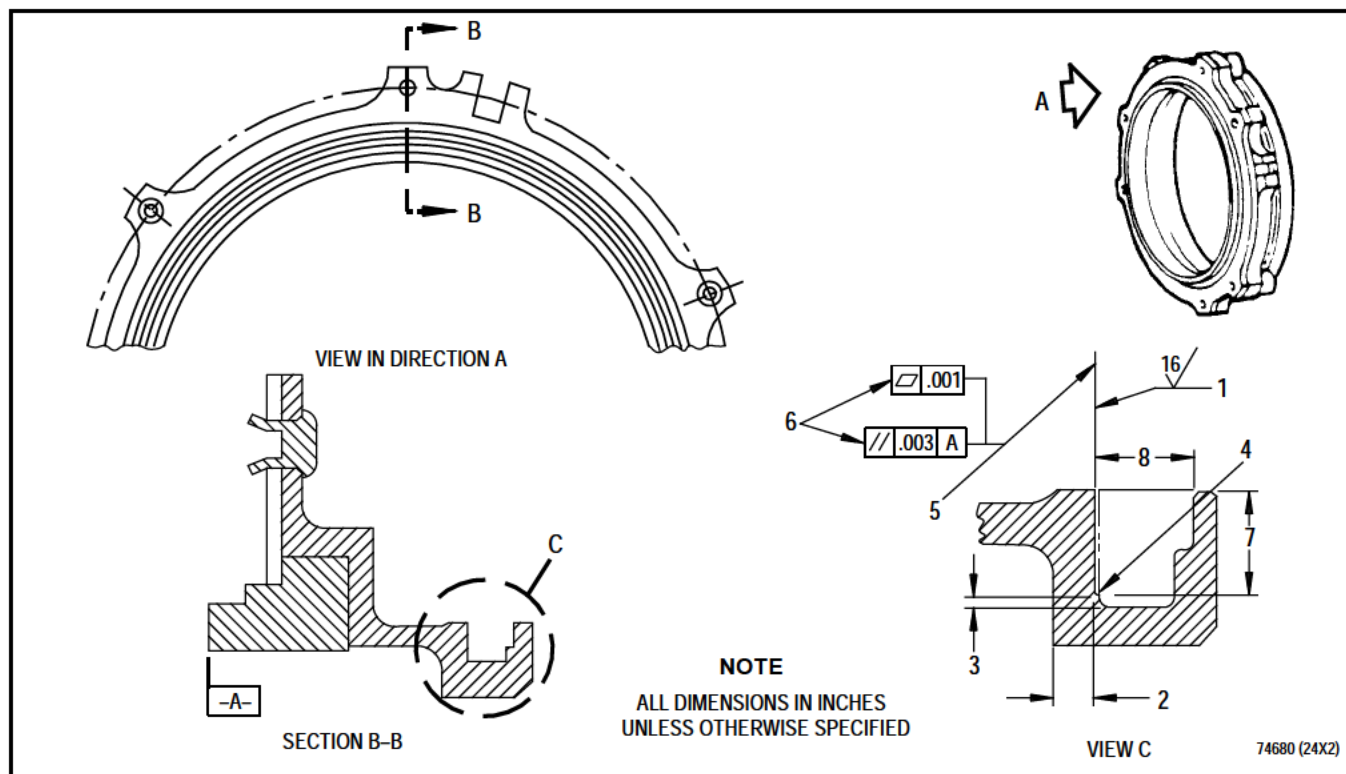
If carbon element was not removed, failure to use extreme care during machining can cause damage to carbon element.

- b. Machine surface(1) to dimension(8) as required to remove step or wear. Remove only enough material to remove all evidence of steps or wear while maintaining dimensions(2) and (8). Do not allow tooling to contact carbon element, if installed.
- c. Record actual machined dimension(8) for future marking.
- d. Locally fluorescent penetrant inspect machined area. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.

NOTE

It is permissible to machine seal ring groove 0.005 inch oversize and still use standard size seal ring.

- e. Mark USE OVERSIZE RING and size code on part in area adjacent to part number. Determine size code per figure 10 using measurement recorded in step c. Mark using deep electrolytic etch. Refer to T.O. 2-1-111, SPOP 401.
For example: If measured dimension(8) is 0.202 inch, mark part USE OVERSIZE RING P10.
- f. If carbon element was removed before performing this repair, replace carbon element per paragraph 5.
- g. If carbon element was not removed before performing this repair, bake face seal assembly at 250° to 300°F (121° to 149°C) for 2 hours ±15 minutes in air.
- h. If groove is enlarged again, mark out old size code and mark new size code.



1. Machining surface
2. 0.040 inch minimum
3. 0.000 to 0.010 inch
4. 0.005 to 0.020 inch modified radius
5. This surface shall be flat within 0.001 inch and parallel to Surface A within 0.003 inch.
6. Over distance 7
7. 0.150 inch minimum machining depth
8. Machining dimension:

NOTE

Parts with this repair require oversize seal ring and special marking. Refer to text.

Oversize Seal Ring Groove

Dimensions (inch)	Size Code
0.192 to 0.200	Standard
0.202 to 0.205	P10
0.207 to 0.210	P15

Figure 10. No. 2 Bearing Front Face Seal Assembly - Oversize Ring Groove Repair

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 3 BEARING, FRONT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 13	0				
14 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures - Marking, Electrochemical (SPOP 401) - -	SWP 023 02
General Repair Procedures - Plating, Chromium, on Steel, Nickel, or Colbalt (SPOP 22) - - - - -	SWP 092 06
Painting SermeTel W - - - - -	SWP 097 03
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

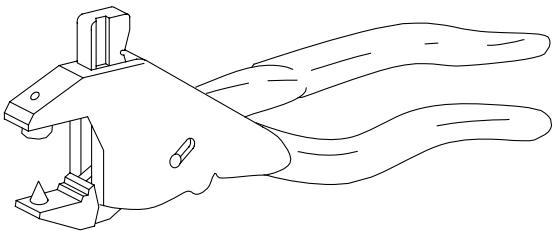
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Rivet	2150048	6

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing Front Face Seal Assembly (PN 4012468 or 4012501) - Spring Seat or rivet replacement	
	Riveter - - - - -	PWA 26523

ILLUSTRATED SUPPORT EQUIPMENT



PWA 26523 -C

Figure T1. PWA 26523 Riveter

1. INTRODUCTION.

- a. This work package contains instructions for repair of the No. 3 bearing face seal assembly.

**2. NO. 3 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4012468 OR 4012501) - SPRING
SEAT OR RIVET REPLACEMENT.**

(See Figure 1.)

- a. Remove damaged spring seat(4, figure 1) as follows:



- Do not cut into positioning plate material when removing flared end of rivet or spring seat.
 - Do not allow tooling to come in contact with carbon element, as carbon is easily damaged.
- (1) Use standard tooling to drill out flare of spring seat or rivet without cutting into positioning plate.
- (2) Use pliers, if necessary, to remove damaged spring seat or rivet. Do not use punch and hammer which could cause damage to carbon element.

- b. Install replacement spring seat(4) or rivet(1 or 5) as follows:

- (1) Ensure hole in positioning plate and housing is not blocked and is free of metal burrs.
- (2) Lightly lubricate hole in shank of spring seat or rivet.
- (3) Install spring seat or rivet through hole from housing side.
- (4) Use PWA 26523 riveter to flare spring seat or rivet shank. Refer to T.O. 2-1-111.

- c. Repeat steps a. and b., as necessary, to replace damaged parts.

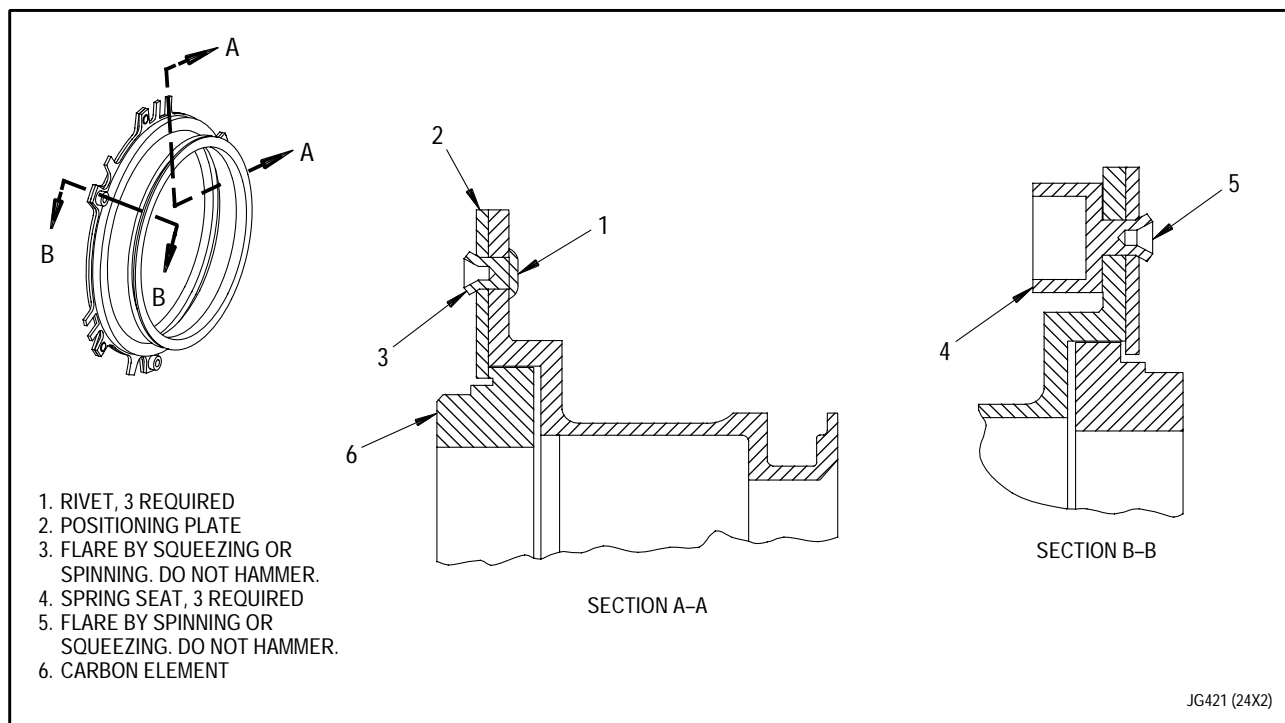


Figure 1. No. 3 Bearing Front Face Seal Assembly - Spring Seat or Rivet Replacement

3. NO. 3 BEARING FRONT FACE SEAL ASSEMBLY (PN 4012468 or 4012501) - FACE SEAL (CARBON) ELEMENT REPLACEMENT.

(See Figure 2.)

- a. Forward seal assembly with worn or damaged carbon face seal element to one of the addresses below for replacement of face seal elements.

- Sealol, Inc.
 Warwick Industrial Park
 P.O. Box 2158,
 Providence, Rhode Island 02905

- Koppers Company, Inc.
 Metal Products Division
 Bush and Hamburg Street
 P.O. Box 626
 Baltimore, Maryland 21203

- Union Carbide Corporation
 Linde Division
 Coating Service Department
 1500 Polco Street
 Indianapolis, Indiana 46224

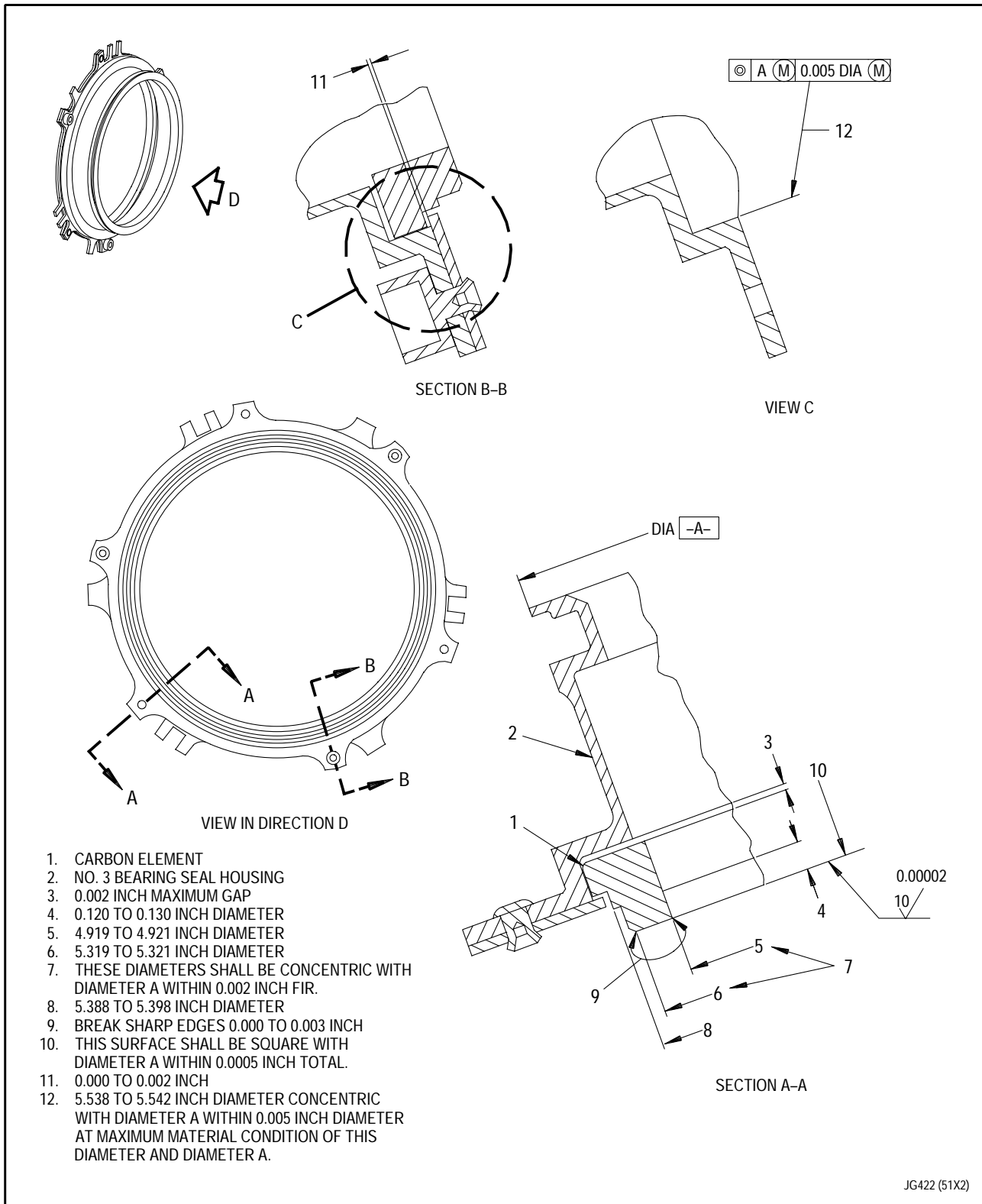


Figure 2. No. 3 Bearing Front Face Seal - Carbon Element Replacement

- b. Handle repaired face-type oil seals per T.O. 2-1-111.
- c. Repair outline is as follows:
 - (1) Remove rivets or spring seats per paragraph 2. Discard parts.
 - (2) Remove positioning plate and carbon element. Discard carbon element. Retain positioning plate.
 - (3) Install new carbon element(1, figure 2).
 - (4) Install positioning plate with new rivets and spring seats per paragraph 2.
 - (5) Machine carbon element to finish dimensions. (See figure 2.)

**4. NO. 3 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4012468 or 4012501) - FACE
SEAL ELEMENT LAPPING REPAIR.**

(See figure 2.)



Do not use abrasive compounds to lap or polish carbon element seal face. Abrasive particles can become embedded in carbon material and cause wear damage to seal during engine operation.

a. Lap repair face seal as follows:

- (1) During lapping do not reduce overall width of seals below minimum dimension given for each seal. (See figure 2.)
- (2) Lapping equipment shall be properly maintained.
- (3) Check flatness of lap surface frequently.

b. Lap repair unserviceable face seal chips, nicks, and scratches as follows:

- (1) Gap seal to within serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

c. Lap repair unserviceable face seal scratches extending across sealing face as follows:

- (1) Scratches larger than serviceable limit may be partially removed by lapping to serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

d. Lap repair unserviceable face seal squareness and surface finish per figure 2 as follows:

- (1) Maintain seal lip height within serviceable limit.
- (2) Check surface finish using optical flats. Refer to T.O. 2-1-111.

**5. NO. 3 BEARING FRONT FACE SEAL
ASSEMBLY (PN 4012468 OR 4012501) -
ALUMINUM COATING APPLICATION.**

(See Figure 3.)

- a. Apply two coats of aluminum coating. Refer to T.O. 2J-F100-53-1, SWP 097 03 (SPOP 162).

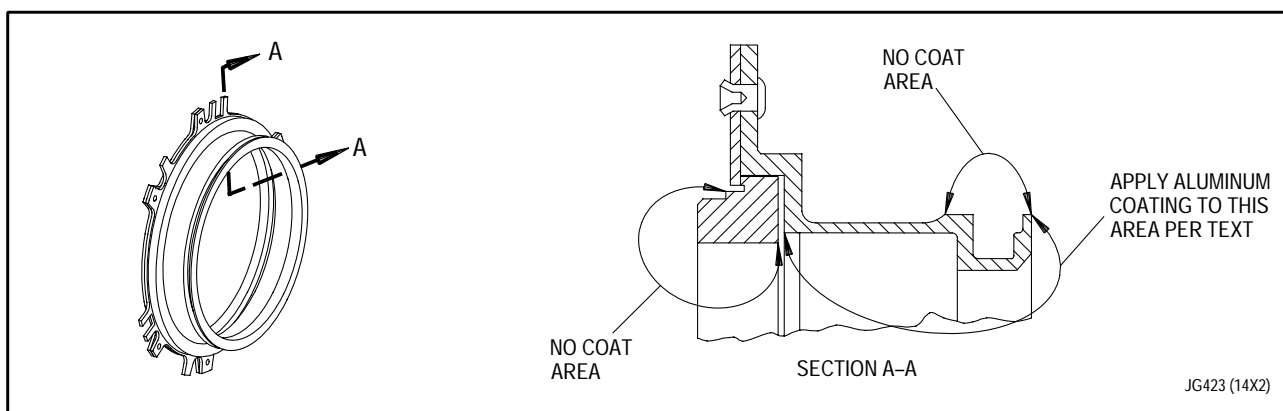


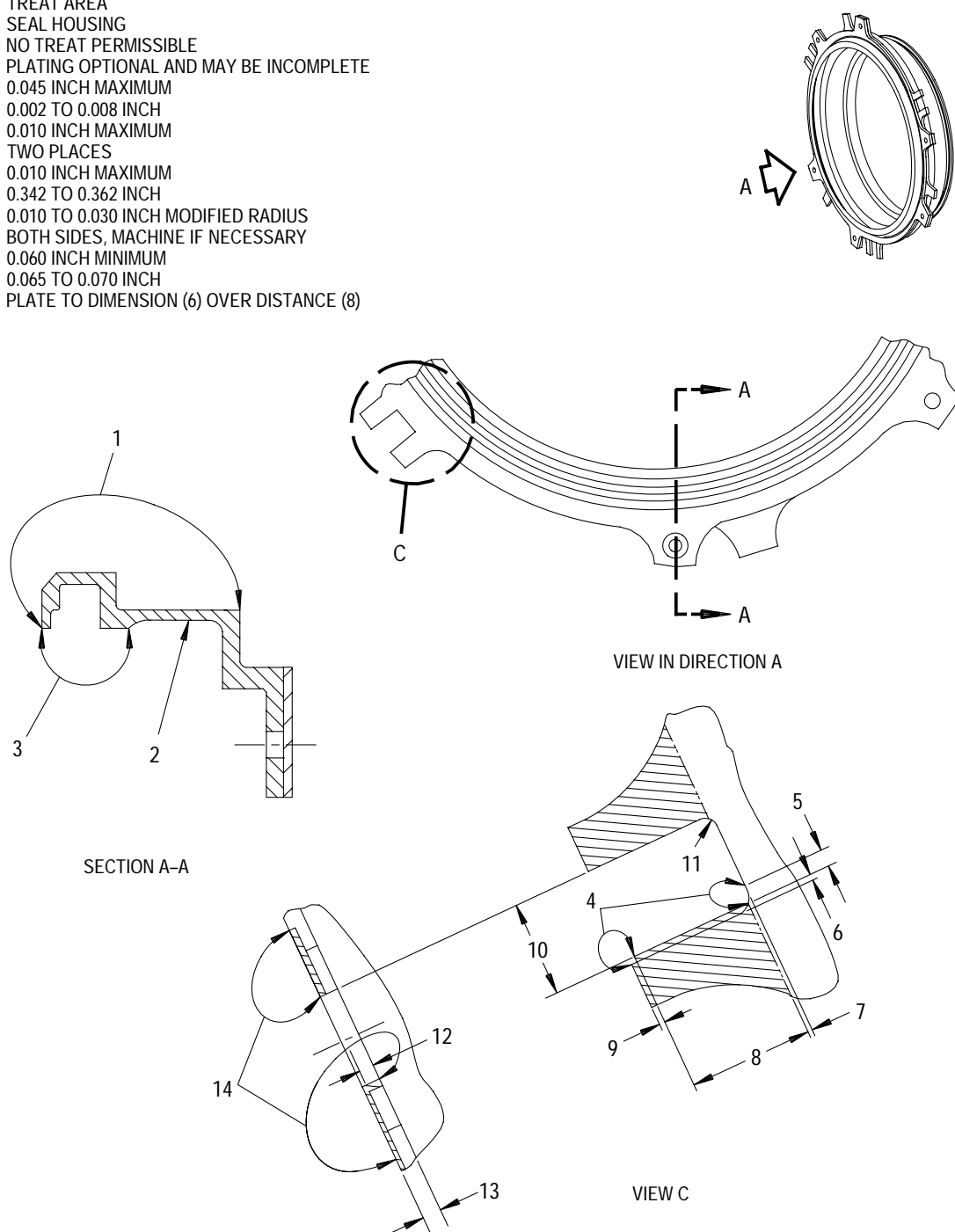
Figure 3. Application of PWA 110 Aluminum Coating

**6. NO. 3 BEARING FRONT FACE SEAL
ASSEMBLY - GUIDE SLOT REPAIR.**

(See Figure 4.)

- a. Remove carbon face seal element per paragraph 3.
- b. Chemically strip coating in area(1) per T.O. 2J-F100-53-1, SWP 092 06.
- c. Machine area to be plated to limits. (See figure 4.)
- d. Magnetic particle inspect per T.O. 2J-F100-9. No cracks allowed.
- e. Chromium plate area(14) to dimensions given in figure. Plate per T.O. 2J-F100-53-1, SWP 092 06. Dimensions specified are after plating.
- f. Bake at 735° to 765°F (390° to 407°C) for two hours.
- g. Finish machine to dimensions shown. Resulting mismatch between plated and unplated areas is acceptable.
- h. Magnetic particle inspect reworked area per step d.
- i. Treat area(1) per T.O. 2J-F100-53-1, SWP 097 03 and burnish. Resistivity shall be less than 15 ohms per inch.
- j. Permanently identify with beehive symbol per T.O. 2J-F100-53-1, SWP 023 02 (SPOP 401), shallow etch in area near part number.
- k. Install carbon face seal element per paragraph 3.

1. TREAT AREA
2. SEAL HOUSING
3. NO TREAT PERMISSIBLE
4. PLATING OPTIONAL AND MAY BE INCOMPLETE
5. 0.045 INCH MAXIMUM
6. 0.002 TO 0.008 INCH
7. 0.010 INCH MAXIMUM
8. TWO PLACES
9. 0.010 INCH MAXIMUM
10. 0.342 TO 0.362 INCH
11. 0.010 TO 0.030 INCH MODIFIED RADIUS
12. BOTH SIDES, MACHINE IF NECESSARY
13. 0.060 INCH MINIMUM
14. 0.065 TO 0.070 INCH
15. PLATE TO DIMENSION (6) OVER DISTANCE (8)



JG424 (51X2)

Figure 4. No. 3 Bearing Front Face Seal Assembly - Guide Slot Repair

**7. NO. 3 BEARING FRONT FACE SEAL
ASSEMBLIES - PISTON RING GROOVE REPAIR.**

(See Figure 5.)

- a. Remove carbon face seal element per paragraph 3.
- b. Chemically strip coating in area(1, figure 5) per T.O. 2J-F100-53-1, SWP 097 03 (SPOP 162).

NOTE

It is permissible to machine seal ring groove 0.005 inch oversize and still use standard size seal ring.

- c. Machine surface(7) to dimension(8), as required to remove step or wear. Remove only enough material to remove all evidence of steps or wear while maintaining dimension(4).
- d. Measure and record dimension(8).
- e. Magnetic particle inspect per T.O. 2J-F100-9. No cracks allowed.
- f. Treat area(1) per T.O. 2J-F100-53-1, SWP 097 03 and burnish. Resistance shall be less than 15 ohms per inch.
- g. Mark USE OVERSIZE RING and size code on part in area adjacent to part number marking. Use measurement recorded in step d. to determine size code. Permanently identify per T.O. 2J-F100-53-1, SWP 023 02. Use deep electrolytic etch.

Example: Measurement from step d. of 0.172 inch requires the following part marking: USE OVERSIZE RING P15.
- h. If groove is enlarged again, mark out old size code and mark new size code.
- i. Install carbon face seal element per paragraph 3.

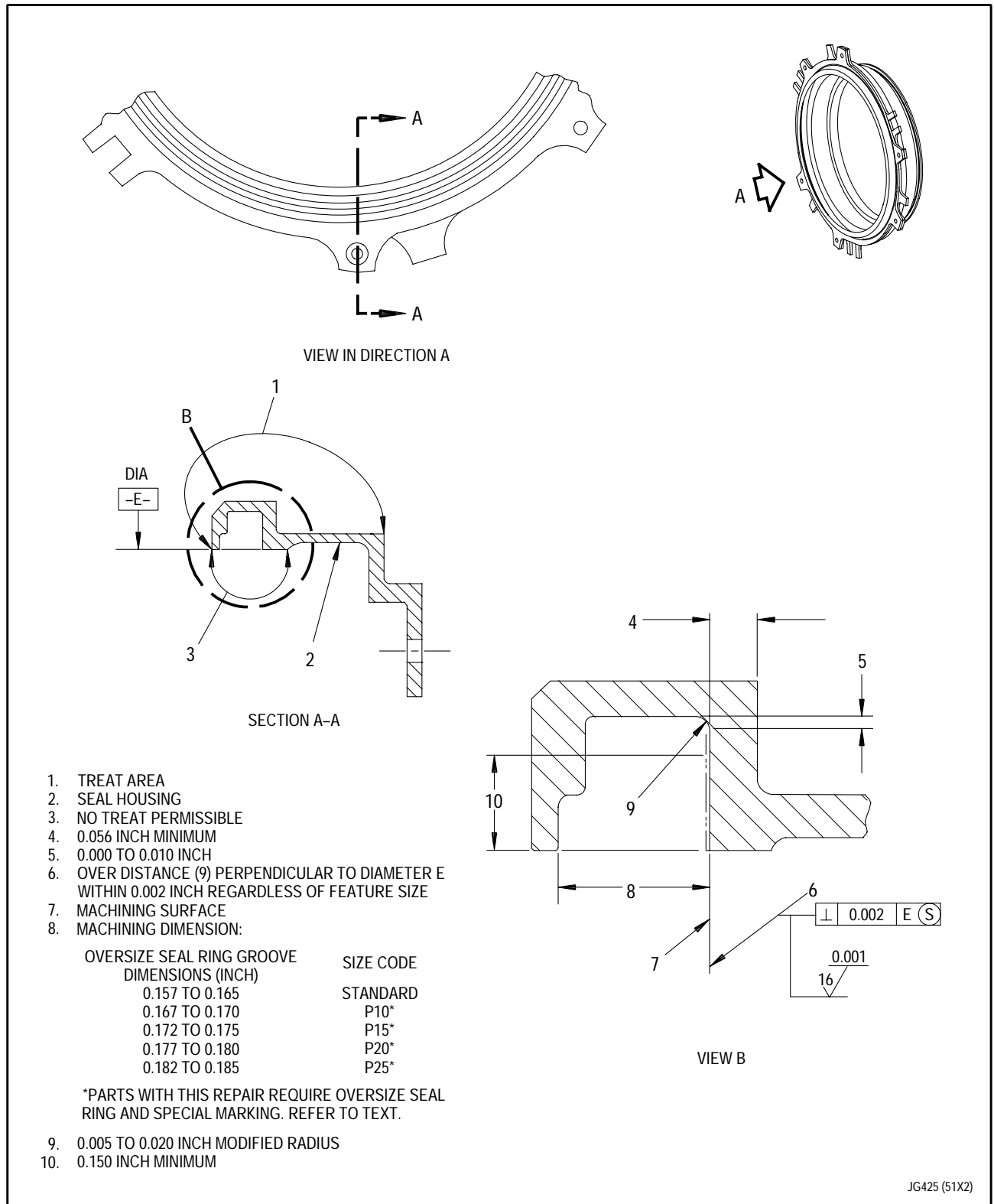


Figure 5. No. 3 Bearing Front Face Seal Assemblies - Piston Ring Groove Repair

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 3 BEARING, REAR -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 9	0				
10 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

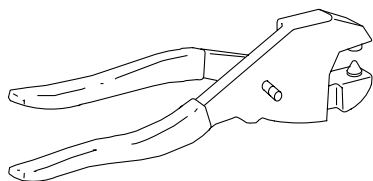
None

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Rivet	2150048	6

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing Rear Face Seal Assembly (PN 4036993 or 4036994) - Spring Seat or Rivet Replacement	
	Riveter - - - - -	PWA 50310

ILLUSTRATED SUPPORT EQUIPMENT

PWA 50310 -C

Figure T1. PWA 50310 Riveter

1. INTRODUCTION.

- a. This work package contains instructions for repair of the No. 3 bearing rear face seal assembly.

2. NO. 3 BEARING REAR FACE SEAL ASSEMBLY (PN 4036993 or 4036994) - SPRING SEAT OR RIVET REPLACEMENT.

(See Figure 1.)

- a. Remove damaged spring seat (see figure 1.) as follows:



- Do not cut into positioning plate material when removing flared end of spring seat or rivet.
 - Do not allow tooling to come in contact with carbon element. Carbon is easily damaged.
- (1) Use standard tooling to drill out flare of spring seat or rivet without cutting into positioning plate.
 - (2) Use pliers, if necessary, to remove damaged seat or rivet. Do not use punch and hammer as carbon element could be damaged.

- b. Install replacement spring seat or rivet as follows:

- (1) Ensure hole in positioning plate and housing is not blocked and is free of metal burrs.
- (2) Lightly lubricate hole in shank of spring seat or rivet. Install spring seat or rivet through hole from housing side.
- (3) Use PWA 50310 riveter to flare spring seat or rivet shank. Refer to T.O. 2-1-111.

- c. Repeat steps a. and b., as necessary, to replace damaged parts.

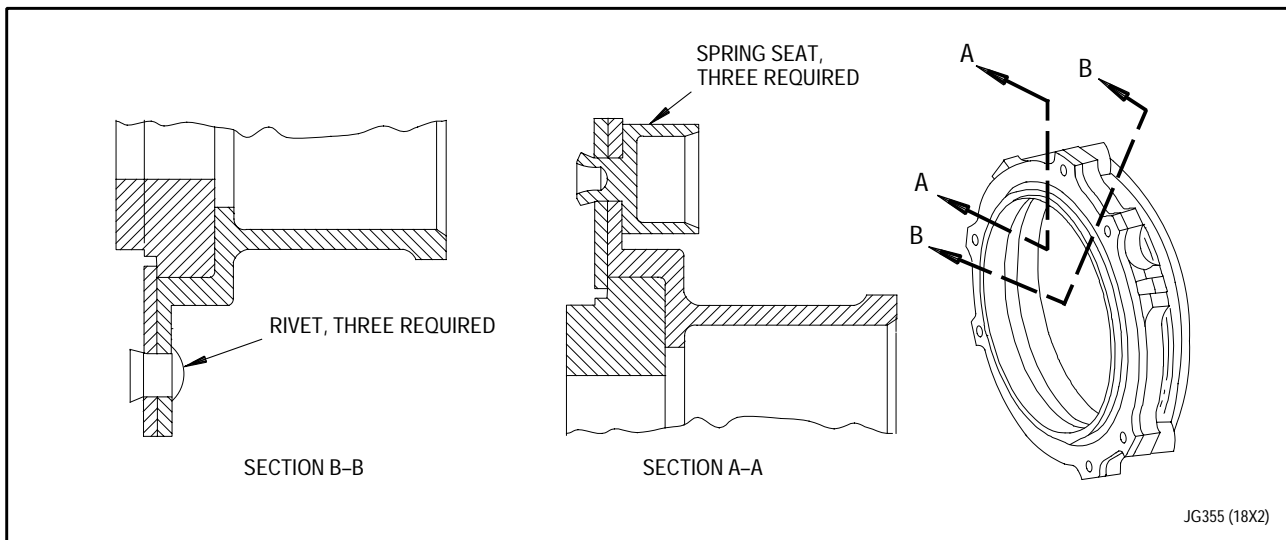


Figure 1. No. 3 Bearing Rear Face Seal Assembly - Spring Seat or Rivet Replacement

**3. NO. 3 BEARING REAR FACE SEAL
ASSEMBLY (PN 4036993 or 4036994) - FACE
SEAL (CARBON) ELEMENT REPLACEMENT.**

(See Figure 2.)

- a. Forward seal assembly with worn or damaged carbon face seal element to one of the addresses below for replacement of face seal elements.

- Sealol, Inc.
Warwick Industrial Park
P.O. Box 2158,
Providence, Rhode Island 02905

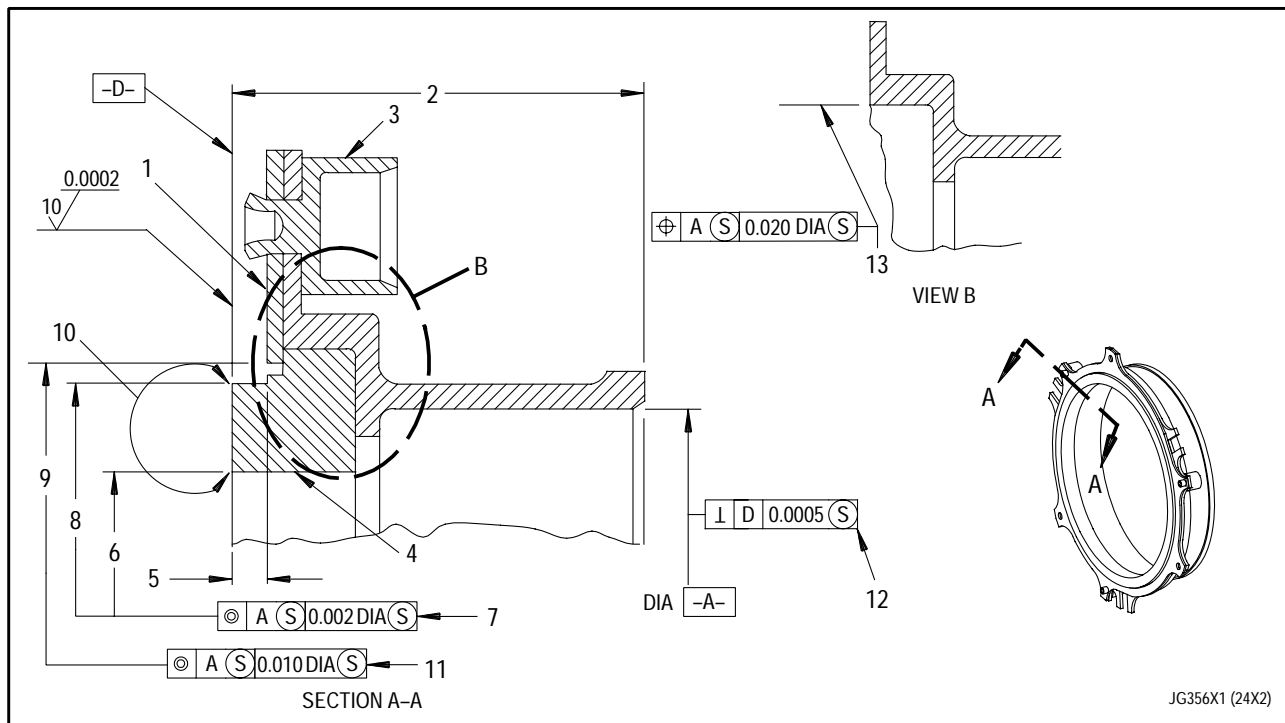
- Koppers Company, Inc.
Metal Products Division
Bush and Hamburg Street
P.O. Box 626
Baltimore, Maryland 21203

- Union Carbide Corporation
Linde Division
Coating Service Department
1500 Polco Street
Indianapolis, Indiana 46224

- b. Handle repaired face-type oil seals per T.O. 2-1-111.

- c. Repair outline is as follows:

- (1) Remove rivets, spring seats(3, figure 2) per paragraph 2. Discard parts.
- (2) Remove positioning plate(1) and carbon element(4). Discard carbon element(4). Retain plate(1).
- (3) Install new carbon element(4).
- (4) Install positioning plate(1) with new rivets and spring seats(3) per paragraph 2.
- (5) Machine carbon element(4) to finish dimensions.



1. Positioning plate
2. 1.345 to 1.355 inches
3. Spring seat, three required. Equally spaced.
4. Carbon element
5. 0.120 to 0.130 inch
6. 6.878 to 6.882 inch average diameter. This diameter may be 0.004 inch out-of-round in excess of this tolerance.
7. This diameter shall be concentric with Diameter A within 0.002 inch diameter Regardless of Feature Size of this diameter and Diameter A.
8. 7.278 to 7.282 inch average diameter. This diameter may be 0.004 inch out-of-round in excess of this tolerance.
9. 7.348 to 7.358 inch average diameter. This diameter may be 0.004 inch out-of-round in excess of this tolerance.
10. Break edge 0.000 to 0.003 inch
11. This diameter shall be concentric with Diameter A within 0.010 inch diameter Regardless of Feature Size of this Diameter and Diameter A.
12. This diameter shall be perpendicular to Surface D within 0.0005 inch Regardless of Feature Size of this diameter.
13. 7.498 to 7.502 inch diameter located within 0.020 inch diameter of true position in relation to Diameter A Regardless of Feature Size of this diameter and Diameter A.

Figure 2. No. 3 Bearing Rear Face Seal Assembly - Carbon Element Replacement

4. NO. 3 BEARING REAR FACE SEAL ASSEMBLY (PN 4036993 or 4036994) - FACE SEAL ELEMENT LAPPING REPAIR.

(See figure 2.)



Do not use abrasive compounds to lap or polish carbon element seal face. Abrasive particles can become embedded in carbon material and cause wear damage to seal during engine operation.

a. Lap repair face seal as follows:

- (1) During lapping do not reduce overall width of seals below minimum dimension given for each seal. (See figure 2.)
- (2) Lapping equipment shall be properly maintained.
- (3) Check flatness of lap surface frequently.

b. Lap repair unserviceable face seal chips, nicks, and scratches as follows:

- (1) Lap seal to within serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

c. Lap repair unserviceable face seal scratches extending across sealing face as follows:

- (1) Scratches larger than serviceable limit may be partially removed by lapping to serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

d. Lap repair unserviceable face seal squareness and surface finish per figure 2 as follows:

- (1) Maintain seal lip height within serviceable limit.
- (2) Check surface finish using optical flats. Refer to T.O. 2-1-111.

**5. NO. 3 BEARING FACE SEAL ASSEMBLY
(PN 4036993 or 4036994) - FLAME DEPOSITION
REPAIR.**

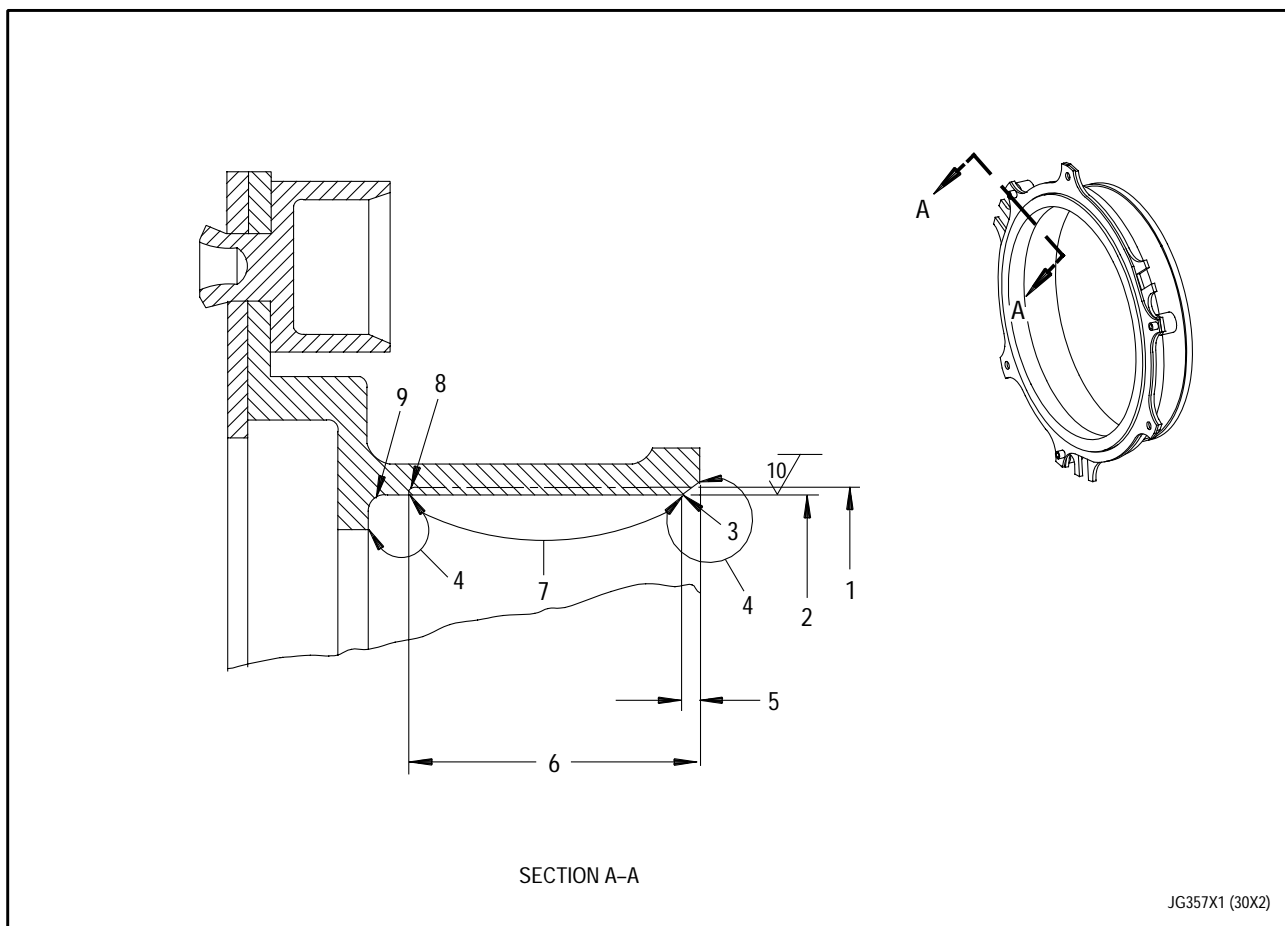
(See Figures 3.)

- a. Remove rivets, spring seats, positioning plate, and carbon element per paragraph 3. Discard carbon element, rivets and spring seats. Retain positioning plate.
- b. Remove existing flame deposition coating by chemical stripping per T.O. 2-1-111, machining, or grinding to dimensions(1, figure 3).
- c. Fluorescent penetrant inspect per T.O. 2J-F100-9. No cracks permitted.
- d. Apply flame deposition coating in area(1). Refer to T.O. 2-1-111 (PWA 46). Allow for a 0.002 to 0.007 inch thickness after machining.

NOTE

Maintain surface finish as shown.

- e. Finish machine to dimensions(2, 3, 5, and 8) shown in figure.
- f. Fluorescent penetrant inspect per T.O. 2J-F100-9. No cracks permitted.
- g. Install new carbon element. Install old positioning plate with new rivets and spring seats. Machine carbon element. Refer to paragraph 3 for procedures.
- h. Mark with beehive symbol in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02.



1. Clean up machine 7.145 to 7.153 inch diameter, hold to minimum value.
2. Finish machine 7.139 to 7.142 inch average diameter which may be 0.002 inch out-of-round in excess of dimension given. Machine to dimension(6) maintaining surface finish requirements.
3. Break edge 0.000 to 0.005 inch.
4. Flame deposition coating optional and incomplete.
5. Chamfer 0.040 to 0.060 x 30° ±2°
6. 0.760 inch minimum
7. Flame deposition coating
8. Runout radius 0.125 inch minimum
9. 0.040 to 0.060 inch radius

Figure 3. No. 3 Bearing Rear Face Seal Assembly - Flame Deposition Repair

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, FACE, NO. 4 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 10	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

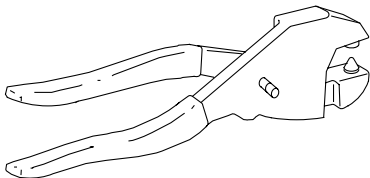
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 4 Bearing Rear Face Seal Assembly Spring Seat or Rivet Replacement	
	Riveter - - - - -	PWA 50310

ILLUSTRATED SUPPORT EQUIPMENT



PWA 50310 -C

Figure T1. PWA 50310 Riveter

1. INTRODUCTION.

- a. This work package contains instructions for repair of the No. 4 bearing face seal assembly.

**2. NO. 4 BEARING FACE SEAL ASSEMBLY
(PN 4035882 OR 4035883) - SPRING SEAT.**

(See Figure 1.)

- a. Remove damaged spring seat(6, figure 1) as follows:



- Do not cut into positioning plate material when removing flared end of spring seat.
 - Do not allow tooling to come in contact with carbon element, as carbon is easily damaged.
- (1) Use standard tooling to drill out flare of spring seat without cutting into positioning plate(3).
- (2) Use pliers, if necessary, to remove damaged spring seat. Do not use punch and hammer which could cause damage to carbon element.

- b. Install replacement spring seat as follows:

- (1) Ensure hole in positioning plate and housing is not blocked and is free of metal burrs.
- (2) Lightly lubricate hole in shank of spring seat.
- (3) Install spring seat through hole from housing side.
- (4) Use PWA 50310 riveter to flare spring seat. Refer to T.O. 2-1-111.

- c. Repeat steps a. and b., as necessary, to replace damaged parts.

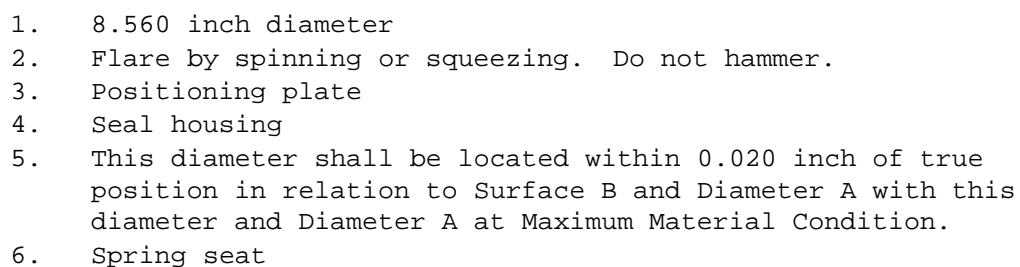


Figure 1. No. 4 Bearing Face Seal - Spring Seat Replacement

**3. NO. 4 BEARING FACE SEAL ASSEMBLY
(PN 4035882 or 4035883) - FACE SEAL
(CARBON)
ELEMENT REPLACEMENT.**

(See Figure 2.)

- a. Forward seal assembly with worn or damaged carbon face seal element to one of the addresses below for replacement of face seal elements.

- Sealol, Inc.
Warwick Industrial Park
P.O. Box 2158,
Providence, Rhode Island 02905

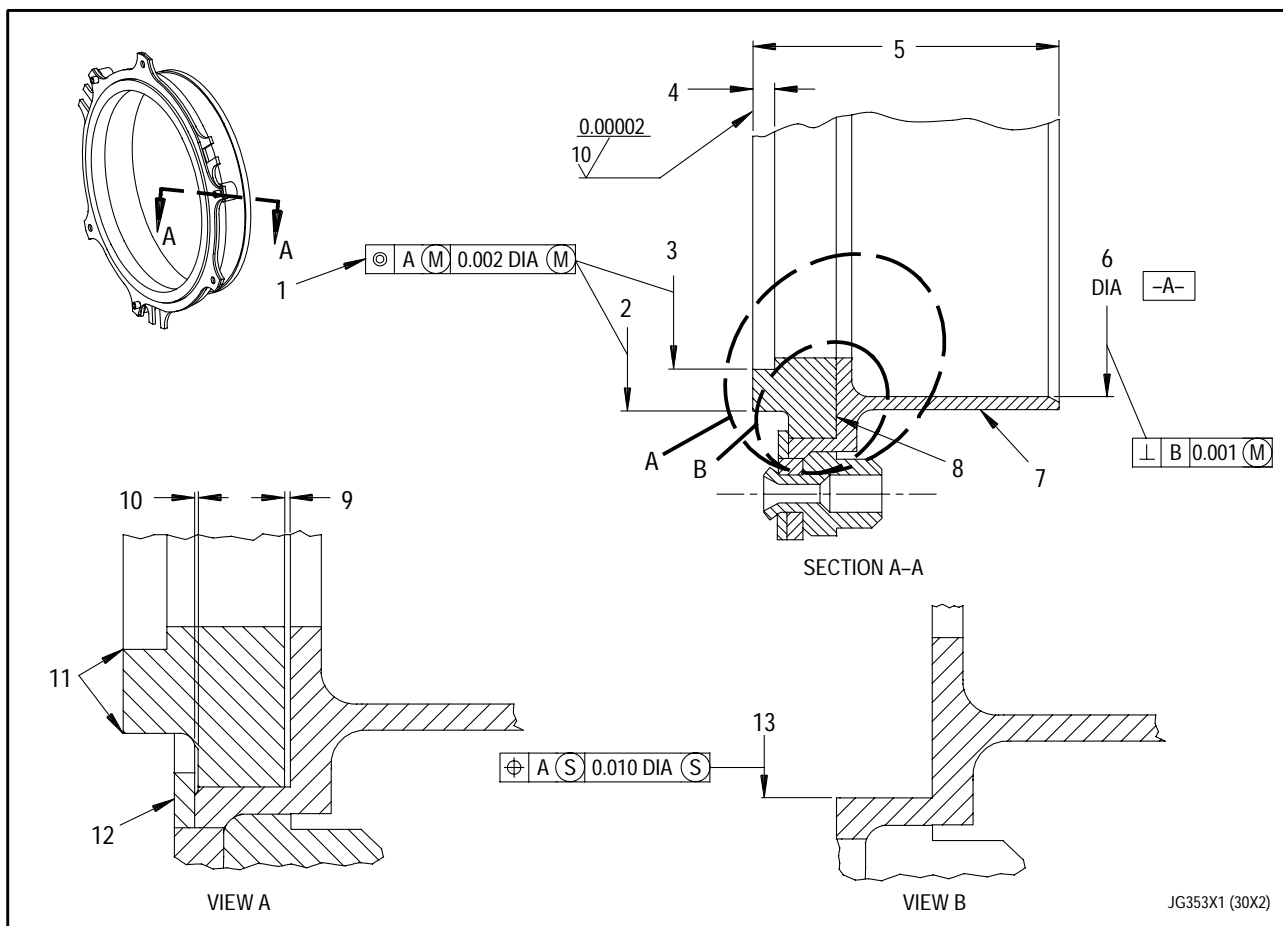
- Koppers Company, Inc.
Metal Products Division
Bush and Hamburg Street
P.O. Box 626
Baltimore, Maryland 21203

- Union Carbide Corporation
Linde Division
Coating Service Department
1500 Polco Street
Indianapolis, Indiana 46224

- b. Handle repaired face-type oil seals. Refer to T.O. 2-1-111.

- c. Repair outline is as follows:

- (1) Remove spring seats per paragraph 2. Discard parts.
- (2) Remove positioning plate(12, figure 2) and carbon element(8). Discard carbon element.
- (3) Install new carbon element.
- (4) Install positioning plate with new spring seats per paragraph 2.
- (5) Machine carbon element to finish dimensions. (See figure 2.)



1. These diameters shall be concentric with Diameter A within 0.002 inch diameter with these diameters and Diameter A at Maximum Material Condition.
2. 7.736 to 7.740 inch average diameter. This diameter may be 0.004 inch out of round in excess of this tolerance.
3. 7.348 to 7.352 inch average diameter. This diameter may be 0.004 inch out-of-round in excess of this tolerance.
4. 0.100 to 0.120 inch
5. 1.520 to 1.530 inches
6. This diameter shall be perpendicular with Surface B within 0.001 with this diameter at Maximum Material Condition.
7. No. 4 bearing seal housing
8. Carbon element
9. 0.002 in maximum gap between mating surface
10. 0.000 to 0.002 inch gap permissible
11. Break edge 0.001 to 0.003 inch
12. Positioning plate
13. 7.940 to 7.944 inch diameter located within 0.010 inch diameter of true position in relation to Diameter A Regardless of Feature Size of this diameter and Diameter A.

Figure 2. No. 4 Bearing Face Seal - Carbon Element Replacement

**4. NO. 4 BEARING FACE SEAL ASSEMBLY
(PN 4035882 or 4035883) - FACE SEAL ELEMENT
LAPPING REPAIR.**

(See figure 2.)



Do not use abrasive compounds to lap or polish carbon element seal face. Abrasive particles can become embedded in carbon material and cause wear damage to seal during engine operation.

a. Lap repair face seal as follows:

- (1) During lapping do not reduce overall width of seals below minimum dimension given for each seal. (See figure 2.)
- (2) Lapping equipment shall be properly maintained.
- (3) Check flatness of lap surface frequently.

b. Lap repair unserviceable face seal chips, nicks, and scratches as follows:

- (1) Lap seal to within serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

c. Lap repair unserviceable face seal scratches extending across sealing face as follows:

- (1) Scratches larger than serviceable limit may be partially removed by lapping to serviceable limit.
- (2) Maintain seal lip height within serviceable limit.

d. Lap repair unserviceable face seal squareness and surface finish per figure 2 and as follows:

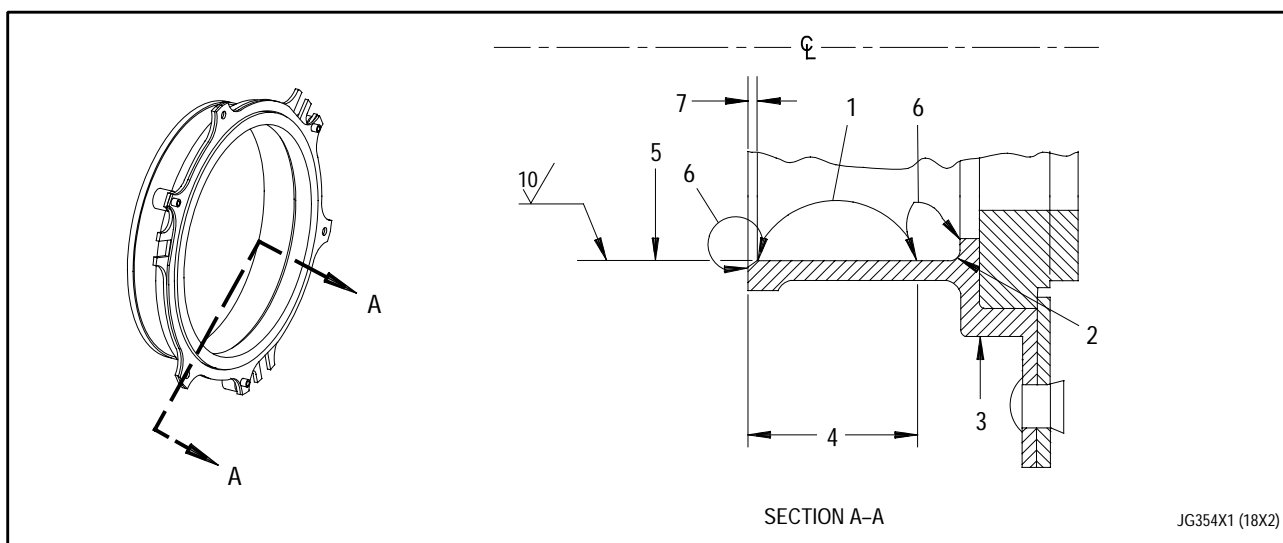
- (1) Maintain seal lip height within serviceable limit.
- (2) Check surface finish using optical flats. Refer to T.O. 2-1-111.

5. NO. 4 BEARING FACE SEAL ASSEMBLY (PN 4035882 or 4035883) - FLAME DEPOSITION REPAIR.

(See Figure 3.)

- a. Remove spring seats, positioning plate, and carbon element per paragraph 2 and 3. Discard carbon element and spring seats.

- b. Remove existing flame deposition coating by chemical stripping per T.O. 2-1-111, machining, or grinding to dimension(1, figure 3).



1. Hardfaced area. Clean up machine to 7.611 to 7.619 inch diameter, hold to minimum value.
2. 0.031 to 0.062 inch radius
3. No. 4 bearing seal housing
4. 0.850 inch minimum
5. Finish machine 7.605 to 7.607 inch average diameter which may be 0.001 inch over maximum or 7.605 to 7.608 inch average diameter may be 0.002 inch out-of-round in excess of dimension given.
6. Hardface optional and may be incomplete
7. Chamfer 0.040 to 0.050 x 30° ±2°

Figure 3. No. 4 Bearing Face Seal Assembly - Flame Deposition Repair

T.O. 2J-F100-53-7

WP 420 00

- c. Apply flame deposition coating in area(1) per PWA 46 in T.O. 2-1-111. Allow for a 0.002 to 0.007 inch thickness after machining.

NOTE

Maintain surface finish as shown.

- d. Finish machine to dimensions(5 and 7).
- e. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks permitted.

- f. Install new carbon element. Install old positioning plate with new rivets and spring seats. Machine carbon element. Refer to paragraph 3 for procedures.

- g. Mark with beehive symbol in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02.

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, COMPRESSOR, THIRD STAGE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 20

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	27	5 - 19 Added	27	20 Blank Added	27

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Stator, Compressor, Third Stage - Inspection - - - - -	WP 321 00
Nondestructive Inspection Methods - - - - -	T.O. 33B-1-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BEADS, CERAMIC	AZB, 210 MAXIMUM
SHOT, CAST STEEL	ASR, 110 MAXIMUM
WIRE, WELDING	AMS 4956 (TITANIUM ALLOY)

EXPENDABLE ITEMS

None

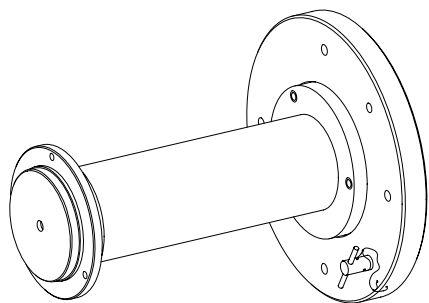
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	THIRD STAGE COMPRESSOR STATOR - INNER PLATFORM TRAILING EDGE REPAIR	
	FIXTURE, WELD, 3RD STAGE COMPRESSOR STATOR (REPAIR)	PWA 71016
	FIXTURE, STRESS RELIEF, 3RD STAGE COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71017
	FIXTURE, MACHINE, 3RD STAGE COMPRESSOR STATOR, REAR (REPAIR) - - - - -	PWA 71015
	GAGE, DIAL FLUSH PIN, 3RD STAGE COMPRESSOR STATOR -	PWA 71018
	PEDESTAL, AUTOMATED SHOTPEEN INSTALLATION - - - - -	PWA 70449
	HOLDER, TEST STRIP, 3RD STAGE COMPRESSOR STATOR - - -	PWA 71044
	FIXTURE, SHOTPEEN, 3RD STG COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71041

APPLICABLE SUPPORT EQUIPMENT (continued)

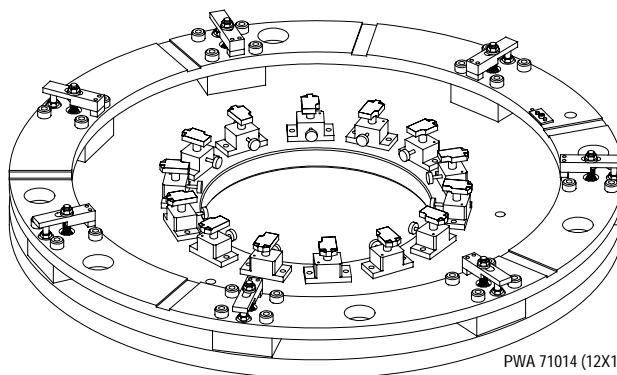
Paragraph	Function - Tool Nomenclature	Tool Number
4	THIRD STAGE COMPRESSOR STATOR - OUTER PLATFORM TRAILING EDGE REPAIR	
	FIXTURE, WELD, 3RD STAGE COMPRESSOR STATOR (REPAIR)	PWA 71016
	FIXTURE, STRESS RELIEF, 3RD STAGE COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71017
	FIXTURE, MACHINE, 3RD STAGE COMPRESSOR STATOR, REAR (REPAIR) - - - - -	PWA 71015
	PEDESTAL, AUTOMATED SHOTPEEN INSTALLATION - - - - -	PWA 70449
	HOLDER, TEST STRIP, 3RD STAGE COMPRESSOR STATOR - - -	PWA 71044
	FIXTURE, SHOTPEEN, 3RD STG COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71041
5	THIRD STAGE COMPRESSOR STATOR - ANTIROTATION LUG REPAIR	
	FIXTURE, WELD, 3RD STAGE COMPRESSOR STATOR (REPAIR)	PWA 71016
	FIXTURE, STRESS RELIEF, 3RD STAGE COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71017
	FIXTURE, MACHINE, 3RD STAGE COMPRESSOR STATOR, FRONT - - - - -	PWA 71014
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR - - -	PWA 71024
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR - - -	PWA 71025
	PLATE, RISER, PLASMA SPRAY, UNIVERSAL - - - - -	PWA 71087
	FIXTURE, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 71021
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR - - -	PWA 71019
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR - - -	PWA 71020

ILLUSTRATED SUPPORT EQUIPMENT



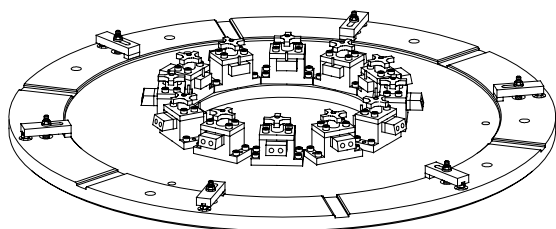
PWA 70449 -C

Figure T1. PWA 70449 PEDESTAL



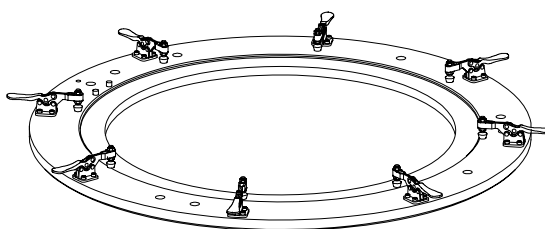
PWA 71014 (12X1)

Figure T2. PWA 71014 FIXTURE



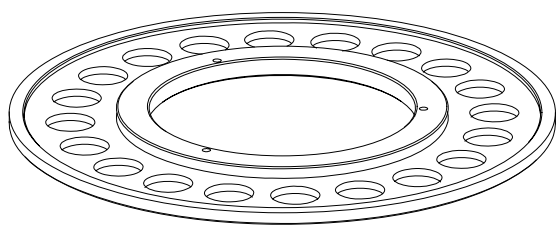
PWA 71015 -C

Figure T3. PWA 71015 FIXTURE



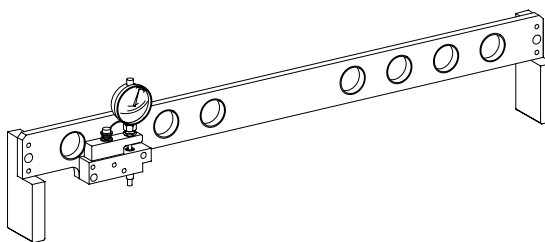
PWA 71016 -C

Figure T4. PWA 71016 FIXTURE



PWA 71017 -C

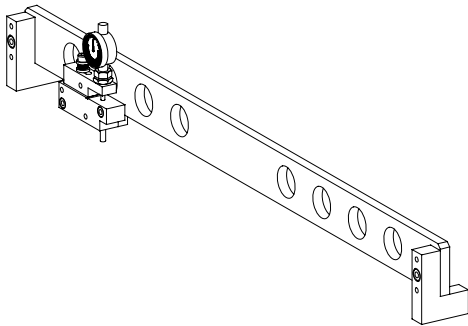
Figure T5. PWA 71017 FIXTURE



PWA 71018 -C

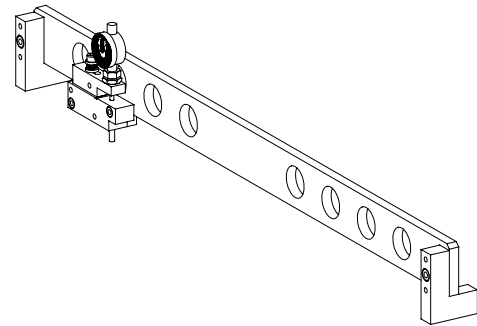
Figure T6. PWA 71018 GAGE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



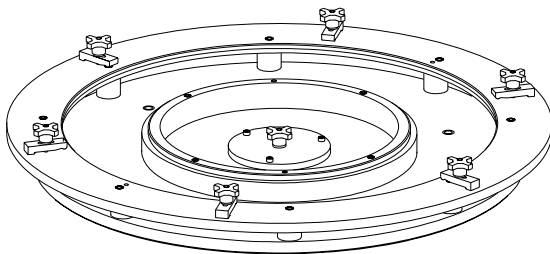
PWA 71019 (12X1)

Figure T7. PWA 71019 GAGE



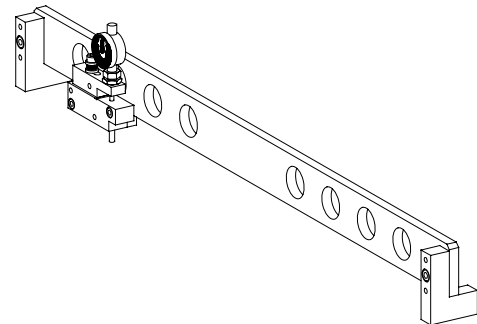
PWA 71020 (12X1)

Figure T8. PWA 71020 GAGE



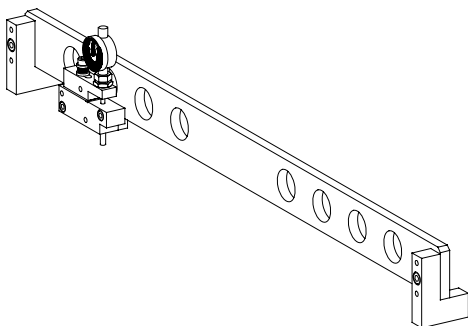
PWA 71021 -C

Figure T9. PWA 71021 FIXTURE



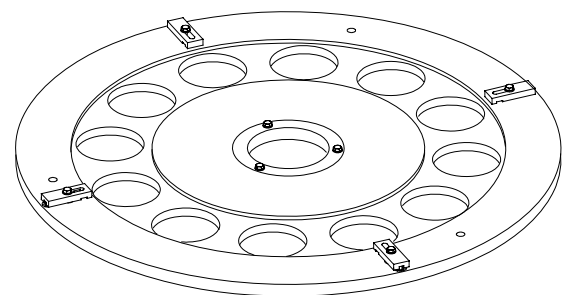
PWA 71024 (12X1)

Figure T10. PWA 71024 GAGE



PWA 71025 (12X1)

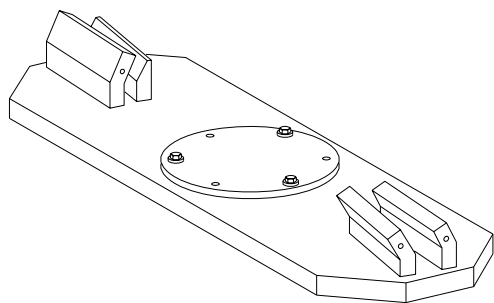
Figure T11. PWA 71025 GAGE



PWA 71041 -C

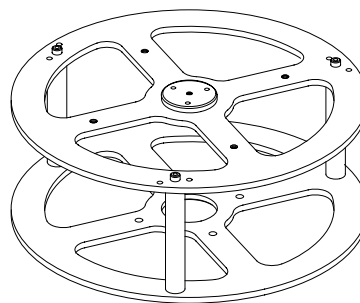
Figure T12. PWA 71041 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 71044 -C

Figure T13. PWA 71044 HOLDER



PWA 71087 -C

Figure T14. PWA 71087 PLATE

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the third stage compressor stator assembly.

2. THIRD STAGE COMPRESSOR STATOR - VANE BLENDING.**NOTE**

Limits stated in WP 321 00 pertain to isolated damage areas and shall not be interpreted as authority for removal of material all across leading or trailing edge as might be done in single machine cut.

- a. Minor damage shall be repaired by blending, using fine files and/or stones. Minimum amount of material shall be removed and surface finish shall compare to that of a new part. Maximum reparable limits in WP 321 00 shall be maintained.
- b. All blend repaired damage and acceptable round-bottom dents shall be nondestructive inspected for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. All blends shall have a minimum length to depth ratio of 5.
- d. Blends in airfoil fillet radii shall maintain original fillet radius size.
- e. Surface blends shall not reduce original thickness by more than 20%.
- f. Airfoil edge blends shall maintain original minimum radius.

3. THIRD STAGE COMPRESSOR STATOR - INNER PLATFORM TRAILING EDGE REPAIR.

(See Figures 1 and 2.)

- a. Clean stator per SPOP 208. Refer to T.O. 2-1-111.
- b. Install stator in PWA 71016 fixture rear face up as follows:
 - (1) Locate offset hole(1, figure 1) and two bolt holes that are farther apart than all others. Fit two bolt holes over locating pins on fixture.
 - (2) Ensure stator outer flange is flat on fixture base with no visible gaps. Actuate eight toggle clamps to secure stator to fixture.



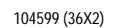
Use minimum practicable heat input to minimize trailing edge distortion.

- c. Gas tungsten arc weld build up platform edge using manual (GTAW-MA) or automatic (GTAW-ME) method and AMS 4956 welding wire per PWA 16-66X. See View in Direction B. Refer to T.O. 2-1-111.
- d. Place stator on PWA 71017 fixture rear face up.

NOTE

If performing repairs per paragraphs 4 and 5, stress relieve concurrently.

- e. Stress relieve stator for 2 hours at 1135° to 1165°F (613° to 630°C) in suitable protective atmosphere per SPOP 464. Air cool or faster. Refer to T.O. 2-1-111.
- f. Radiographic inspect weld repaired areas. Refer to T.O. 33B-1-1. Evaluate to SXRS-33, except no cracks allowed. Refer to T.O. 2-1-111.



NOTE

- Unless otherwise specified, all dimensions apply when Surface B is flat within 0.001 inch and Diameter C maintains a clearance envelope of 31.869 inch diameter in free state or constrained. Constraint contact allowed only on Surfaces B, D and E, and Diameter C.
 - Unless otherwise specified, break edges 0.003 to 0.015 inch.
1. Offset hole located at 178°30'
 2. 0.100 to 0.150 inch, 70 places
 3. Weld build up per text, 0.040 to 0.060 inch thick, 70 places.
 4. 9°58', reference
 5. Area J
 6. 1.782 to 1.786 inches from Surface B

Figure 1. Third Stage Compressor Stator - Inner Platform Trailing Edge Weld Repair

- g. Install stator in PWA 71015 fixture as follows:
- (1) Loosen six strap clamps and slide outwardly.
 - (2) Loosen 12 hand knobs on inner diameter slide blocks and slide inwardly.
 - (3) Place stator on fixture rear side up. Ensure stator outer flange is flat against fixture base.
 - (4) Secure stator in place with six strap clamps over stator outer flange and 12 slide blocks with rubber cushions contacting stator inner diameter cast surface.

NOTE

Parent material is PWA 1262 cast aluminum alloy.

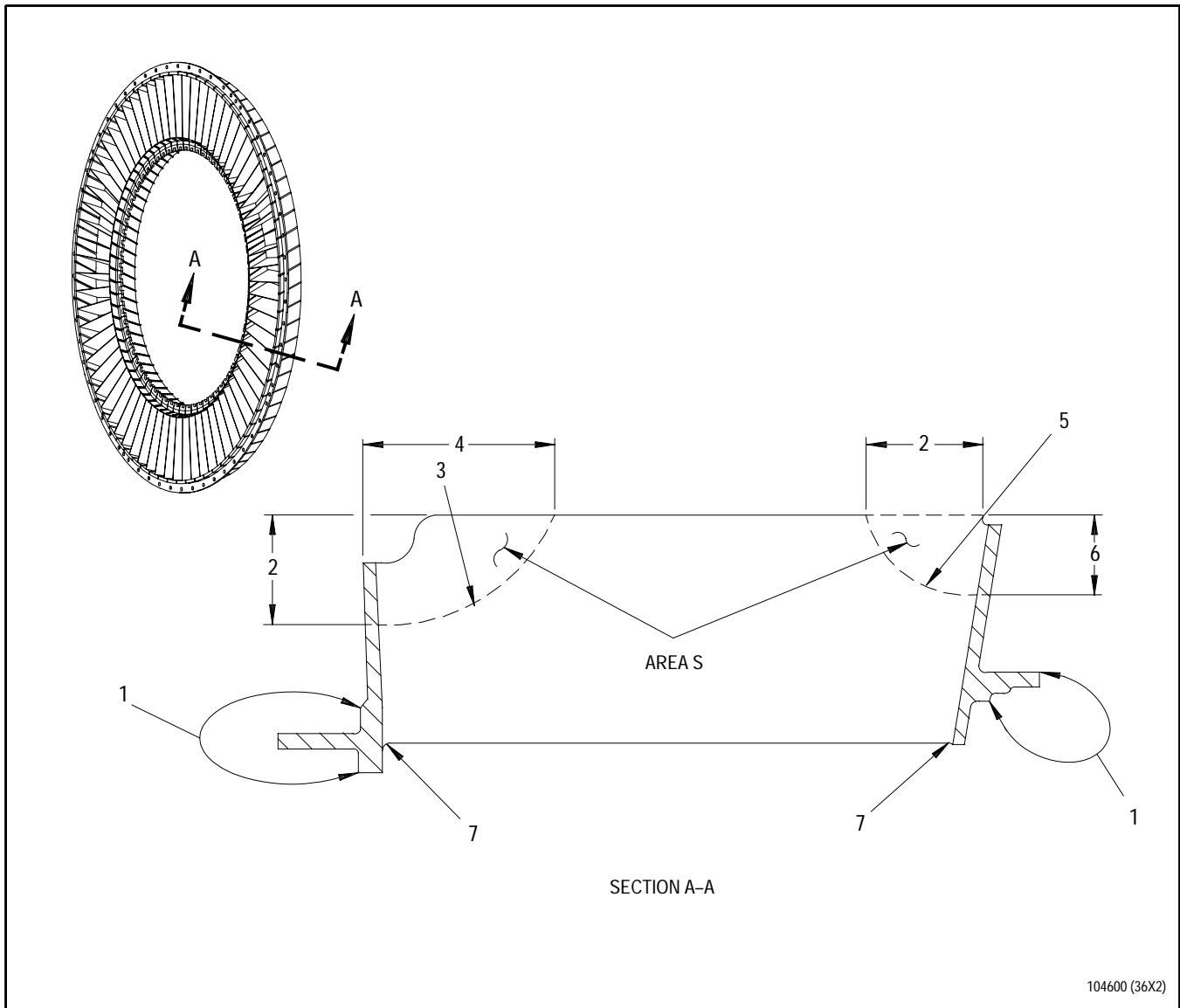
- h. Machine interrupted surface Area J per Section A-A. Remove excess weld material, if present, by finishing 0.000 to 0.005 inch above parent material. Grinding, if used, shall be per SPOP 530 only. Blend transition into airfoil trailing edge shall be smooth and continuous. Surface finish shall be 63 AA or better. Refer to T.O. 2-1-111. Measure dimension(6) using PWA 71018 gage.
- i. Fluorescent penetrant inspect machined areas per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- j. Clean stator per SPOP 208. Refer to T.O. 2-1-111.

- k. Prepare stator for shotpeening as follows:
- (1) Install PWA 70449 pedestal in automated shotpeen booth.
 - (2) Calibrate shotpeen intensity with PWA 71044 holder installed on pedestal. Remove holder.
 - (3) With center hex head screw and cover plate removed from pedestal, install PWA 71041 fixture on pedestal and secure using three captured hex bolts.
 - (4) Loosen and retract four strap clamps on fixture, install stator rear side up and secure with four strap clamps. Ensure outer flange of stator is flat against outer platform of fixture.

NOTE

If performing repairs per paragraphs 4 and 5, peen after all repairs, including stress relief, are completed.

- l. Peen Area S, figure 2, per AMS 2430 with intensity 10N using cast steel shot, or ceramic beads per AMS 2431. Peening on remainder of airfoil is optional except as shown, and may be incomplete. No lines of demarcation permitted. No distortion of leading and trailing edges permitted. Refer to T.O. 2-1-111, SPOP 501.



1. No peening allowed in this area
2. 1.000 inch minimum
3. 2.500 to 3.000 inch radius
4. 2.180 inches minimum
5. 0.800 to 1.300 inch radius
6. 0.750 inch minimum
7. 0.094 to 0.125 inch modified radius all around airfoil, 70 places

Figure 2. Third Stage Compressor Stator - Shotpeening

4. THIRD STAGE COMPRESSOR STATOR - OUTER PLATFORM TRAILING EDGE REPAIR.

(See figure 2 and Figure 3.)



Cutting into parent material of outer platform may result in damage.

NOTE

Damper material is AMS 4911 titanium alloy.

- a. Remove and discard outer diameter damper(5, figure 3) using cutoff wheel or other suitable method.
- b. Line through PN 4077688 identification marking(4) using vibration peening method. Refer to T.O. 2-1-111. Ensure PN 4075983 identification marking(6) is present on stator. Identify as required.
- c. Clean stator per SPOP 208. Refer to T.O. 2-1-111.
- d. Install stator in PWA 71016 fixture per paragraph 3.



Use minimum practicable heat input to minimize trailing edge distortion.

- e. Gas tungsten arc weld build up outer platform trailing edge using manual (GTAW-MA) or automatic (GTAW-ME) method and AMS 4956 welding wire per PWA 16-66X. See View in Direction B. Refer to T.O. 2-1-111.

- f. Place stator on PWA 71017 fixture rear face up.

NOTE

If performing repairs per paragraphs 3 and 5, stress relieve concurrently.

- g. Stress relieve stator for 2 hours at 1135° to 1165°F (613° to 630°C) in suitable protective atmosphere per SPOP 464. Air cool or faster. Refer to T.O. 2-1-111.
- h. Radiographic inspect weld repaired areas. Refer to T.O. 33B-1-1. Evaluate to SXRS-33, except no cracks allowed. Refer to T.O. 2-1-111.
- i. Install stator into PWA 71015 fixture per paragraph 3.

NOTE

Parent material is PWA 1262 cast titanium alloy.

- j. Machine repaired area per View E. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111.
- k. Fluorescent penetrant inspect machined areas per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- l. Clean stator per SPOP 208. Refer to T.O. 2-1-111.

NOTE

If performing repairs per paragraphs 3 and 5, peen after all repairs, including stress relief, are completed.

- m. Prepare stator for shotpeening and peen Area S, figure 2, per paragraph 3.

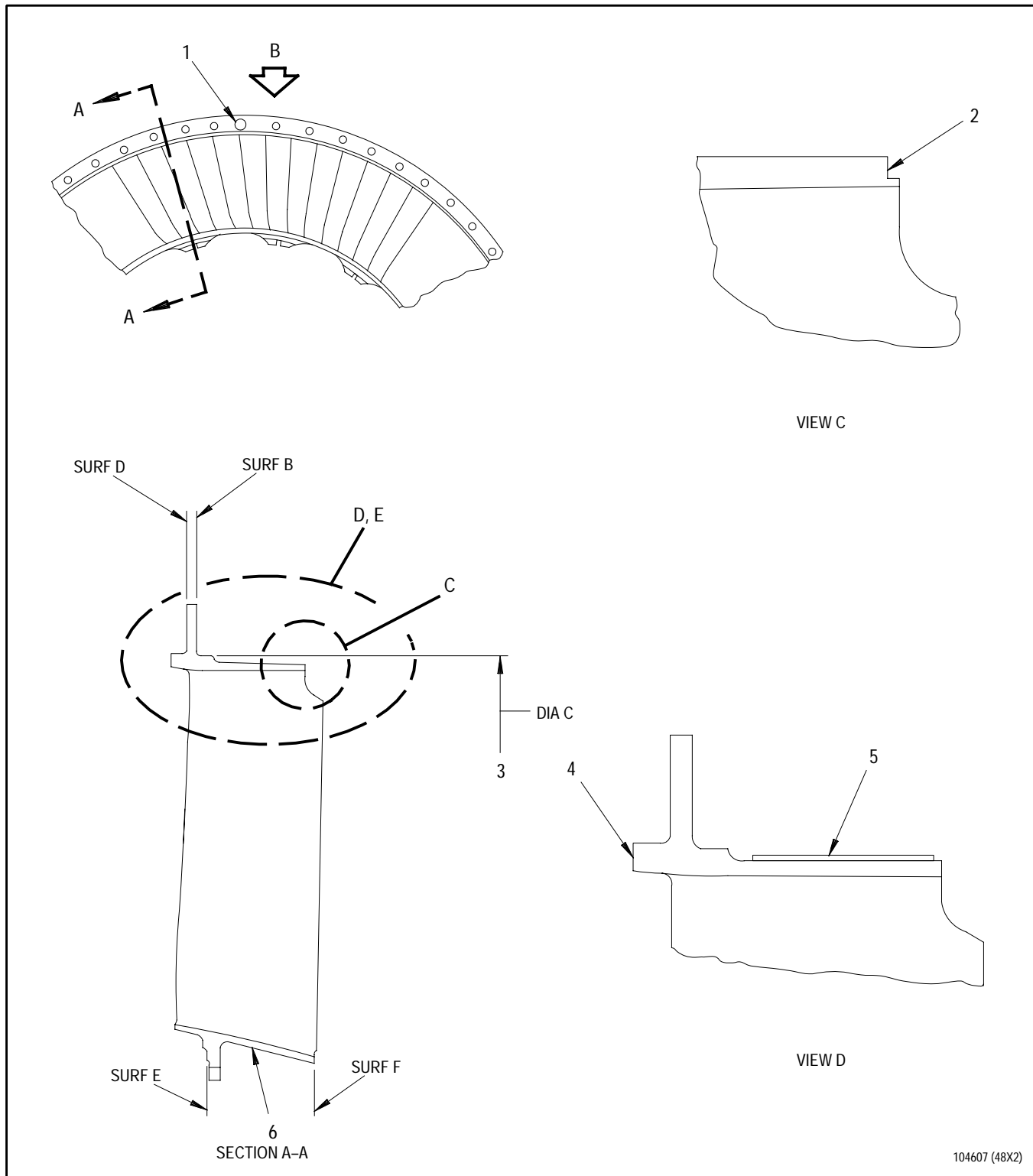


Figure 3. Third Stage Compressor Stator - Outer Platform Repair (Sheet 1 of 2)

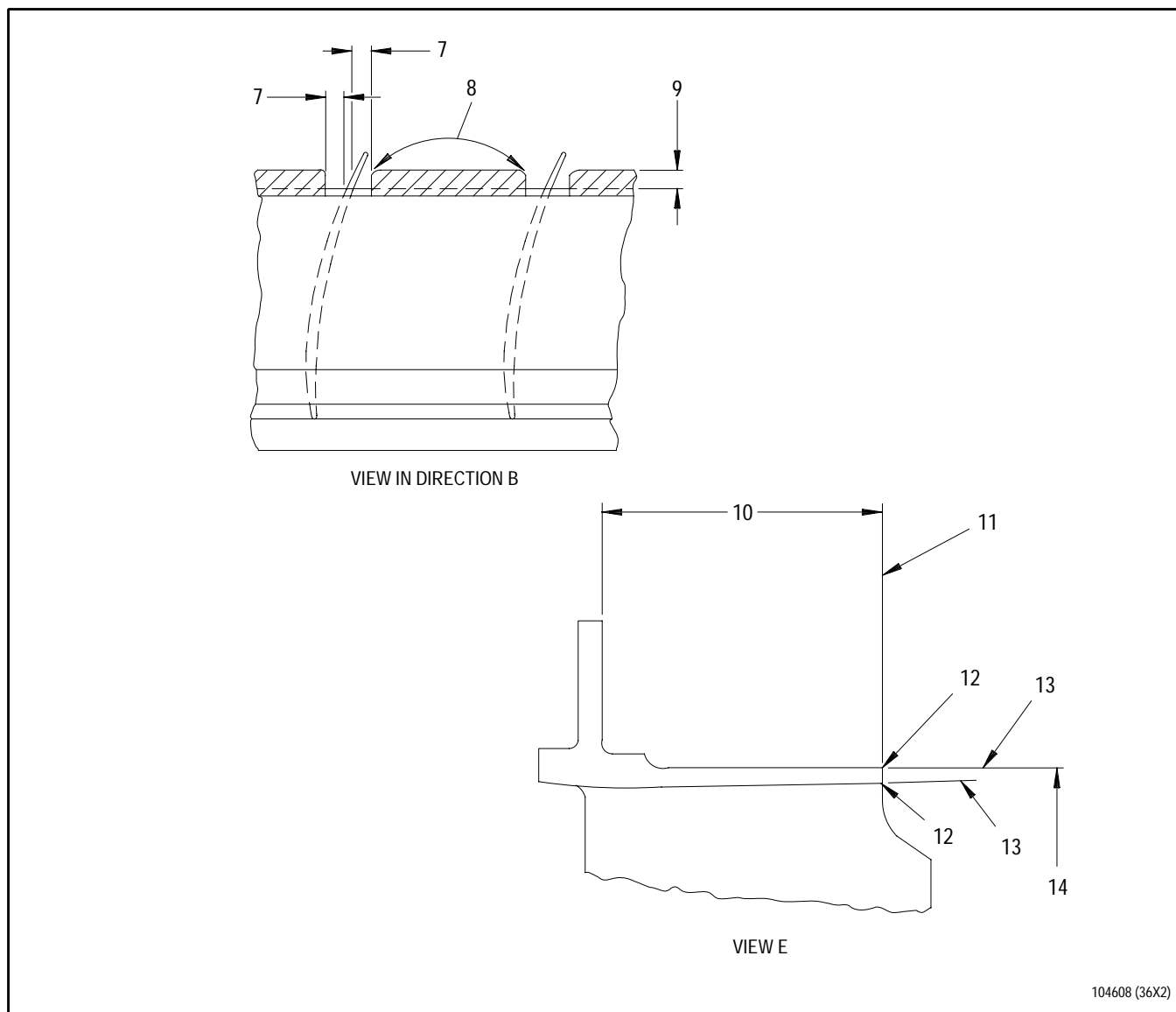


Figure 3. Third Stage Compressor Stator - Outer Platform Repair (Sheet 2 of 2)

Legend for figure 3

NOTE

- Unless otherwise specified, all dimensions apply when Surface B is flat within 0.001 inch and Diameter C maintains a clearance envelope of 31.869 inch diameter in free state or constrained. Constraint contact allowed only on Surfaces B, D and E, and Diameter C.
 - Surface finish shall be per T.O. 2-1-111.
1. Offset hole, reference
 2. Typical wear pattern before repair
 3. 31.866 inch Diameter C
 4. Location of assembly identification marking PN 4077688
 5. Damper PN 4077687
 6. Location of stator identification marking, PN 4075983
 7. 0.100 to 0.150 inch, 70 places
 8. Weld build up per text, 70 places.
 9. 0.040 to 0.060 inch thick weld bead
 10. 1.542 to 1.546 inches
 11. Interrupted surface. Surface finish shall be 34 AA or better.
 12. Break edges 0.003 to 0.015 inch.
 13. Finish excess weld material 0.000 to 0.005 inch above this surface. Blend transition into airfoil trailing edge shall be smooth and continuous.
 14. 31.720 inch diameter, reference

5. THIRD STAGE COMPRESSOR STATOR - ANTIROTATION LUG REPAIR.

(See figure 2 and Figure 4.)

- a. Clean stator per SPOP 208.
Refer to T.O. 2-1-111.
- b. Install stator in PWA 71016 per paragraph 3.
- c. Gas tungsten arc weld build up slot in antirotation lug using manual (GTAW-MA) method and AMS 4956 welding wire per PWA 16-66X. See View E, figure 4. Refer to T.O. 2-1-111.
- d. Place stator on PWA 71017 fixture rear side up.

NOTE

If performing repairs per paragraphs 3 and 4, stress relieve concurrently.

- e. Stress relieve stator for 2 hours at 1135° to 1165°F (613° to 630°C) in suitable protective atmosphere per SPOP 464. Air cool or faster. Refer to T.O. 2-1-111.
- f. Radiographic inspect weld repaired areas. Refer to T.O. 33B-1-1. Evaluate to SXRS-33, except no cracks allowed. Refer to T.O. 2-1-111.
- g. Install stator in PWA 71014 fixture as follows:
 - (1) Loosen and slide six strap clamps outwardly.
 - (2) Loosen 14 support plates and turn to load stator.
 - (3) Place stator on fixture rear side down. Outer flange of stator shall be flat against top surface of fixture support ring.
- (4) Turn 14 support plates and secure in place with thumb screws.
- (5) Slide six strap clamps over stator outer flange and tighten nuts.

NOTE

Parent material is PWA 1262 cast titanium alloy.

- h. Machine antirotation lugs per Section B-B. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111. Measure dimension(8) using PWA 71024 gage and dimension(9) using PWA 71025 gage.
- i. Fluorescent penetrant inspect machined surfaces per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- j. Clean stator per SPOP 208. Refer to T.O. 2-1-111.
- k. Prepare stator for grit blasting as follows:
 - (1) Mask entire stator, except Area H(18), per SPOP 36. Do not vapor degrease. Refer to T.O. 2-1-111.
 - (2) Install PWA 71087 plate in automated grit blast/plasma spray booth.
 - (3) Install PWA 71021 fixture on PWA 71087 plate and secure using hand knob.
 - (4) Loosen and retract six strap clamps on fixture, install stator rear side down and secure with six strap clamps. Ensure outer flange of stator is flat against outer support ring of fixture.

- l. Grit blast Area H(18) per SPOP 170. Refer to T.O. 2-1-111.
- m. Remove and replace masking as required to remove any trapped grit.
- n. Install stator in PWA 71021 fixture and plasma spray Area H(18) 0.020 inch minimum thickness per PWA 53-37. Refer to T.O. 2-1-111.
- o. Remove masking and install stator in PWA 71014 fixture per step g.
- p. Machine antirotation slots per View F. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111.
- q. Fluorescent penetrant inspect machined surfaces per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- r. Machine antirotation lug faces per Section C-C. Measure dimension(15) using PWA 71019 gage and dimension(16) using PWA 71020 gage.
- s. Clean stator per SPOP 208. Refer to T.O. 2-1-111.

NOTE

If performing repairs per paragraphs 3 and 4, peen after all repairs, including stress relief, are completed.

- t. Peen Area S, figure 2, per AMS 2430 with intensity 10N using cast steel shot, or ceramic beads. Peening on remainder of airfoil is optional except as shown, and may be incomplete. No lines of demarcation permitted. No distortion of leading and trailing edges permitted. Refer to T.O. 2-1-111, SPOP 501.
- u. Permanently identify with beehive symbol using SPOP 401 shallow etch in area near part number. Refer to T.O. 2-1-111.

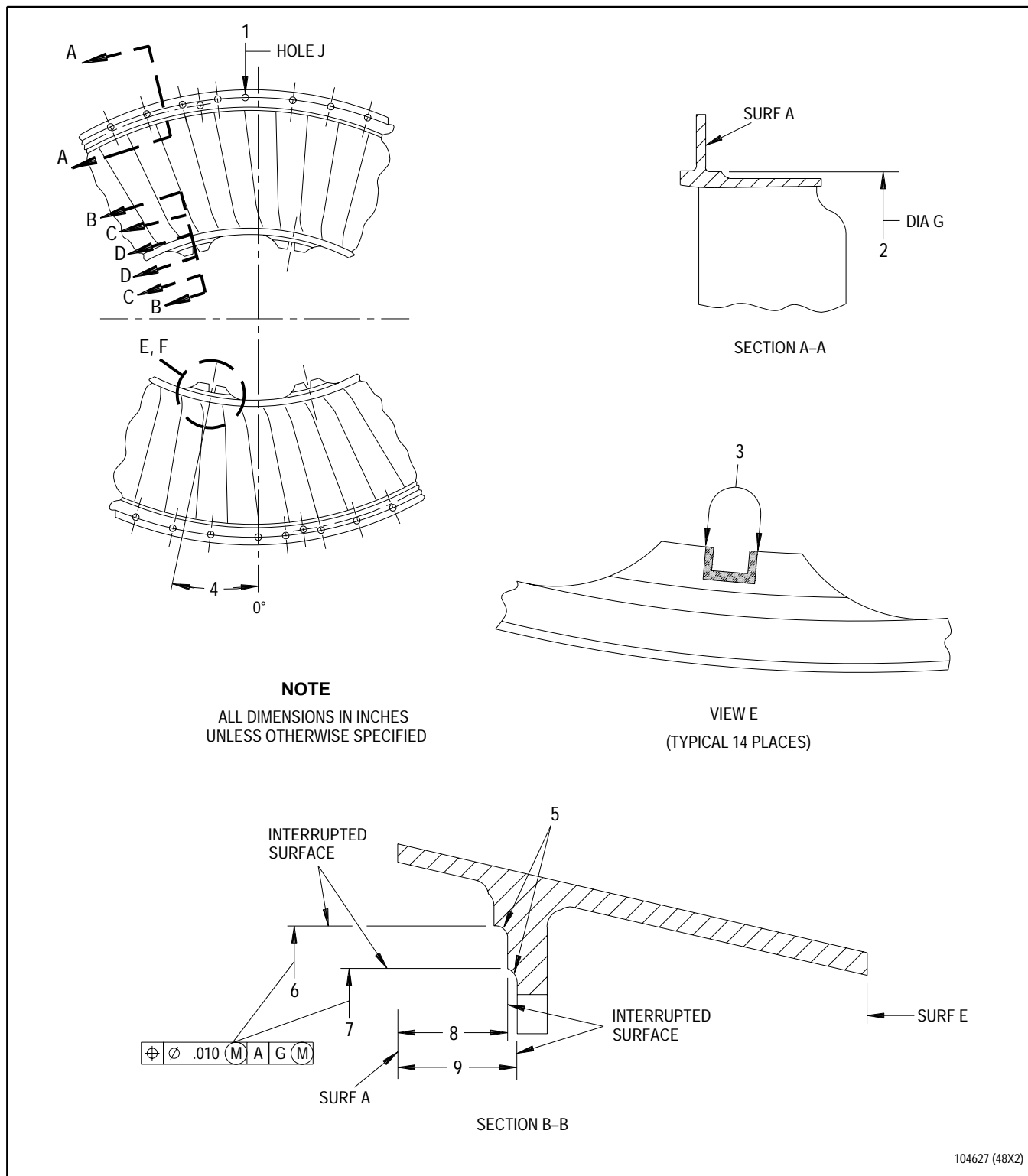


Figure 4. Third Stage Compressor Stator - Antirotation Lug Repair (Sheet 1 of 2)

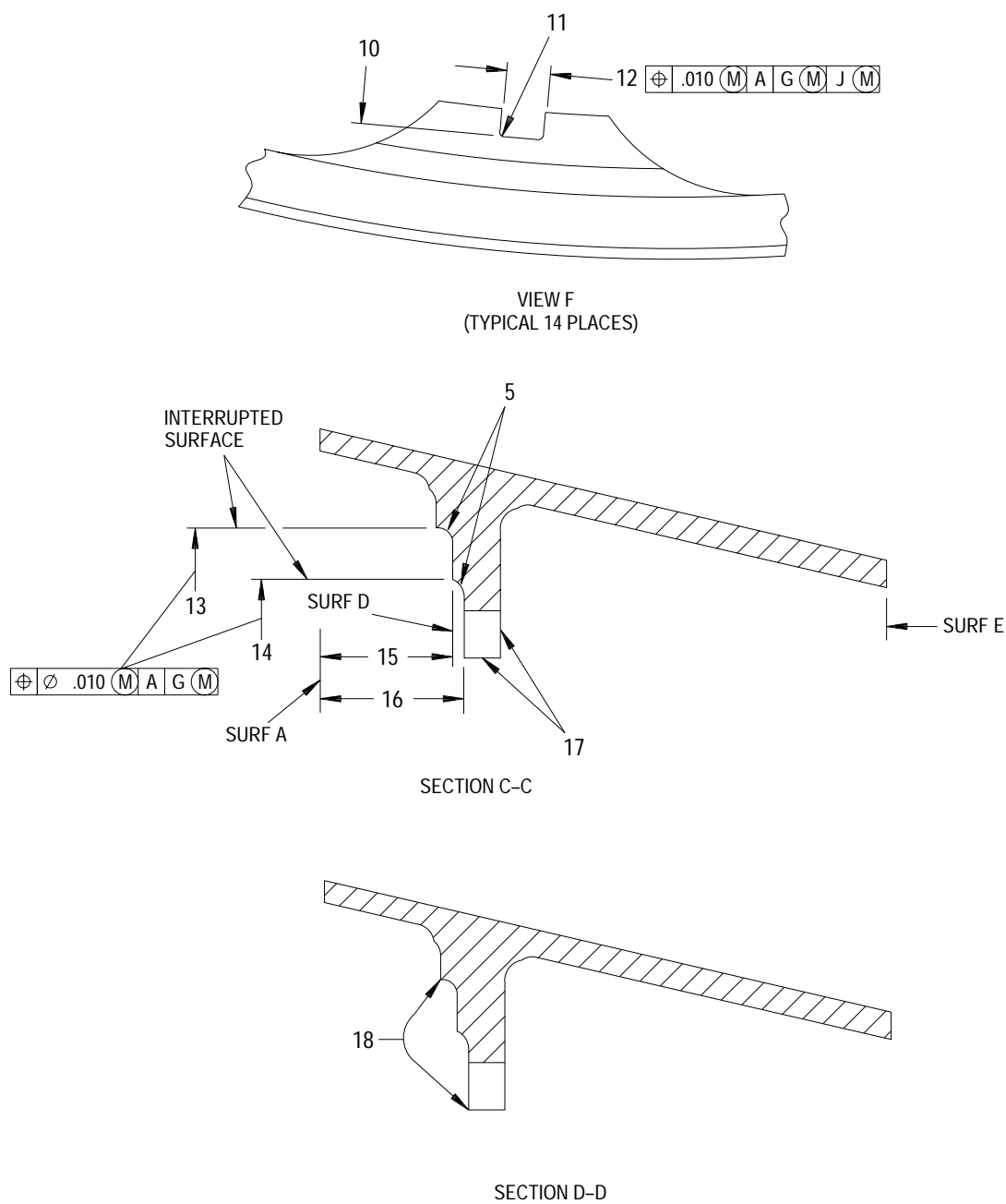


Figure 4. Third Stage Compressor Stator - Antirotation Lug Repair (Sheet 2 of 2)

Legend for figure 4**NOTE**

- Unless otherwise specified, all dimensions apply when Surface A is flat within 0.001 inch and Diameter G maintains a clearance envelope of 31.869 inch diameter in free state or constrained. Constraint contact allowed only on Surfaces A, D and E, and Diameter G.
 - Unless otherwise specified, break edges 0.003 to 0.015 inch.
1. 0.276 inch diameter offset Hole J located at 178°30'
 2. 31.868 inch Diameter G
 3. Weld build up per text, 0.065 to 0.100 inch all around slot.
 4. 9°58'
 5. 0.040 to 0.078 inch modified radius
 6. 20.705 to 20.725 inches diameter
 7. 20.300 to 20.310 inches diameter
 8. 0.305 to 0.323 inch to Surface A
 9. 0.354 to 0.364 inch to Surface A
 10. 10.105 to 10.115 inches from axis of Diameter G
 11. 0.040 to 0.078 inch modified radius, both sides
 12. 0.326 to 0.330 inch
 13. 20.685 to 20.705 inches diameter
 14. 20.280 to 20.290 inches diameter
 15. 0.298 to 0.302 inch to Surface A
 16. 0.340 to 0.350 inch to Surface A
 17. Remove excess weld material if present by finishing 0.000 to 0.005 inch above parent material.
 18. Area H. Grit blast and plasma spray per text.

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, NO. 3 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	3 - 14 Added	29		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

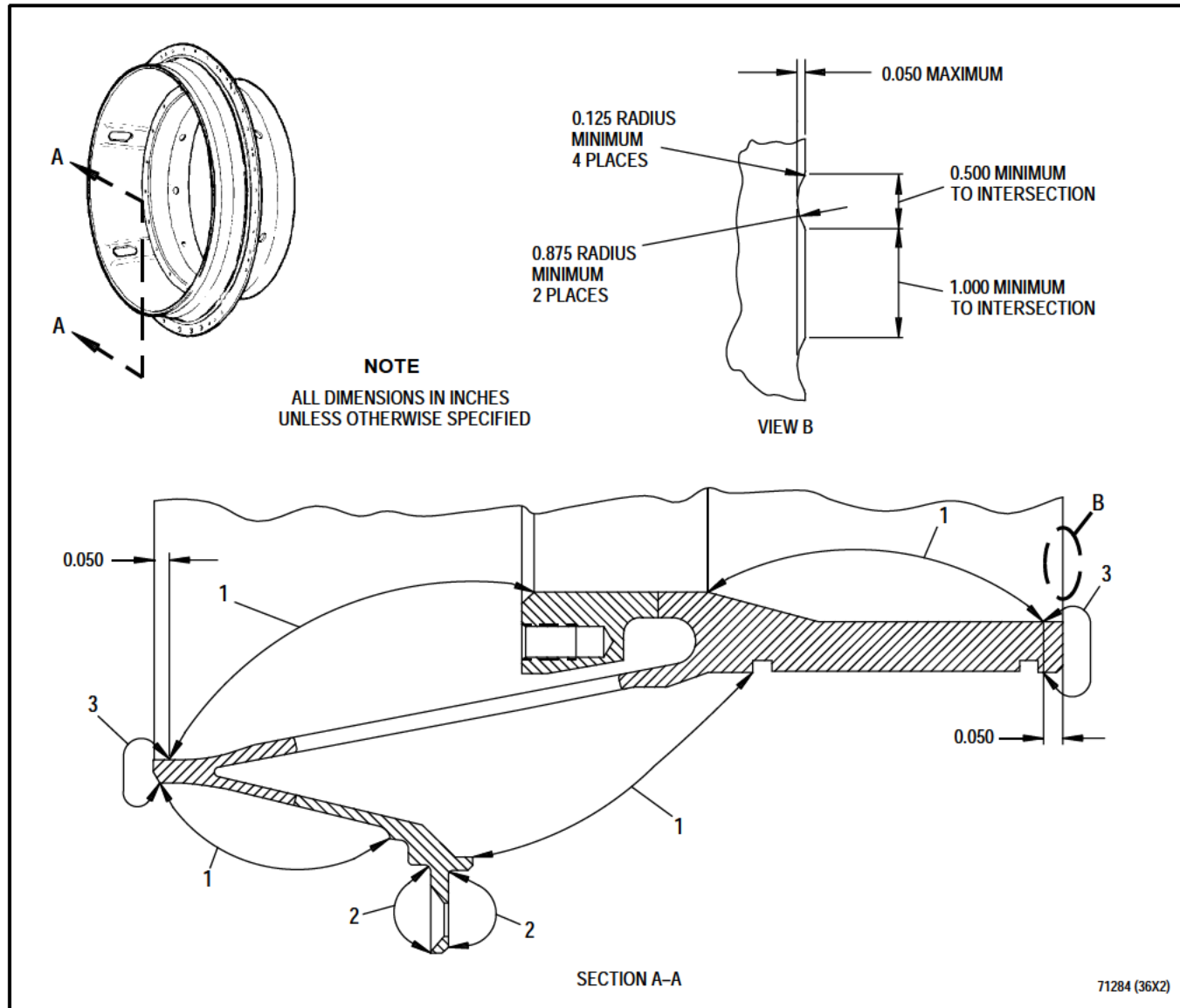
1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 3 bearing support assembly.

2. NO. 3 BEARING SUPPORT ASSEMBLY - BLEND REPAIR.

(See Figure 1.)

- a. Blend to limits of figure 1.
- b. Blend per SPOP 532, except that blend radius shall be ten times blend depth. Refer to T.O. 2-1-111.
- c. Fluorescent penetrant inspect repair area for cracks per SPOP 62. Refer to T.O. 2-1-111.



Area	Condition	Maximum Repairable Limits	Action
1.	Raised metal	Any amount	Blend per text.
	Nicks, dents, scratches	0.005 inch deep prior to blend and 0.010 inch deep after blend	Blend per text.
2.	Raised metal	Any amount	Blend per text.
	Galling, wear	0.003 inch deep, 25% of repair area	Blend per text.
3.	Raised metal	Any amount	Blend per text.
	Nicks, dents, scratches	0.050 inch deep, 12 repairs maximum	Blend per text.

Figure 1. No. 3 Bearing Support Assembly - Blend Repair

3. NO. 3 BEARING SUPPORT ASSEMBLY - JACKSCREW HOLES REPAIR.

(See Figure 2.)

- a. Machine unserviceable jackscrew holes at Locations E to dimensions specified(6), to remove all traces of damaged thread. Grinding, if used, shall be per SPOP 530. Refer to T.O. 2-1-111.
- b. Machine new jackscrew hole(11) at Location D, at location shown.

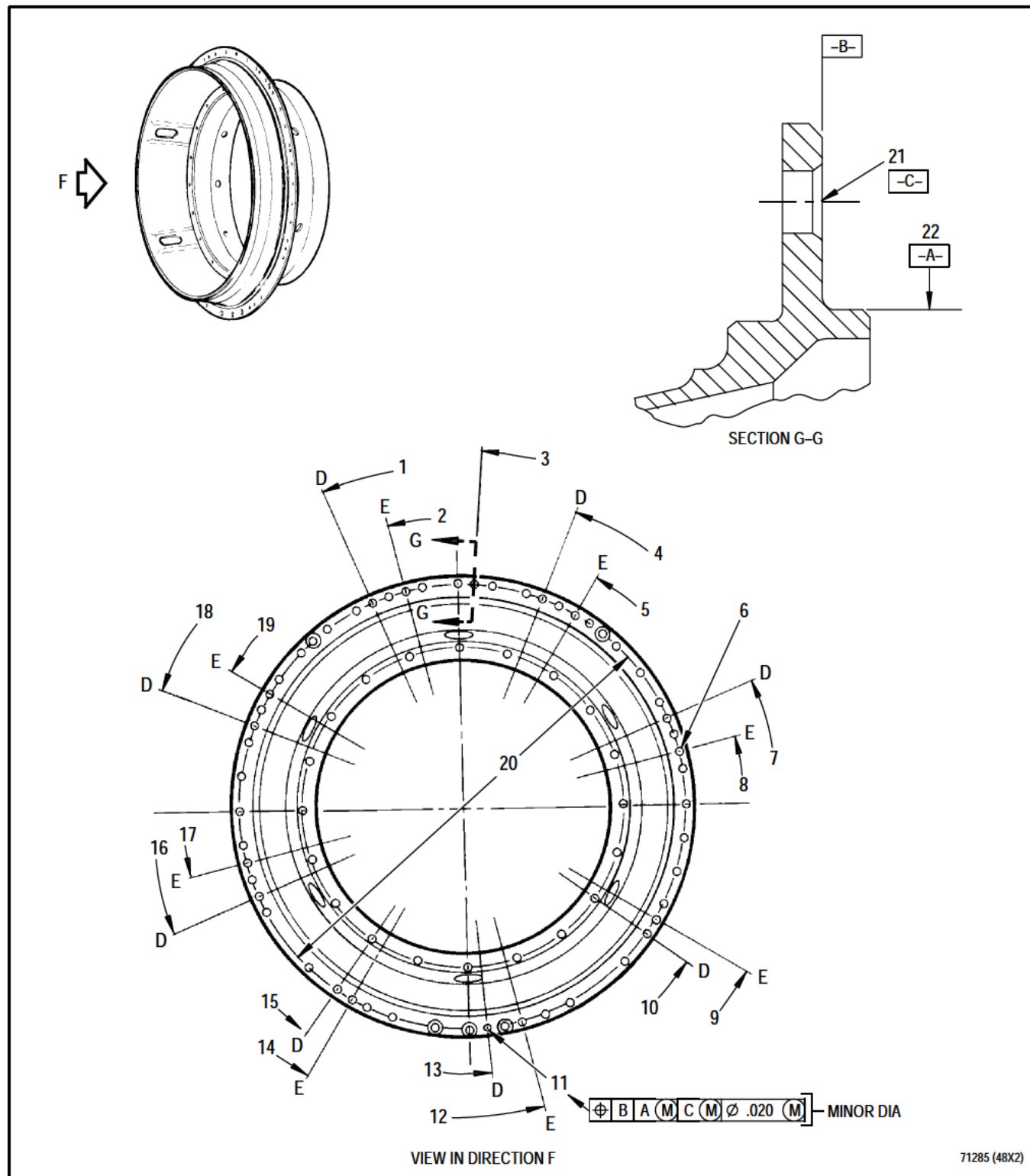


Figure 2. No. 3 Bearing Support Assembly - Jackscrew Hole Repair

Legend for figure 2

1. 22°30'
2. 13°30', reference
3. 355°30', reference
4. 337°30'
5. 328°30', reference
6. 0.260 inch diameter maximum, holes at Location E
7. 292°30'
8. 283°30', reference
9. 238°30', reference
10. 234°
11. 0.250-28UNF-2B modified; 0.2152 to 0.2229 inch minor diameter modified; 8 places maximum as shown; minor diameter to be located within 0.020 inch diameter of true position in relation to Surface B and Diameters A and C with minor diameter, and Diameters A and C at Maximum Material Condition.
12. 193°30', reference
13. 184°30'
14. 148°30', reference
15. 144°
16. 112°30'
17. 103°30', reference
18. 67°30'
19. 58°30', reference
20. 13.280 inches diameter
21. 0.189 inch diameter, Maximum Material Condition, reference
22. 12.618 inches diameter average, Maximum Material Condition, reference

**4. NO. 3 BEARING SUPPORT ASSEMBLY -
SNAP DIAMETER REPAIR.**

(See Figure 3.)

- a. Machine support to remove damage to dimensions(1 and 2).
- b. Strip coating from surfaces F and J, if present per SPOP 48. Refer to T.O. 2-1-111.
- c. Glass bead peen area(5) excluding holes to intensity of 8N per SPOP 500. Refer to T.O. 2-1-111.
- d. Coat area(15) to dimensions(19 and 20). If required, coat area(15) of Surfaces F and J to dimensions(21 and 22). Coat as follows:
 - (1) Plasma spray per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
 - (2) Spray deposition outside enclosed area is permissible, but such excess shall be removed.
 - (3) Coat thickness shall be 0.002 to 0.010 inch after final machining.

e. Final machine as follows:

- (1) Grinding, if used, shall be per SPOP 530. Refer to T.O. 2-1-111.
- (2) Machine snap diameters to dimensions(25, 26, 30, 31, 33, and 34).
- (3) If required, machine Surfaces F and J to dimensions(27, 32, and 38).
- (4) Coat thickness shall be 0.002 to 0.010 inch after final machining.

f. Electrolytic etch beehive symbol in area(37) per SPOP 401. Refer to T.O. 2-1-111.

5. NO. 3 BEARING SUPPORT ASSEMBLY - FRONT AND REAR FLANGE SURFACE REPAIR.

(See figure 3.)

- a. Remove raised metal with hand files, fine stones, fine grade abrasives, or crocus cloth and engine oil.
- b. Clean up machine Surfaces F and J to dimensions(3 and 4). Grinding, if used, shall be per SPOP 530. Refer to T.O. 2-1-111.
- c. Strip coating on diameters(1 and 2), if present per SPOP 48. Refer to T.O. 2-1-111.
- d. Fluorescent penetrant inspect surfaces per SPOP 62. Refer to T.O. 2-1-111.
- e. Mask areas not to be peened or coated.
- f. Glass bead peen area(5) excluding holes to intensity of 8N per SPOP 500. Refer to T.O. 2-1-111.

g. Coat area(15) to dimensions (21 and 22). If required, coat area(15) of snap diameters to dimensions(19 and 20). Coat as follows:

- (1) Plasma spray per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
- (2) Spray deposition outside enclosed area is permissible, but such excess shall be removed.
- (3) Coat thickness shall be 0.002 to 0.010 inch after final machining.

h. Final machine as follows:

- (1) Grinding, if used, shall be per SPOP 530. Refer to T.O. 2-1-111.
- (2) Machine Surfaces F and J to dimensions(27 and 38). No step is allowed on Surfaces F and J after repair.
- (3) Machine to dimension(32).
- (4) If required, machine snap diameters to dimensions(25, 26, 30, 31, 33, and 34).
- (5) Coat thickness shall be 0.002 to 0.010 inch after final machining.

i. Electrolytic etch beehive symbol in area(37) per SPOP 401. Refer to T.O. 2-1-111.

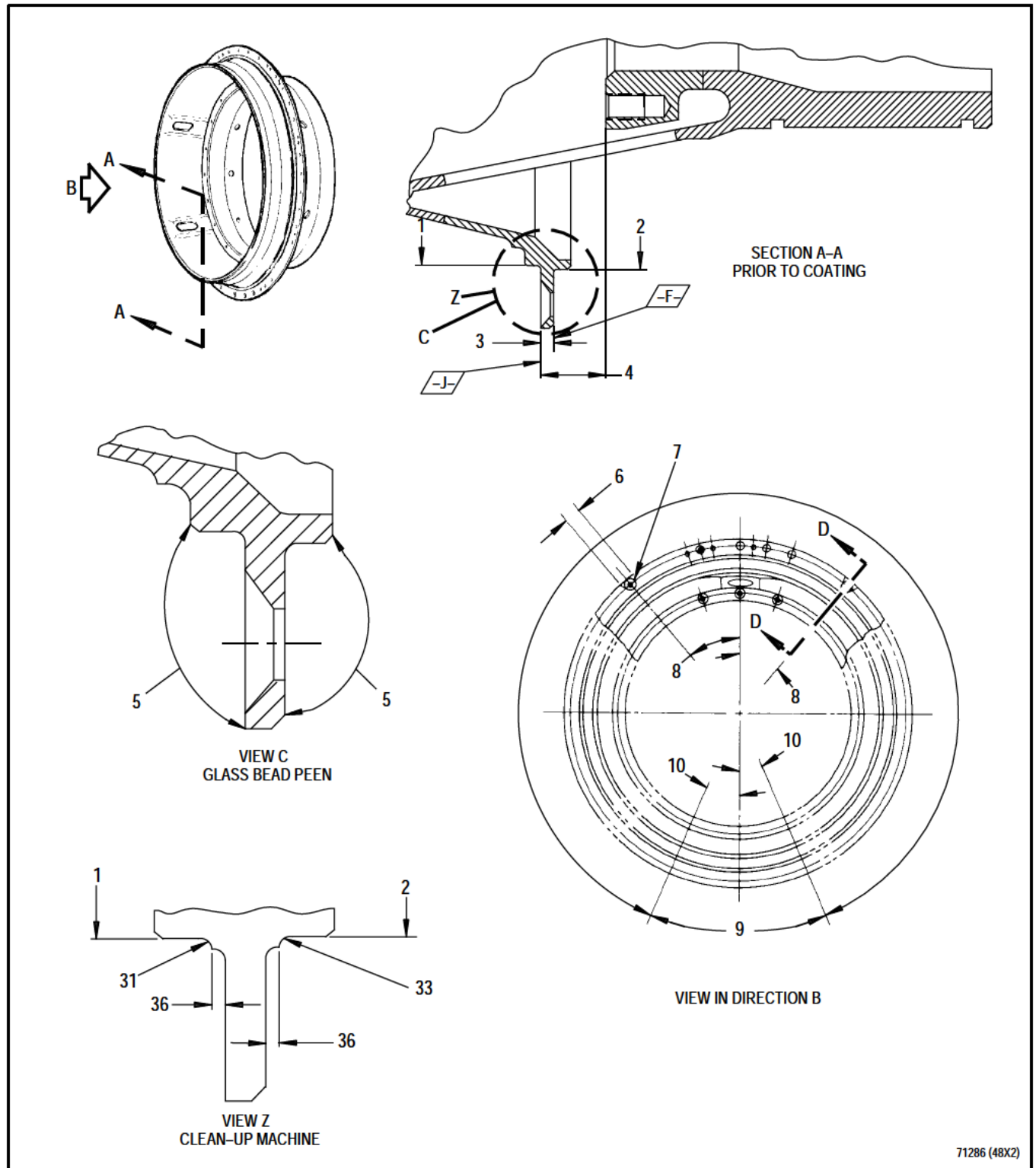
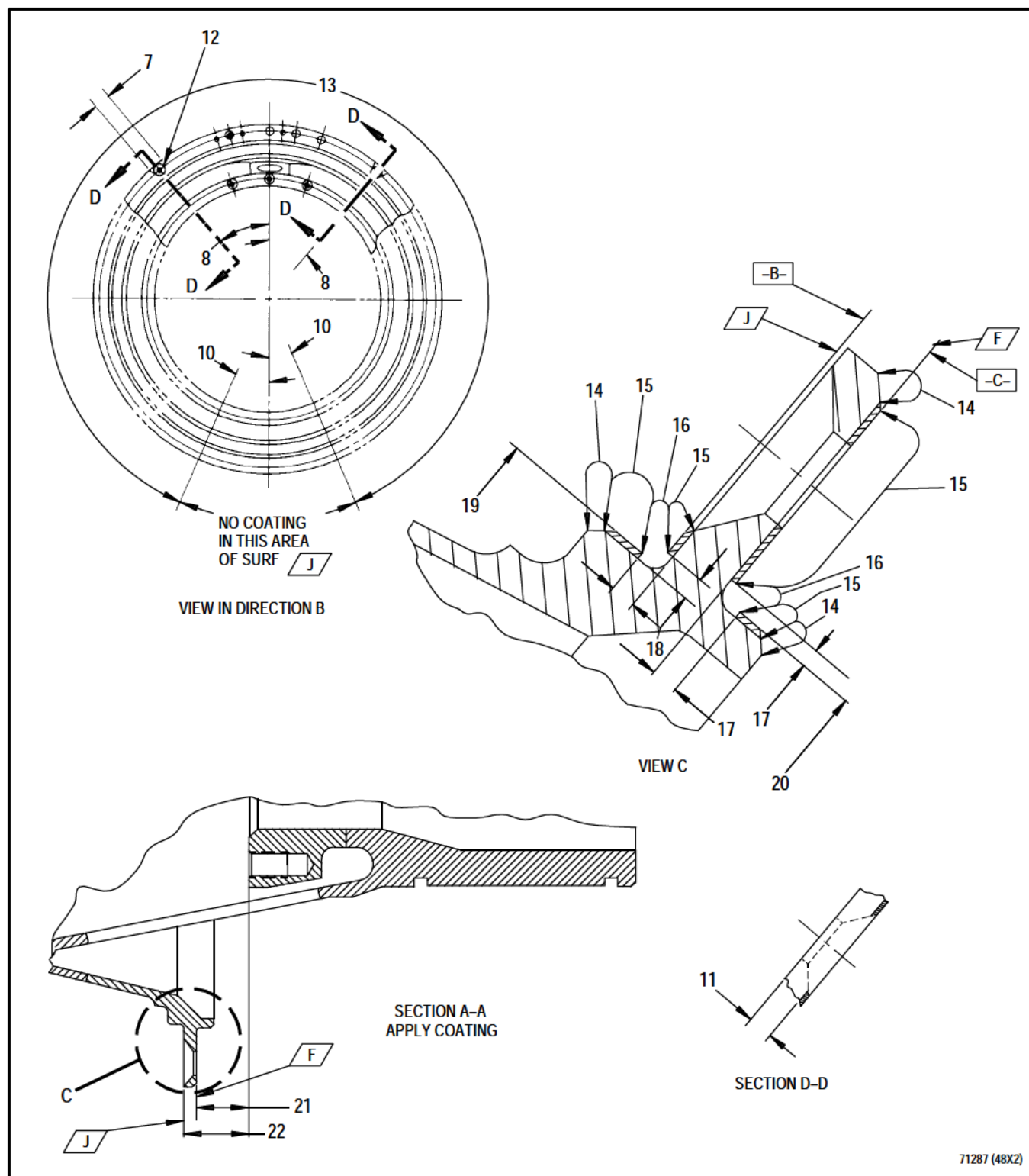
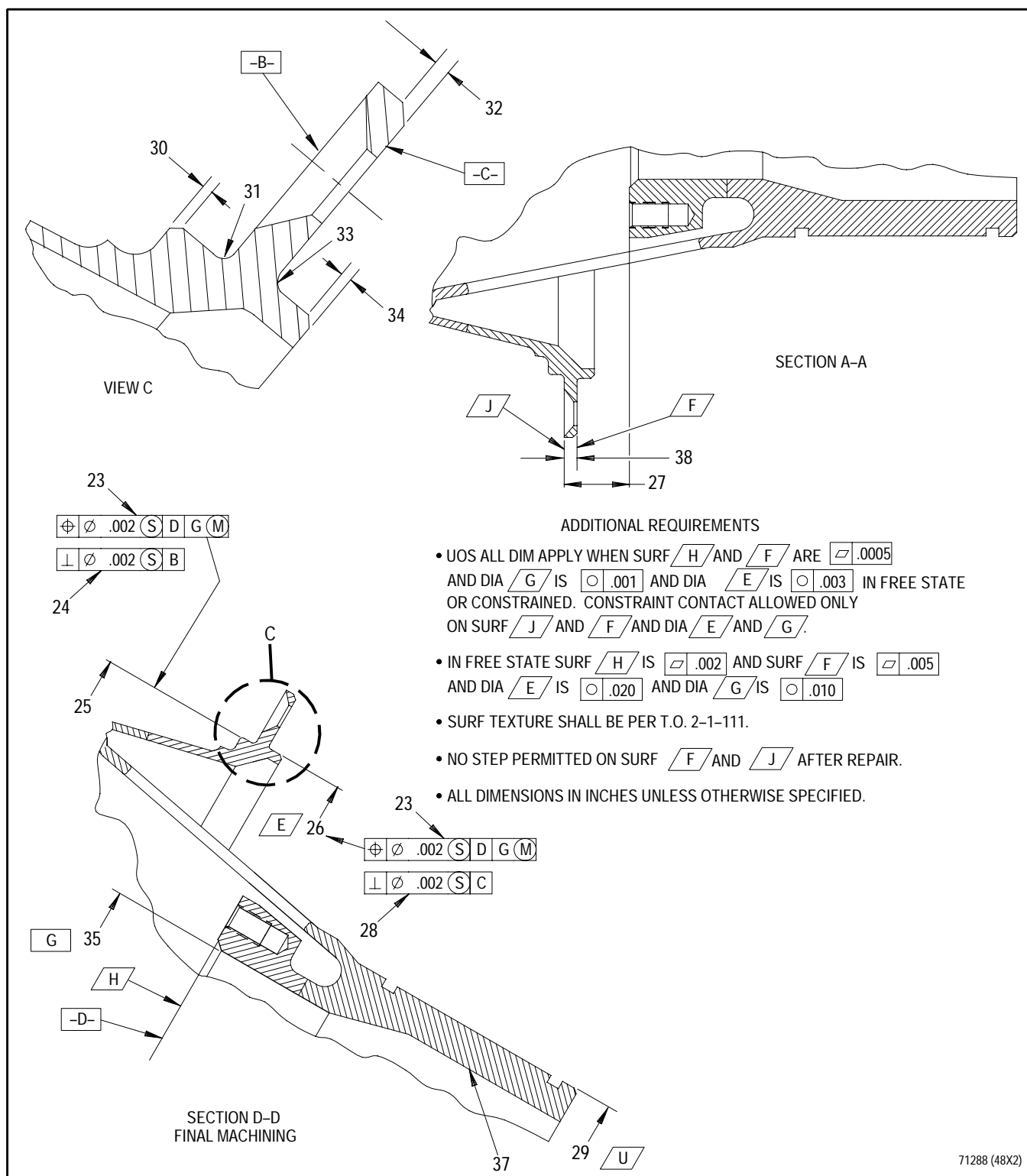


Figure 3. No. 3 Bearing Support Assembly - Snap Diameter and Front and Rear Flange Surface Repair
(Sheet 1 of 3)



71287 (48X2)

Figure 3. No. 3 Bearing Support Assembly - Snap Diameter and Front and Rear Flange Surface Repair (Sheet 2 of 3)



71288 (48X2)

Figure 3. No. 3 Bearing Support Assembly - Snap Diameter and Front and Rear Flange Surface Repair (Sheet 3 of 3)

Legend for figure 3

1. 12.525 to 12.535 inches diameter. Hold to maximum value.
2. 12.598 to 12.612 inches diameter. Hold to maximum value.
3. 0.115 inch minimum wall
4. 0.589 to 0.595 inch
5. Glass bead peen enclosed area excluding holes per text.
6. 0.500 to 0.550 inch, two places
7. No peen in this area, two places
8. 40°30', reference
9. No peen
10. 22°30'±1°0'
11. 0.115 inch minimum, two places
12. No coat or peen in this area, two places
13. Coating permitted in this area of Surface J excluding holes
14. Coating optional and may be incomplete.
15. Coat per text.
16. No coating or grit blast permitted.
17. 0.030 to 0.045 inch
18. 0.045 to 0.060 inch
19. 12.553 inches diameter minimum after coat
20. 12.630 inches diameter minimum after coat
21. 0.468 inch maximum
22. 0.604 inch maximum
23. This diameter shall be located within 0.002 inch of true position in relation to Surface D and Diameter G. Tolerance applies Regardless of Feature Size of this diameter and Diameter G.
24. This diameter shall be perpendicular to Surface B within 0.002 inch Regardless of Feature Size of this diameter.
25. 12.541 to 12.547 inches diameter
26. 12.618 to 12.620 inches average diameter
27. 0.5980 to 0.5995 inch
28. This diameter shall be perpendicular to Surface C within 0.002 inch Regardless of Feature Size of this diameter.
29. Diameter U. 9.946 to 9.948 inches diameter reference
30. Chamfer 0.010 to 0.030 inch x 45°±5°
31. 0.015 to 0.045 inch modified radius
32. Chamfer 0.020 to 0.050 inch x 45°±5°
33. 0.020 to 0.030 inch modified radius
34. Chamfer 0.020 to 0.040 inch x 45°±5°
35. Diameter G. 8.8583 to 8.8592 inches average diameter reference
36. 0.000 to 0.020 inch
37. Marking restricted to this surface.
38. 0.118 to 0.121 inch

**6. NO. 3 BEARING SUPPORT ASSEMBLY -
BEARING JOURNAL REPAIR.**

(See Figure 4.)

- a. Clean up machine to dimension(1).
- b. Plasma spray enclosed area(5) to dimension(2) as follows:
 - (1) Plasma spray per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
 - (2) Spray deposition outside enclosed area is permissible, but such excess shall be removed.
- c. Final machine to dimensions(4, 7, 8, 9, and 10). Coat thickness shall be 0.002 to 0.010 inch after machining. Grinding, if used, shall be per SPOP 530. Refer to T.O. 2-1-111.
- d. Electrolytic etch beehive symbol in area(11) per SPOP 401. Refer to T.O. 2-1-111.

Legend for figure 4

- 1. 8.865 to 8.881 inches diameter. Hold to minimum value.
- 2. 8.847 inches diameter maximum
- 3. Coat optional and may be incomplete.
- 4. 0.981 to 1.043 inches
- 5. Coat enclosed area per text.
- 6. No coat permitted.
- 7. 8.8583 to 8.8592 inches average diameter
- 8. This diameter shall be perpendicular to Surface B within 0.001 inch Regardless of Feature Size of this diameter.
- 9. Chamfer 0.070 to 0.090 inch x 45°±5°
- 10. 0.150 inch minimum
- 11. Marking restricted to this surface.

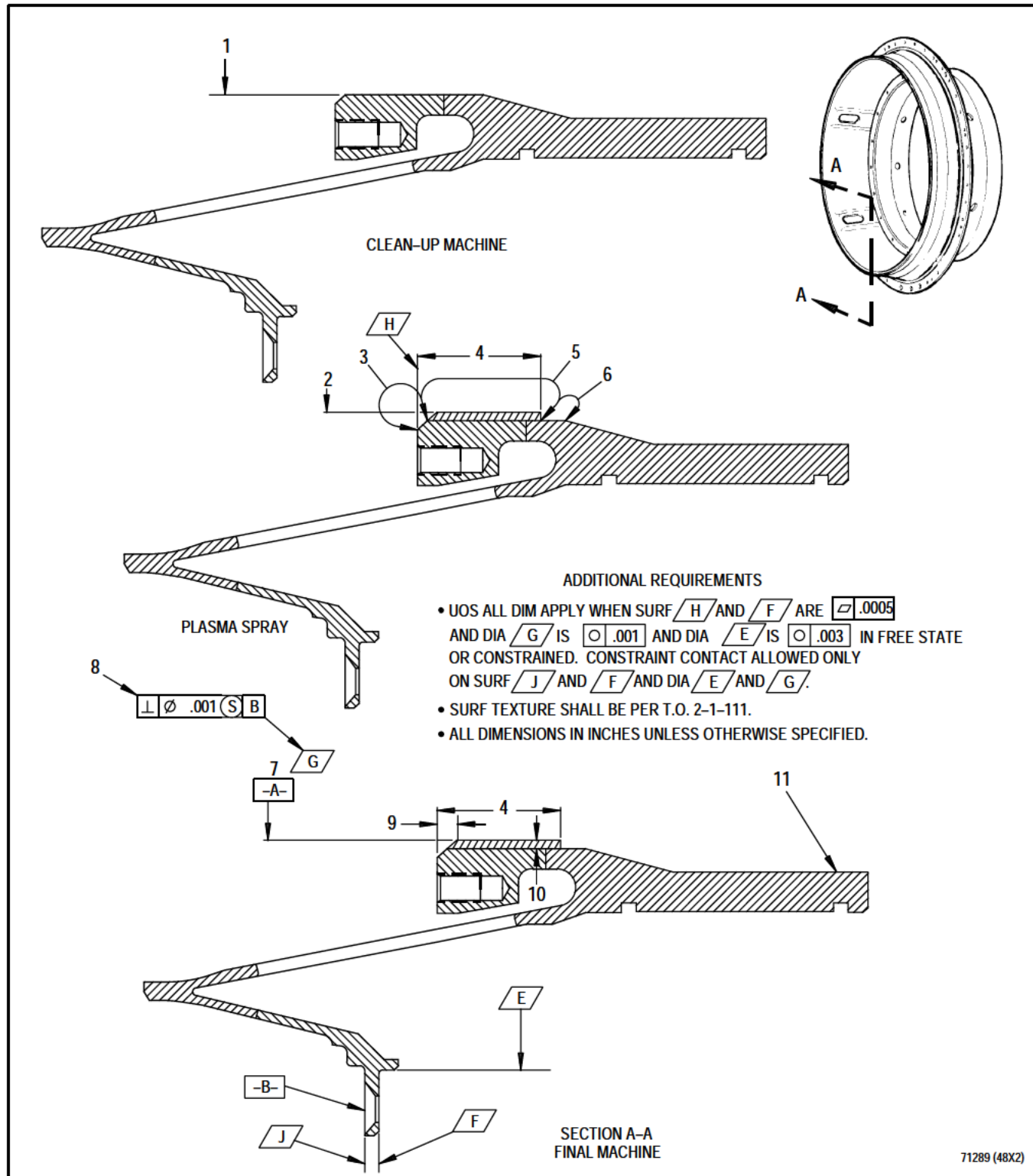


Figure 4. No. 3 Bearing Support Assembly - Bearing Journal Repair

WORK PACKAGE

TECHNICAL PROCEDURES

RING ASSEMBLY, AIR SEALING, NO. 4 BEARING, REAR -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1		1			
2 - 4		0			
5 - 6		1			
7		0			
8 Blank		0			

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
Plating, Nickel, on Stainless Steel, Nickel, or Cobalt (SPOP 26) - - - - -	SWP 092 10
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Standard Maintenance Procedures SPOP 401 - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for the repair of the No. 4 bearing rear air sealing ring assembly.

2. NO. 4 BEARING REAR AIR SEALING RING ASSEMBLY - PLASMA SPRAY REPAIR.

(See Figure 1.)

- Machine to dimension(1) in figure 1.
- Fluorescent penetrant inspect machined surface. Refer to T.O. 2J-F100-9. No cracks allowed.
- Plasma spray area(9) per PWA 53-47. Refer to T.O. 2J-F100-53-1, WP 096 00.
- Finish machine to dimensions given in figure 1.
- Permanently identify with beehive symbol. Refer to T.O. 2J-F100-53-1, SWP 023 02.

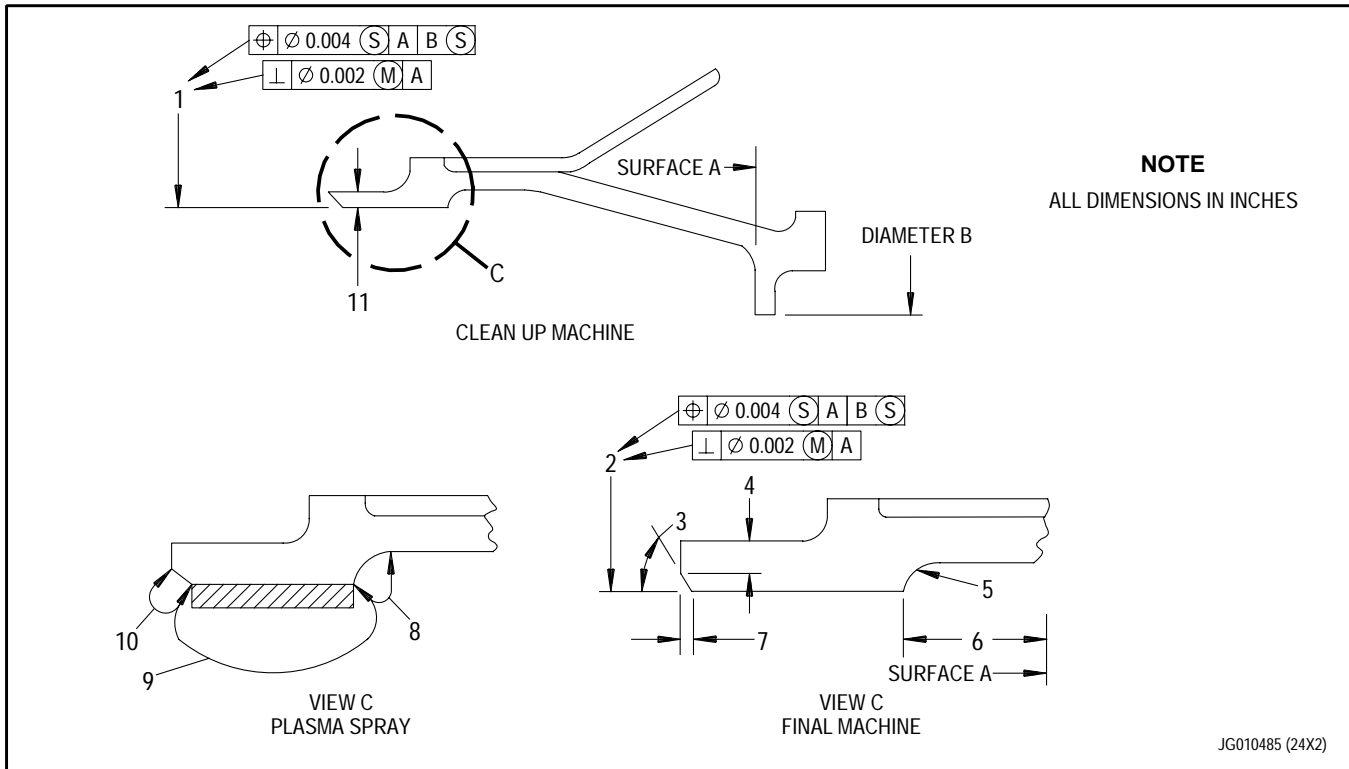


Figure 1. No. 4 Bearing Rear Air Sealing Ring Assembly - Plasma Spray Repair

Legend for figure 1

1. 12.165 to 12.176 inch average diameter. This diameter is located within ± 0.004 inch diameter of true position regardless of feature size to Surface A and Diameter B regardless of feature size. This diameter shall be perpendicular within ± 0.002 inch at Maximum Material Condition to Surface A..
2. 12.182 to 12.185 inch average diameter. True position of this diameter is ± 0.002 inch to Surface A and Diameter B, Regardless of Feature Size. This diameter is to be ± 0.001 inch to Surface A at Maximum Material Condition.
3. $30^\circ \pm 10^\circ$
4. 0.015 inch minimum
5. 0.047 to 0.078 inch
6. 0.850 to 0.890 to Surface A
7. 0.030 to 0.040 inch
8. No plasma spray permitted.
9. Plasma spray per text.
10. Plasma spray is optional and may be incomplete.
11. 0.040 inch minimum after final machine.

**3. NO. 4 BEARING REAR AIR SEALING RING
ASSEMBLY - NICKEL PLATE REPAIR.**

(See Figure 2.)

- a. Nickel plate area(6). Refer to T.O. 2J-F100-53-1, SWP 092 10 (SPOP 26).
- b. Bake to 360° to 390°F (182° to 198°C) for three hours.
- c. Finish machine to dimensions given in Views B and C given in figure 2.
- d. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.
- e. Permanently identify with beehive symbol. Refer to T.O. 2-1-111 shallow etch (SPOP 401).

Legend for figure 2

- 1. Mark per text
- 2. 7.075 to 7.085 inch diameter, reference
- 3. No plate, 8 slots
- 4. 1.030 to 1.080 inches to Surface D.
- 5. 0.047 to 0.078 inch, modification radius.
- 6. Nickel plate per text.
- 7. 7.041 to 7.043 inch average diameter. This diameter shall be located within 0.002 inch diameter of true position regardless of feature size in relation to Diameter B Regardless of Feature Size.
- 8. 0.030 to 0.040 inch
- 9. 0.015 inch minimum
- 10. 30° ±10°
- 11. 0.055 inch minimum prior to plating.

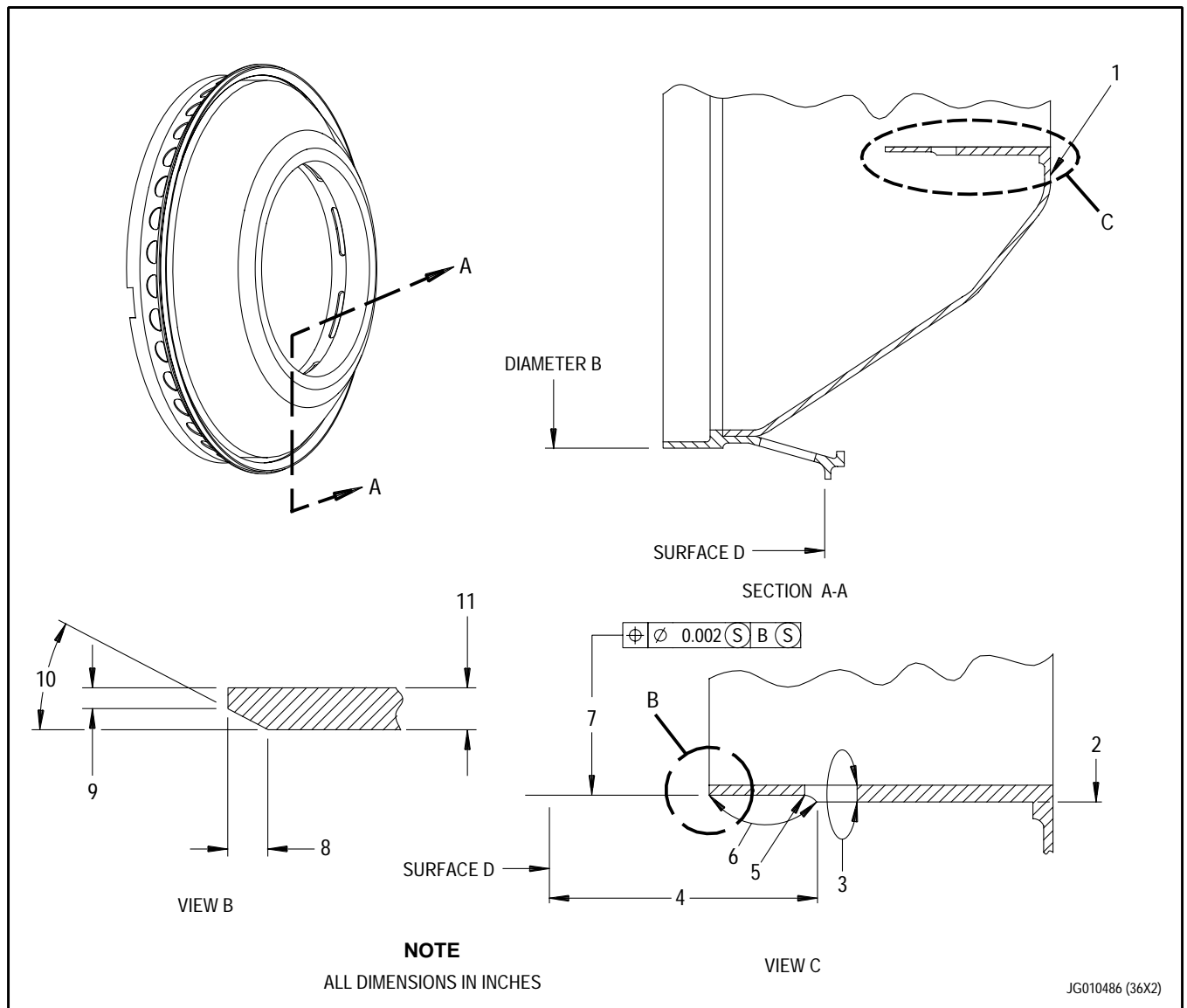


Figure 2. No. 4 Bearing Rear Air Sealing Ring Assembly - Nickel Plate Repair

WORK PACKAGE**TECHNICAL PROCEDURES****SUPPORT ASSEMBLY, NO. 4 BEARING REAR SEAL -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	8	1	12 - 14	16
2 - 4	16	9	0	15	29
5	0	10	16	16	16
6	16	11	0	17 - 18 Added	16
7	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures - Marking, General - - - - -	SWP 023 00
Stripping, Plasma Spray Coatings with Nitric Acid (SPOP 50)	SWP 092 18
Welding, Inert Gas Fusion - - - - -	SWP 093 01
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Cloth, abrasive, crocus	P-C-458
Wire, welding	AMS 5837 (Inconel 625)
Wire, welding	No. 64 (Inconel 718, AMS 5832)

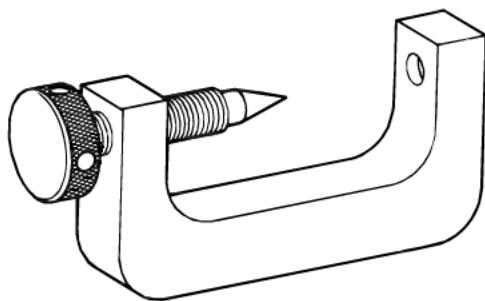
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

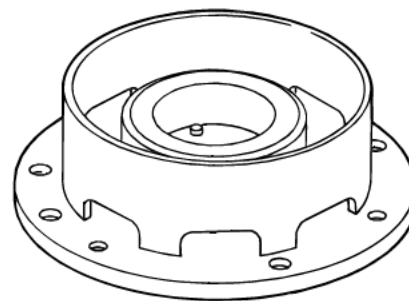
Paragraph	Function - Tool Nomenclature	Tool Number
1	No. 4 Bearing Seal Rear Support Assembly - Pin Replacement	
	Flaring Tool, No. 4 bearing seal support - - - - -	PWA 52424
10	No. 4 Bearing Seal Rear Support Assembly - Ring Groove Repair	
	Fixture, Machining, No. 4 bearing seal support, rear, hydraulic arbor - - - - -	SAALC 8142924
	Master, Setting, No. 4 bearing seal support, rear - - -	SAALC 8142929

ILLUSTRATED SUPPORT EQUIPMENT



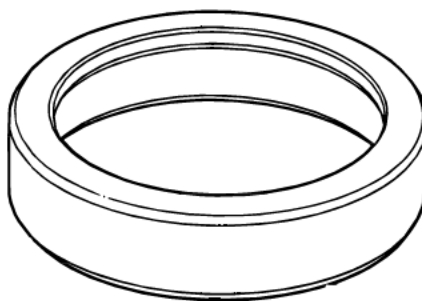
PWA52424-C

Figure T1. PWA 52424 Flaring Tool



SAALC 8142924 -C

Figure T2. SAALC 8142924 Fixture



SAALC 8142925 -C

Figure T3. SAALC 8142929 Master

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing seal rear support assembly.

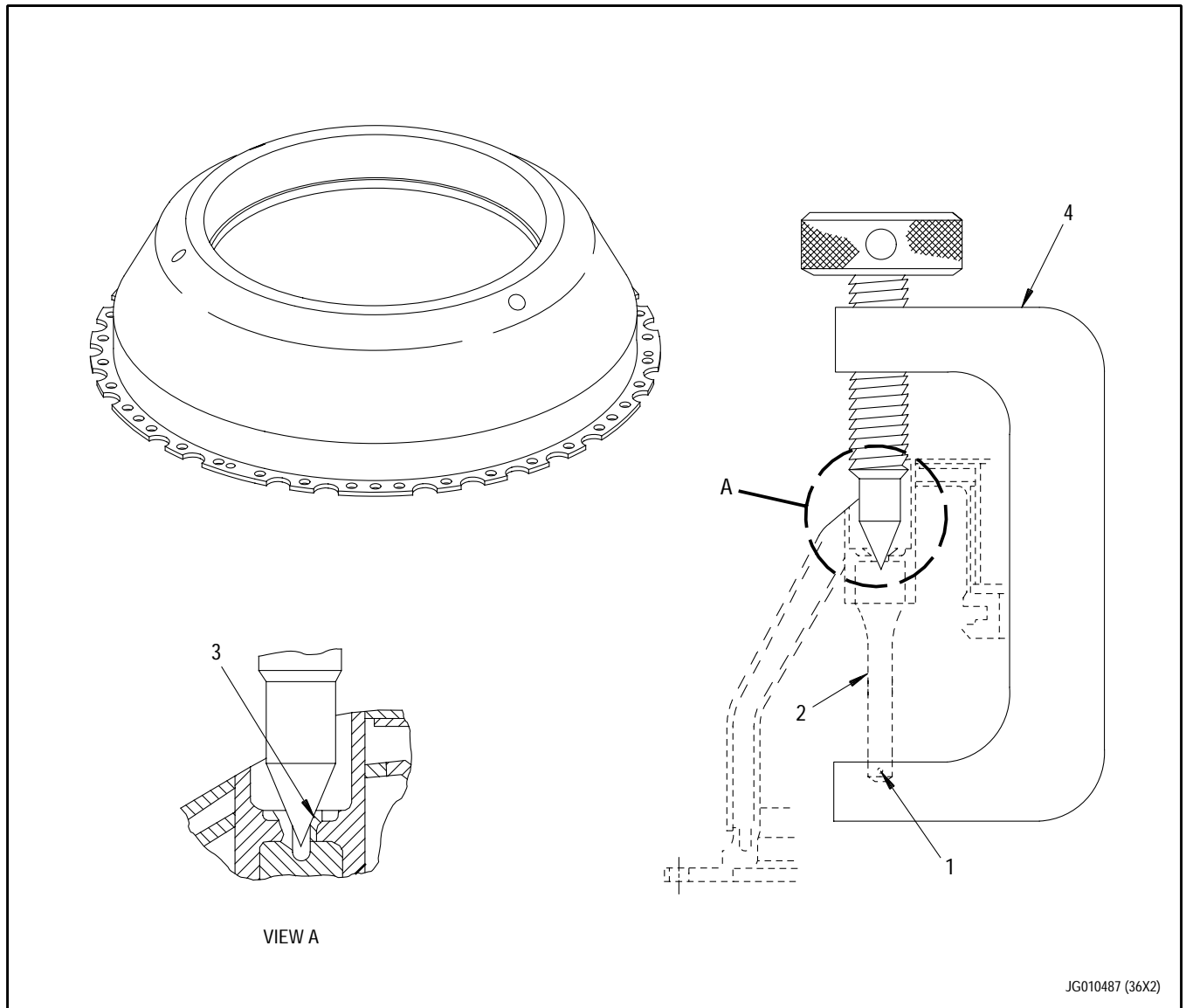
2. NO. 4 BEARING SEAL REAR SUPPORT ASSEMBLY - PIN REPLACEMENT.

(See Figure 1.)

- a. Drill off flared end of unserviceable pin. Do not hammer pins to remove them. Press out pin.
- b. Chill replacement pin in dry ice for 30 minutes.
- c. Install pin. Flare pin with PWA 52424 flaring tool.
(See figure 1.)

3. NO. 4 BEARING SEAL REAR SUPPORT ASSEMBLY - PIN POLISHING.

- a. Hand polish with fine crocus cloth P-C-458. Polish in direction lengthwise with respect to pin.
- b. Pin diameter shall not be reduced more than 0.002 inch.



1. Assemble pins so that these holes are located as shown within 5° of true position.
2. PN 4035860 pin, 3 required.
3. Flare securely. $30^\circ \pm 5^\circ$ inclusive.
4. PWA 52424 flaring tool.

Figure 1. No. 4 Bearing Seal Rear Support Assembly - Pin Replacement

**4. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - CHEVRON SEAL MATING
SURFACE REPAIR.**

(See Figure 2.)

- a. Polish 100% of surface with fine P-C-458.
- b. Complete flatness of surface not required but seal pocket depth shall not exceed 0.112 inch.

- c. Fluorescent penetrant inspect polished surface. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

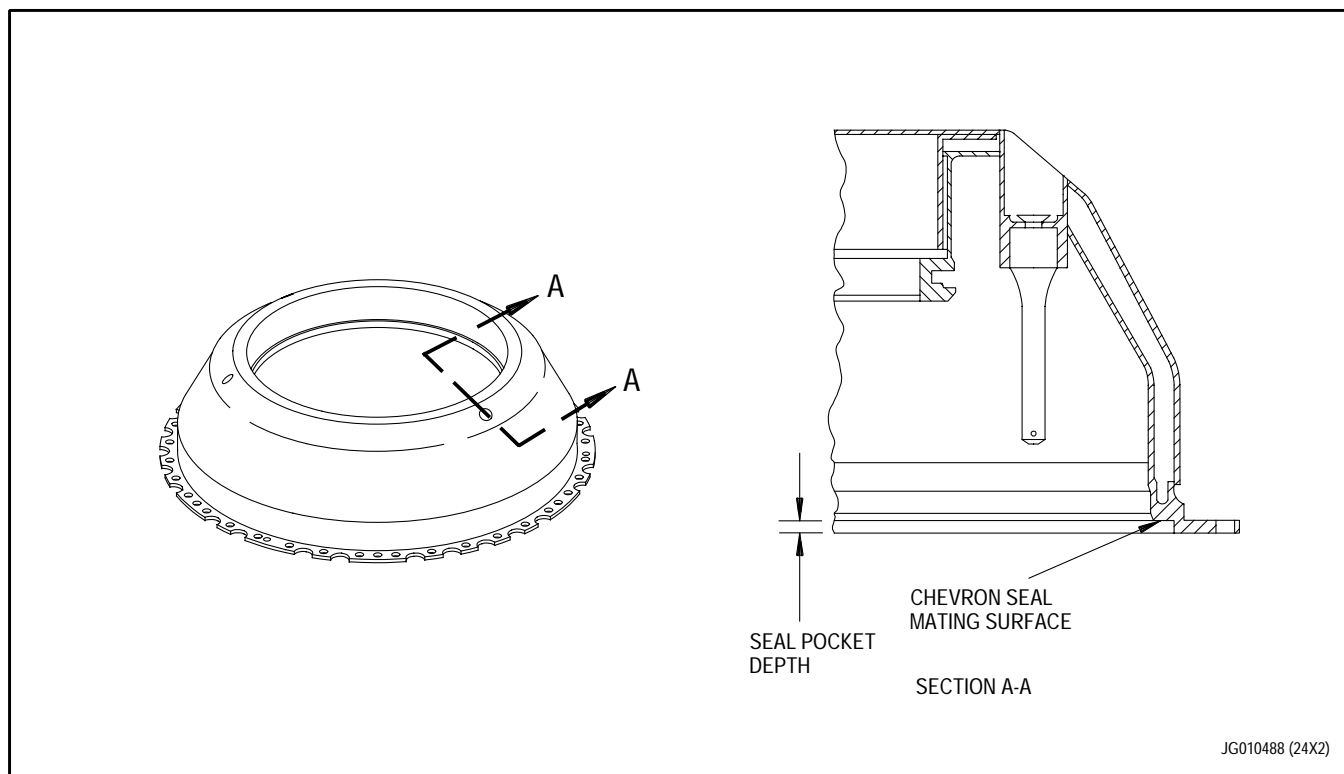


Figure 2. No. 4 Bearing Seal Rear Support Assembly - Chevron Seal Mating Surface Repair

**5. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - JACKSCREW HOLE REPAIR.**

(See Figure 3.)

- a. Machine stripped holes as shown
in figure 3.

Legend for figure 3

NOTE

Unless otherwise specified all dimensions apply when Surface G and Diameter A maintains a clear envelope of 10.495 inch in free state or Constrained. Constraint contact allowed on Surface J, Surface G, and Diameter A.

1. 0.080 inch minimum to thread minor diameter.
2. $143^{\circ} 20'$
3. 0.250 - 28 UNF - 2B modified minor diameter 0.2152 to 0.2229 inch modified. Three holes equally spaced. Chamfer $90^{\circ} \pm 5^{\circ}$ inclusive to 0.250 to 0.280 inch diameter located in relation to thread minor diameter within 0.008 inch minimum radial distance. Holes to be located within 0.020 inch diameter of true position with Surface G, Diameter A, and Datum S, at Maximum Material Condition.

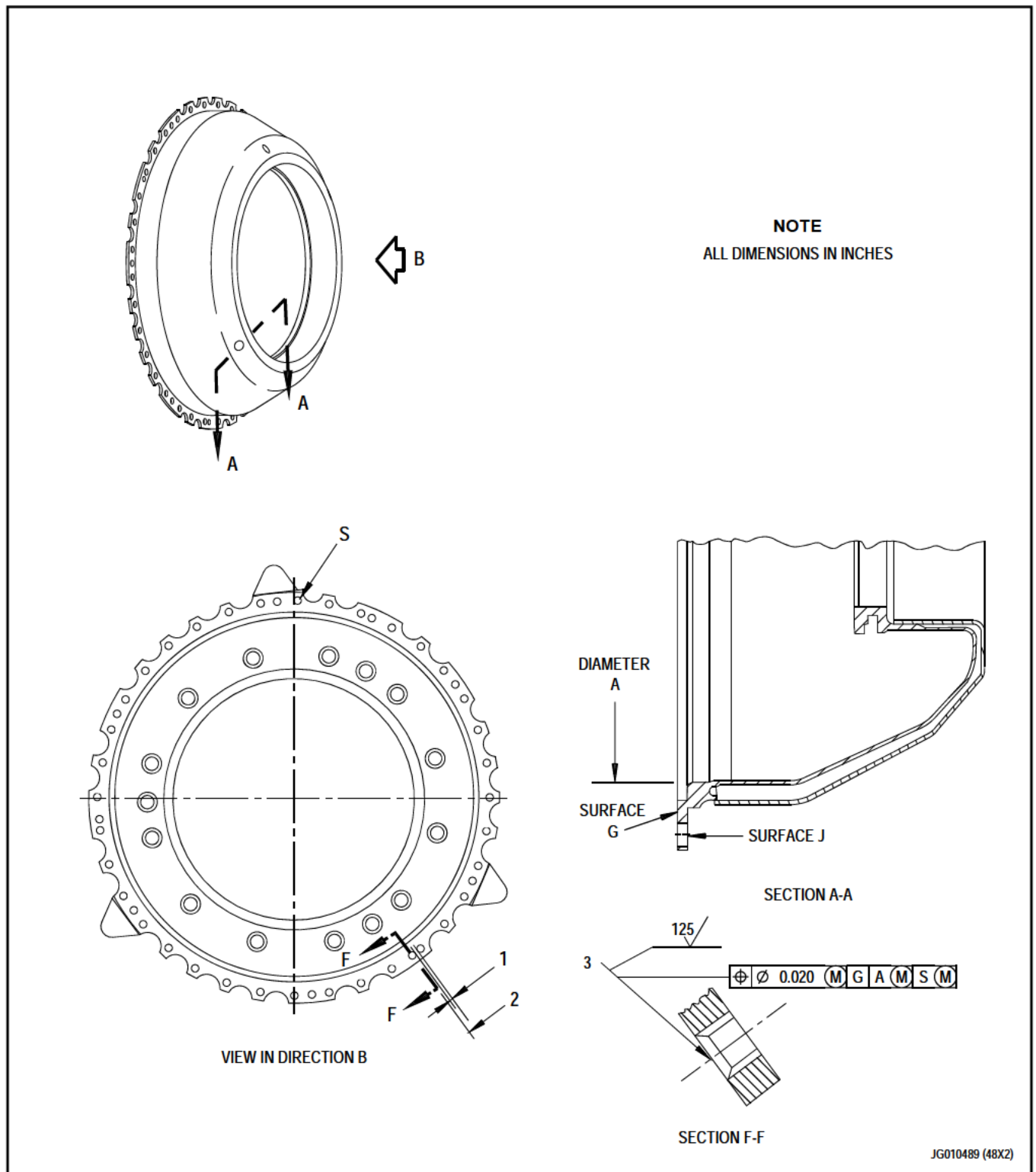


Figure 3. No. 4 Bearing Seal Rear Support Assembly - Jackscrew Hole Repair

**6. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - HEATSHIELD DENT REPAIR.**

(See Figure 4.)

NOTE

Parent material of Part L is
AMS 5599.

a. Repair dents(6) in Area K as
follows:

(1) Drill hole(5) per View G. No
drill point contact
permissible on Part M.

(2) Thread bolt or screw into
hole(5) with knocker
attached and pull out
dent(6).

(3) Repair per the following
limits: Area shall be within
0.050 inch of original part
contour. Local heating of
dented area may be used to
facilitate recontouring but
shall not exceed 1100°F
(593°C). Torch heating not
permitted. Plated parts
shall not exceed 750°F
(399°C).

(4) Fluorescent penetrant
inspect area. Refer to T.O.
2-1-111, SPOP 82. No cracks
allowed.

(5) Clean repaired area with
stainless steel brush.

(6) Manual gas tungsten arc
weld(7) hole(5) using AMS
5837 filler metal. Refer to
T.O. 2J-F100-53-1, SWP 093
01. Welding two vent
holes(12) not allowed.

(7) Fluorescent penetrant
inspect weld and heat
affected area. Refer to T.O.
2-1-111, SPOP 82. No cracks
allowed.

Legend for figure 4

1. Weld Part M per text. Use AMS 5832 filler metal.
2. 4.780 inch radius, 3 places.
3. 4.280 inch radius, 9 places.
4. 0.500 inch radius minimum, 12 places.
5. 0.125 inch maximum diameter hole.
6. Dent over 0.100 inch deep.
7. Weld per text. Use AMS 5837 filler metal.
8. 4.280 inch radius minimum to part center.
9. Part M is defined by dimensions 2, 3, and 4.
10. 0.100 inch maximum dents allowed within Area K as defined by dimensions 2, 3, 8, and 11.
11. 1.000 inch minimum.
12. Plug welding 2 vent holes not allowed.

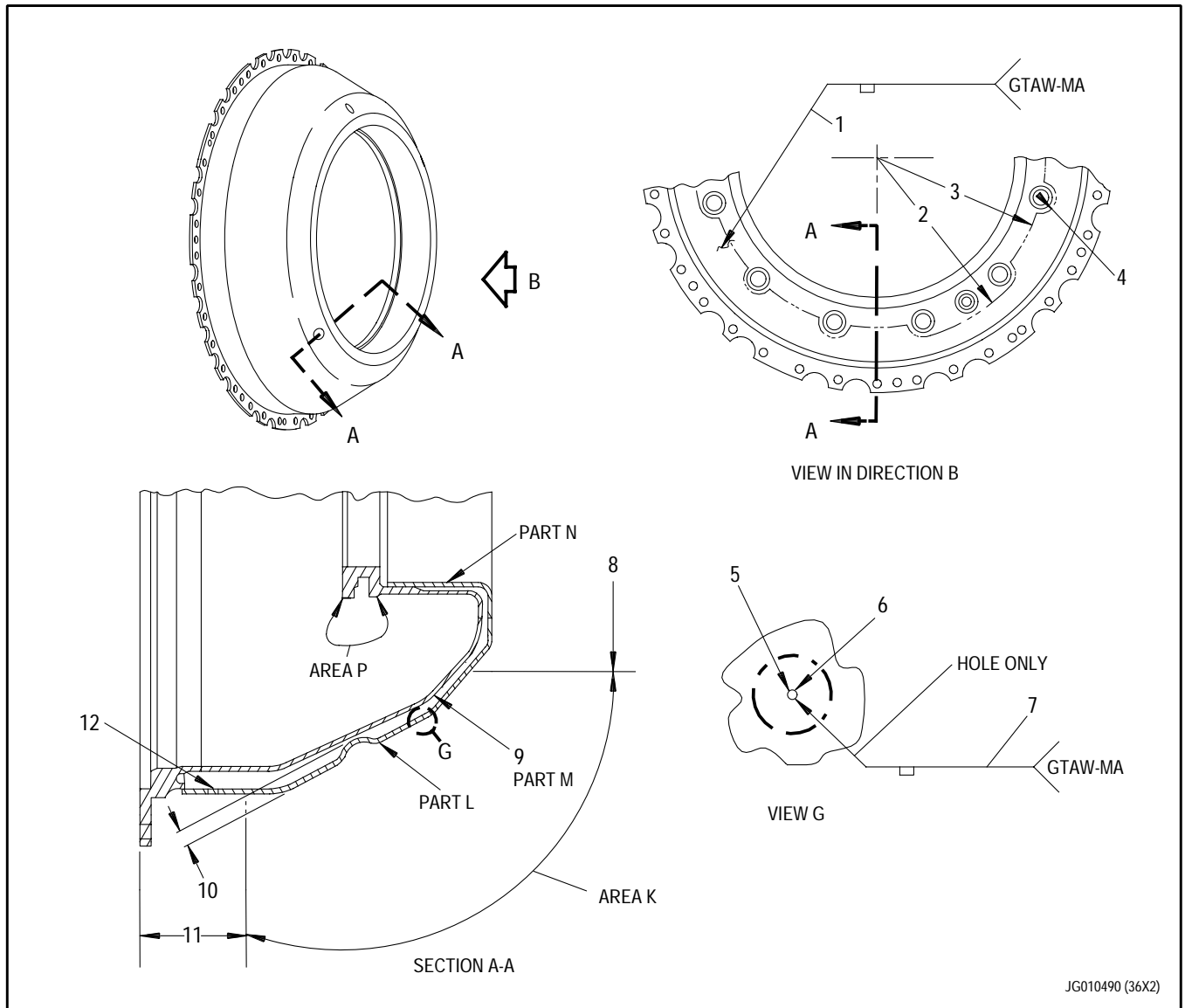


Figure 4. No. 4 Bearing Seal Rear Support Assembly - Weld Repair

**7. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - HEATSHIELD NICK, CRACK,
SCRATCH AND GOUGE WELD REPAIR.**

(See figure 4.)

NOTE

Parent material of Part L and
Part N is AMS 5599.

a. Repair damaged areas on Parts L
and N as follows:

- (1) Fluorescent penetrant
inspect to determine size of
damaged areas. Refer to T.O.
2-1-111, SPOP 82.

NOTE

It is recommended that carbide
or cobalt drills be used for
stop drilling operations.

- (2) Stop drill ends of damaged
areas using 0.125 inch
drill.

- (3) Rout out damage between stop
drill holes to a minimum
width. Root opening shall be
0.060 inch maximum. Drill
point shall not contact
inner
Part M when drilling outer
Part L.
- (4) Manual gas tungsten arc
weld(11) routed out area and
holes using AMS 5837 filler
metal. Refer to T.O.
2J-F100-53-1, SWP 093 01.
- (5) Fluorescent penetrant
inspect weld and heat
affected area. Refer to
T.O. 2-1-111, SPOP 82. No
cracks allowed.

8. NO. 4 BEARING SEAL, REAR, SUPPORT ASSEMBLY - NICK, CRACK, SCRATCH AND GOUGE WELD REPAIR.

(See figure 4.)

- a. Remove pin per paragraph 2.
- b. Strip PWA 259 plate from Area P per paragraph 9.

NOTE

Parent material of Part M is PWA 649-1.

- c. Repair damaged areas on Part M as follows:
 - (1) Fluorescent penetrant inspect to determine size of damaged areas. Refer to T.O. 2-1-111, SPOP 82.

NOTE

It is recommended that carbide or cobalt drills be used for stop drilling operations.

- (2) Rout out damage removing a minimum amount of material. Root opening shall be 0.060 inch maximum. Drill point shall not contact outer Part L when drilling inner Part M.
- (3) Manual gas tungsten arc weld(1) routed out area

using AMS 5832 filler metal. Refer to T.O. 2J-F100-53-1, SWP 093 01.

- (4) Solution heat treat at 1750°F ±25°F in protective atmosphere hold at heat for 1 hour, and cool at a rate equivalent to air cool or faster. Precipitation heat treat at 1325°F ±25° hold at heat for 8 hours, furnace cool at a rate of 100°F maximum per hour to 1150°F ±15°, hold at 1150°F ±15° for 8 hours and air cool. Alternatively precipitation heat treat may be as follows: heat to 1325°F ±25°, hold at heat for 8 hours, furnace cool to 1150°F ±15° until a total aging time of 18 hours has been reached and air cool.
- (5) Fluorescent penetrant inspect weld and heat affected area. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

d. Deleted.

e. Replace pin per paragraph 2.

9. Deleted.

**10. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - RING GROOVE REPAIR.**

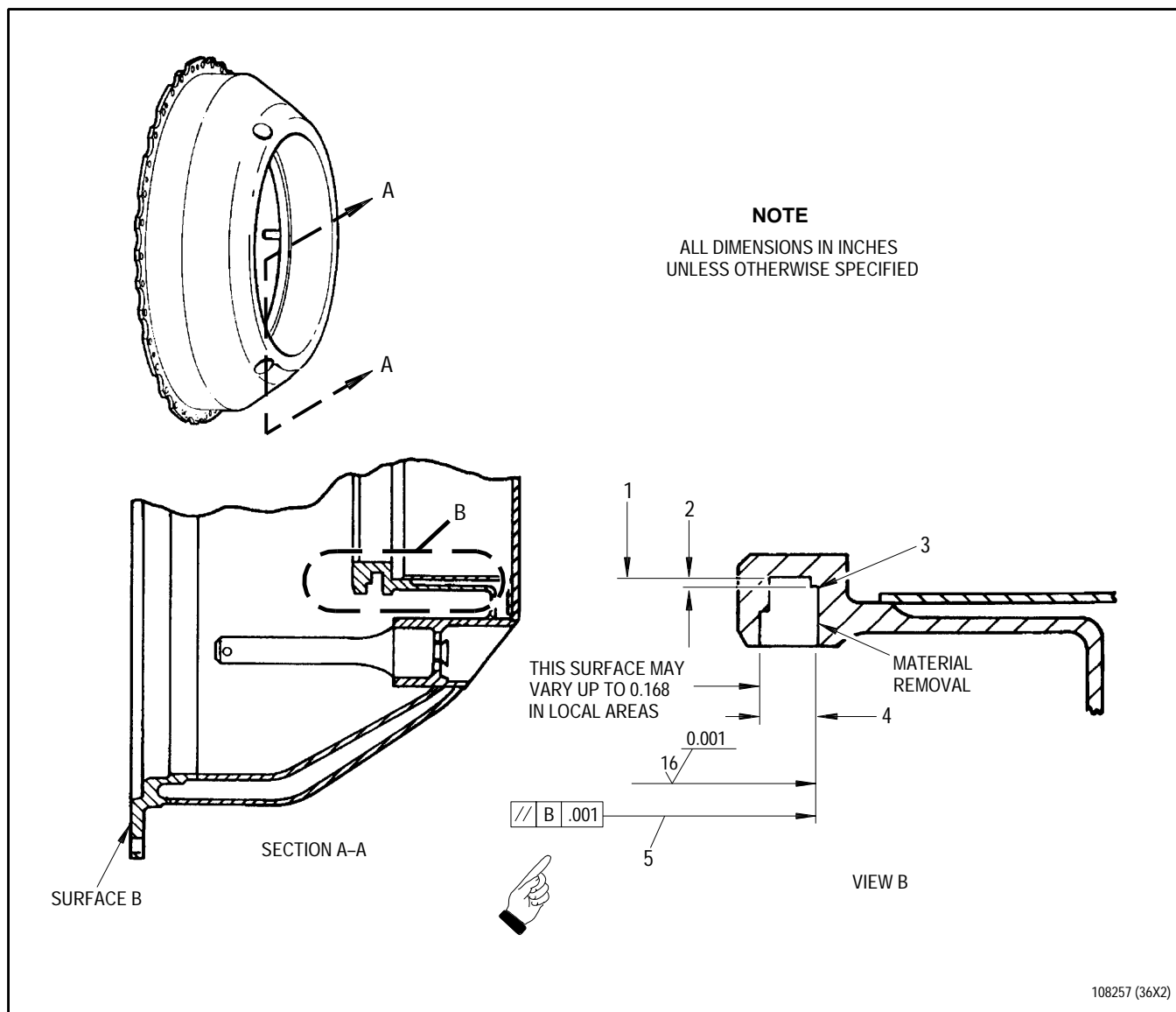
(See Figure 4.)

NOTE

No. 4 bearing support assemblies with ring grooves exceeding repair limits of this paragraph may be repaired per paragraph 11.

- a. Remove three pins (PN 4035860) per paragraph 2 to provide cutting tool clearance.
- b. Before machining, determine that ring groove width does not exceed 0.165 inch for this repair.

- c. Machine groove per figure 4 to remove wear while maintaining surface finish and parallelism. Use SAALC 8142924 fixture and SAALC 8142925 set master. Material removal shall be held to minimum. Maintain dimension(2).
- d. If worn surface will not completely clean up by machining, repair per paragraph 11.
- e. Install new pins (PN 4035860) per paragraph 2.



1. 7.166 to 7.170 inch diameter
2. 0.010 inch maximum
3. 0.005 to 0.020 inch modified radius
4. 0.162 to 0.165 inch. Up to 0.168 inch allowed in localized areas not to exceed 45 degrees in circumference.
5. This surface shall be parallel with Surface B within 0.001 inch.

Figure 5. No. 4 Bearing Seal Rear Support Assembly - Ring Groove Repair

**11. NO. 4 BEARING SEAL REAR SUPPORT
ASSEMBLY - SEAL RING GROOVE REPAIR.**

(See Figure 5.)

NOTE

It is permissible to machine seal ring groove 0.005 inch oversize and still use standard size seal ring.

- a. Remove three guide pins (PN 4035860) per paragraph 2 to provide cutting tool clearance. Discard guide pins.
- b. Before machining, determine if wall thickness(1) will be greater than 0.066 inch minimum for this repair.
- c. Machine per dimension(3) in figure while maintaining dimension(1). Remove only enough material to remove all evidence of steps or wear.
- d. Record actual dimension machined for future marking.

- e. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- f. Reinstall new pins per paragraph 2.
- g. Mark USE OVERSIZE RING and size code in area adjacent to part number. Use measurement recorded in step d. to determine size code. Deep electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, WP 023 00.

Example: Measurement from step d. of 0.172 inch will require the following part marking: USE OVERSIZE RING P15.

- h. If groove is enlarged again, mark out old size code and mark new size code.

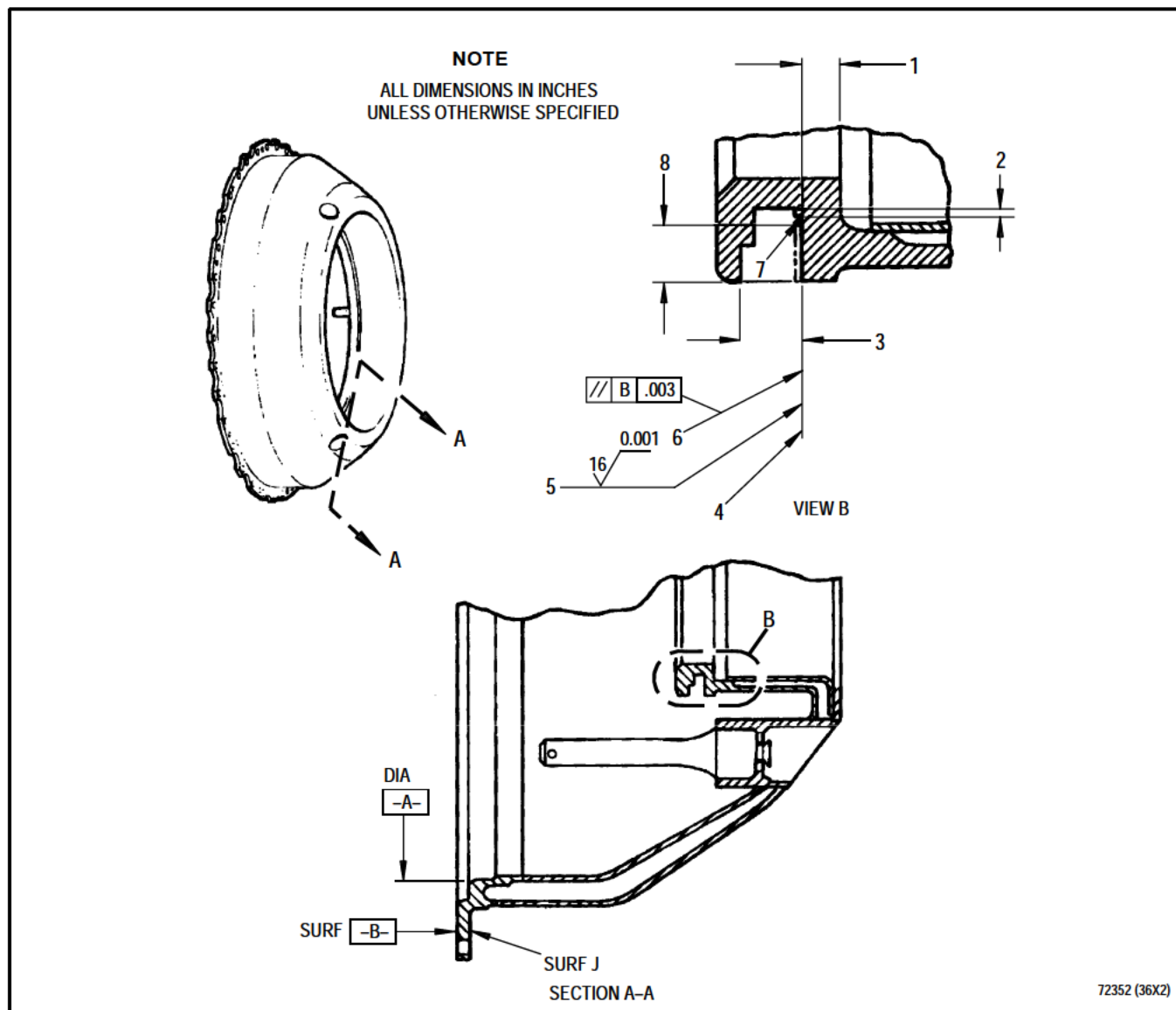


Figure 6. No. 4 Bearing Seal Rear Support Assembly - Seal Ring Groove Repair

Legend for figure 6

NOTE

Unless otherwise specified all dimensions apply when Surface B and Diameter A are flat within 0.0004 inch total and round within 0.002 inch radius respectively in Free State or Constrained. Constraint contact allowed only on Surface J, Surface B, and Diameter A.

1. 0.061 inch minimum
2. 0.000 to 0.010 inch
3. Machining dimension:

Oversize Seal Ring Groove Dimensions (Inch)	Size Code
0.157 to 0.165	Standard
0.167 to 0.170	P10*
0.172 to 0.175	P15*
0.177 to 0.180	P20*
0.182 to 0.185	P25*

4. Wear surface
5. Over distance(8)
6. This surface to be parallel with Surface B within 0.003 inch over distance(8).
7. 0.005 to 0.020 inch modified radius
8. 0.150 inch minimum

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, NO. 4 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					0

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, General - - - - -	WP 023 00
Marking Electromechanical (SPOP 401) - - - - -	SWP 023 02
Cleaning, Vapor Degreaser (SPOP 3) - - - - -	SWP 031 02
Plating, Nickel, on Stainless Steel, Nickel or Cobalt (SPOP 26) - - - - -	SWP 092 10
Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing housing.

2. NO. 4 BEARING HOUSING - SNAP DIAMETER OR BEARING JOURNAL NICKEL PLATING.

(See Figure 1.)

- a. Clean-up machine to dimension shown. (See figure 1.)
- b. Fluorescent penetrant inspect for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.
- c. Nickel plate machined area to dimension specified. Refer to T.O. 2J-F100-53-1, SWP 092 10 (SPOP 26).



Nickel plating thickness shall be 0.002 to 0.010 inch after finish machining.

- d. Finish machine to dimensions shown.
- e. Using approved marking symbols, mark housing in area(16) to indicate part has been nickel plate repaired. Use deep electrolytic etch, hammer metal stamp, press metal stamp, roll metal stamp, manual vibration peen, mechanical vibration peen, manual engrave, mechanical engrave, brand, or drag impression marking procedure. Refer to T.O. 2J-F100-53-1, WP 023 00.

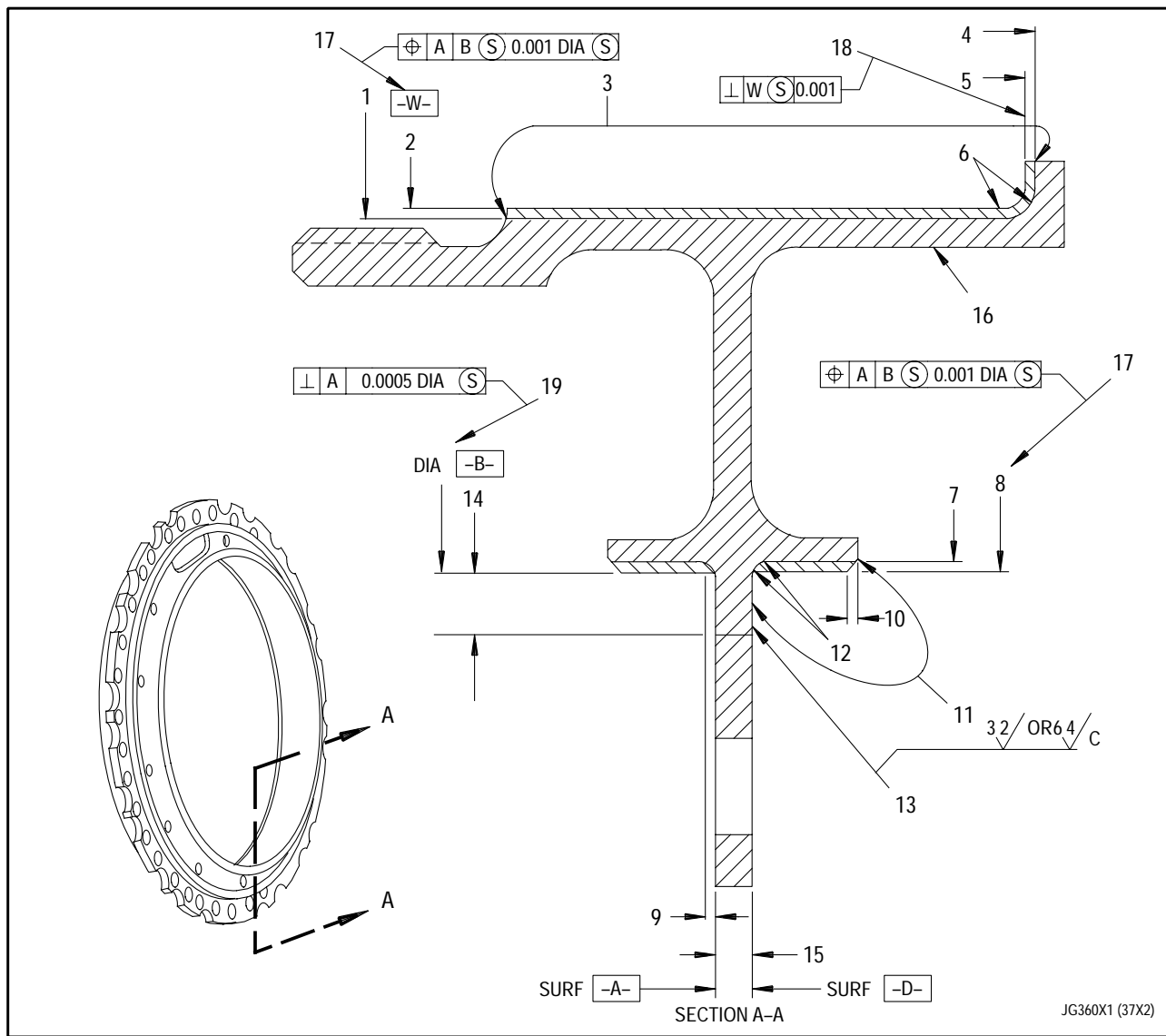


Figure 1. No. 4 Bearing Housing - Nickel Plating Repair

Legend for figure 1**NOTE**

All dimensions apply when Surface A is flat within 0.001 inch, in free state or constrained. Constraint contact allowed only on Surfaces A and D. In free state Surface A is flat within 0.015 inch.

1. Clean-up machine to 8.8598 to 8.8753 inch diameter, hold to minimum value.
2. Nickel plate to 8.8443 inch diameter maximum. Finish machine to 8.8543 to 8.8548 inch diameter.
3. Nickel plate enclosed area per text. Plating outside enclosed area is permissible, but such excess plate shall be removed.
4. From Surface A, clean-up machine to 0.732 to 0.736 inch, hold to minimum value.
5. From Surface A, nickel plate to 0.721 inch maximum. Finish machine to 0.726 to 0.730 inch
6. 0.030 to 0.050 inch modified radius
7. Clean-up machine to 10.482 to 10.495 inch diameter, hold to maximum value, both sides.
8. Nickel plate to 10.513 inch diameter minimum. Finish machine to 10.500 to 10.503 inch diameter, both sides.
9. 0.000 to 0.005 inch, both sides
10. Chamfer 0.020 to 0.040 inch x 45° ±2°, 2 places.
11. Nickel plate enclosed area, both sides, per text. Plating outside enclosed area is permissible, but such excess plate must be removed.
12. 0.016 to 0.031 inch modified radius, both sides
13. This finish for Distance 14
14. 0.200 inch minimum
15. 0.078 to 0.082 inch
16. Marking area
17. This diameter shall be located within 0.001 inch of true position in relation to Surface A and Diameter B regardless of feature size of this diameter and Diameter B.
18. This surface shall be perpendicular with Diameter W within 0.001 inch regardless of feature size of Diameter W.
19. This diameter shall be perpendicular to Surface A within 0.0005 inch regardless of feature size.

3. NO. 4 BEARING HOUSING - FRONT AND REAR FLANGE FACE REPAIR.

(See Figure 2.)

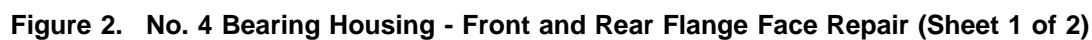
NOTE

Front flange face and front snap diameter shall be repaired prior to other repairs.

a. Faces worn, damaged, or out-of-parallel may be repaired as follows:

- (1) Vapor degrease. Refer to T.O. 2J-F100-53-1, SWP 031 02 (SPOP 3).
- (2) Machine front or rear flange to dimension shown. (See figure 2.)
- (3) Fluorescent penetrant inspect repair area. Refer to T.O. 2J-F100-9. No cracks permitted.
- (4) Grit blast repair area with No. 60 silicon carbide grit using 30 to 70 psi blasting pressure. Do not grit blast outside enclosed area.

- (5) Plasma spray coat area shown to 0.003 to 0.010 inch thickness per PWA 53-13. Do not plasma spray outside of enclosed area. Refer to T.O. 2J-F100-53-1, WP 096 00.
- (6) Machine coated area to finished dimensions.
- (7) Fluorescent penetrant inspect repair area. Refer to T.O. 2J-F100-9. No cracks permitted.
- (8) Permanently identify part with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02 (SPOP 401). Multiple marking with repair code is permitted.



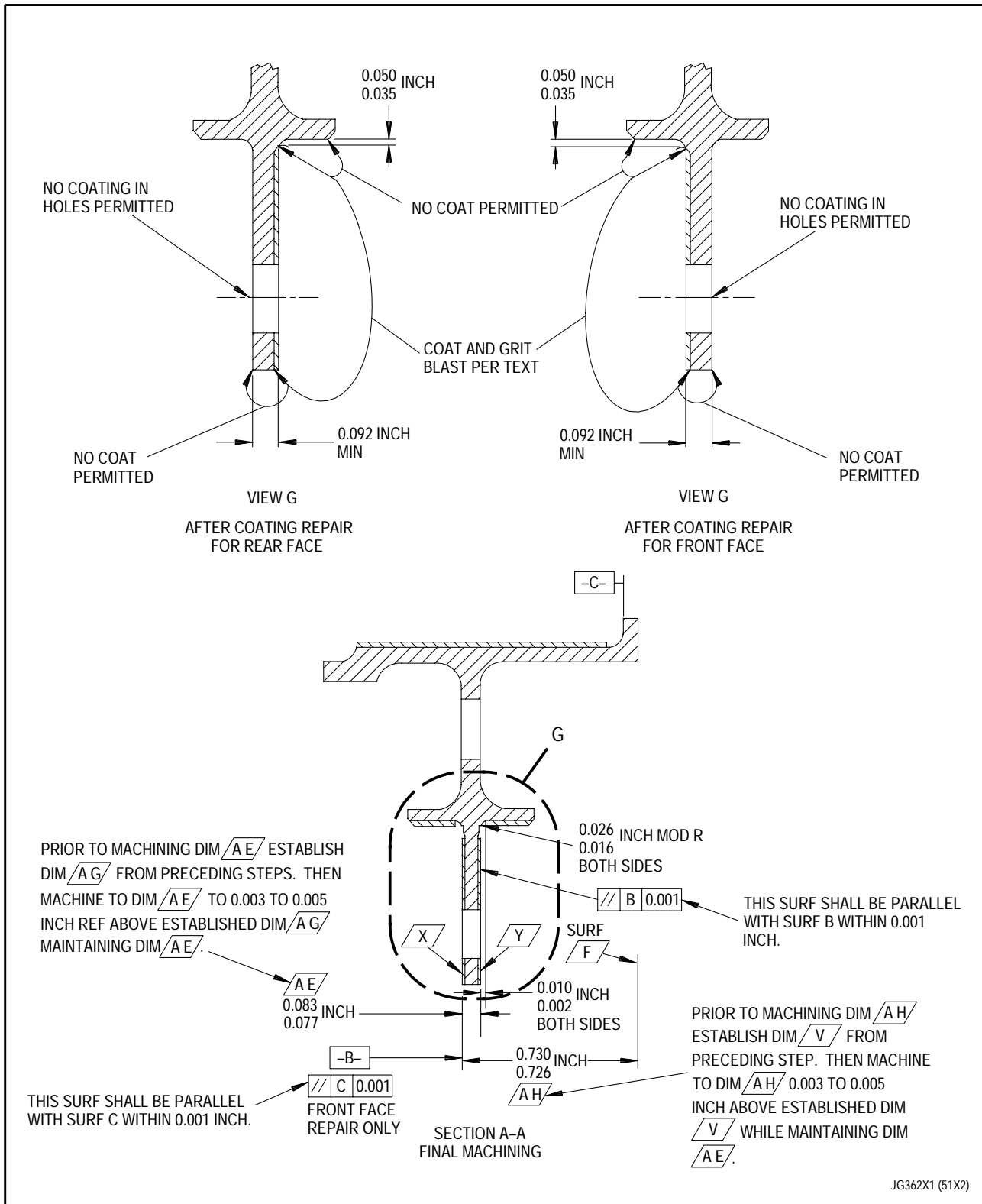


Figure 2. No. 4 Bearing Housing - Front and Rear Flange Face Repair (Sheet 2 of 2)

WORK PACKAGE

TECHNICAL PROCEDURES

SCOOP, NO. 4 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Lapping of Main Bearing Carbon Seals, Seal Plates, and Spacers - - - - -	SWP 091 05
Plating, Nickel, on Stainless Steel Nickel, or Cobalt (SPOP 26) - - - - -	SWP 092 10

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of the No. 4 bearing scoop.

2. NO. 4 BEARING SCOOP - BLEND REPAIR.

- a. Blend requirements.
- (1) All local blending shall extend to a distance at least 15 times the depth of damage.
 - (2) Surface finish of all blends shall be as smooth or smoother than original finish.
- b. Blend scratches, nicks, and dents using a fine stone.

3. NO. 4 BEARING SCOOP - LAPPING.

(See Figure 1.)

- a. Lap sealing surface to obtain required surface finish. Do not exceed minimum part thickness. Refer to T.O. 2J-F100-53-1, SWP 091 05. (See figure 1.)

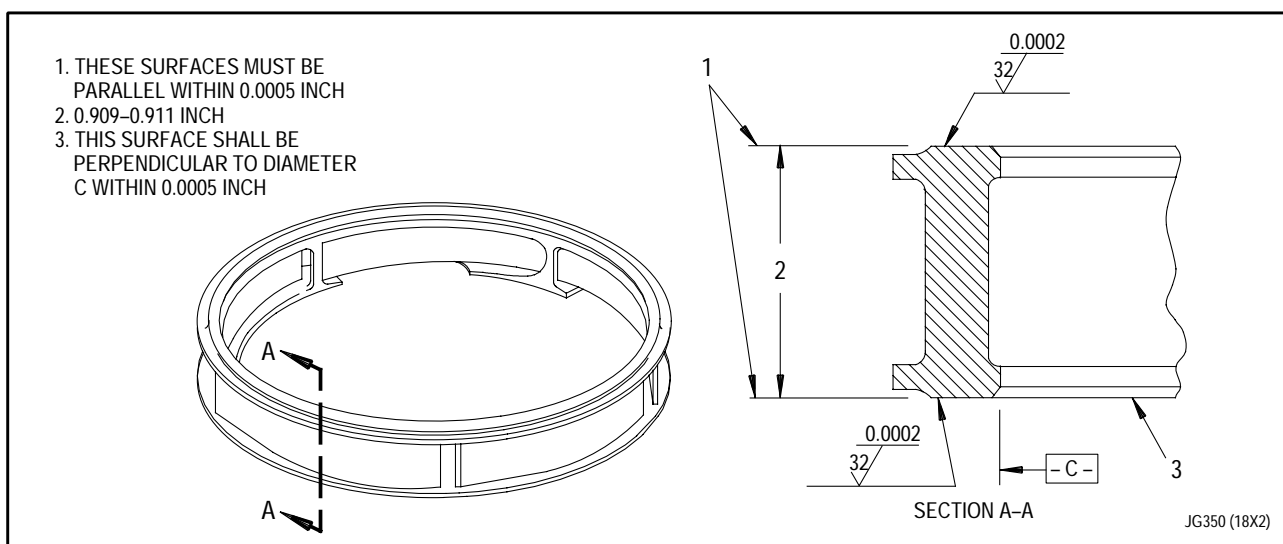


Figure 1. No. 4 Bearing Scoop - Lapping

4. NO. 4 BEARING SCOOP - NICKEL PLATING REPAIR.

(See Figure 2.)

NOTE

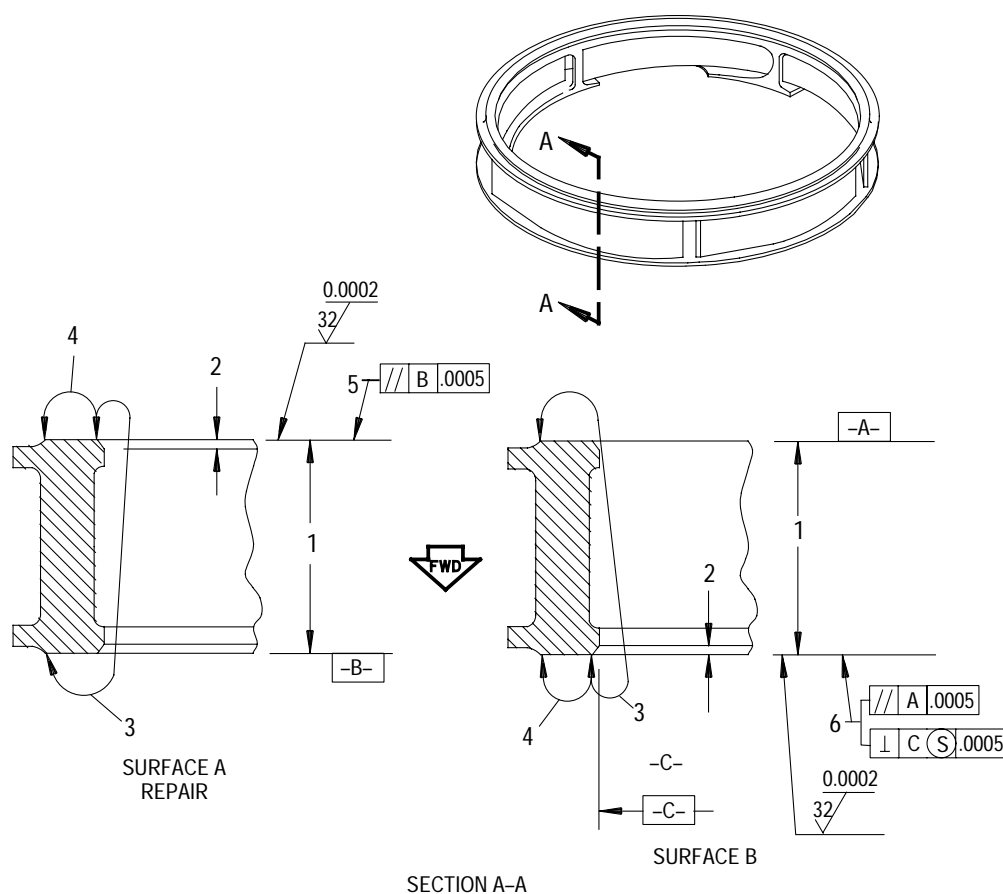
Critical dimensions can be restored by nickel plating either Surface A or Surface B or both surfaces, depending on need. If both surfaces require repair, each shall be machined, plated, and finish machined completely before proceeding with the opposite surface. Parent material is AMS 6322 steel with hardness of Rockwell C30 to 38, or equivalent.

- a. Machine Surface A or B to dimensions shown in figure 2.

NOTE

Plate only enclosed areas shown. Plating outside area is permissible, but such excess shall be removed.

- b. Nickel plate per
T.O. 2J-F100-53-1, SWP 092 10 to dimensions shown in figure 2.
- c. After plating bake at
365° to 385°F (185° to 197°C) for three hours.
- d. Finish machine to dimensions shown in figure 2.



NOTE

REPAIR OF BOTH SURFACES A AND B IS ACCEPTABLE; HOWEVER, ONE SURFACE MUST BE COMPLETED BEFORE REPAIRING THE OTHER.

1. CLEAN UP MACHINE TO 0.901-0.907 INCH; PLATE TO 0.916 INCH MINIMUM
FINISH MACHINE TO 0.909-0.911 INCH.
2. CHAMFER 0.020-0.030 INCH X $45^\circ \pm 2^\circ$.
3. ELECTRICAL CONTACT IS NOT PERMITTED.
4. NICKEL PLATE PER TEXT.
5. THIS SURFACE MUST BE PARALLEL WITH SURFACE B WITHIN 0.0005 INCH.
6. THIS SURFACE MUST BE PARALLEL WITH SURFACE A WITHIN 0.0005 INCH. THIS SURFACE MUST BE PERPENDICULAR WITH DIAMETER C WITHIN 0.0005 INCH REGARDLESS OF FEATURE SIZE OF DIAMETER C.

JG351 (44X2)

Figure 2. No. 4 Bearing Scoop - Nickel Plating Repair

WORK PACKAGE

TECHNICAL PROCEDURES

SHROUD, COMPRESSOR STATOR, THIRD STAGE -

REPAIR

EFFECTIVITY:

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 11	27	12 Blank	27		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection Methods - - - - -	T.O. 33B-1-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE, CROCUS	A-A-1206
WIRE, WELDING	AMS 4956 (TITANIUM ALLOY)

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	THIRD STAGE COMPRESSOR STATOR SHROUD - ANTIROTATION LUG REPAIR	
	FIXTURE, WELD, 3RD STG COMPRESSOR STATOR SHROUD - - -	PWA 71008
	FIXTURE, STRESS RELIEF, 3RD STG COMPRESSOR STATOR (REPAIR) - - - - -	PWA 71009
	FIXTURE, MACHINE, 3RD STAGE COMPRESSOR STATOR SHROUD REPAIR - - - - -	PWA 71006
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR SHROUD - - - - -	PWA 71013
3	THIRD STAGE COMPRESSOR STATOR SHROUD - FLANGE REPAIR	
	FIXTURE, MACHINE, 3RD STAGE COMPRESSOR STATOR SHROUD REPAIR - - - - -	PWA 71006
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR SHROUD - - - - -	PWA 71007
	MASK, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 71011
	GAGE, DIAL FLUSH PIN, 3RD STG COMPRESSOR STATOR SHROUD - - - - -	PWA 71012

ILLUSTRATED SUPPORT EQUIPMENT

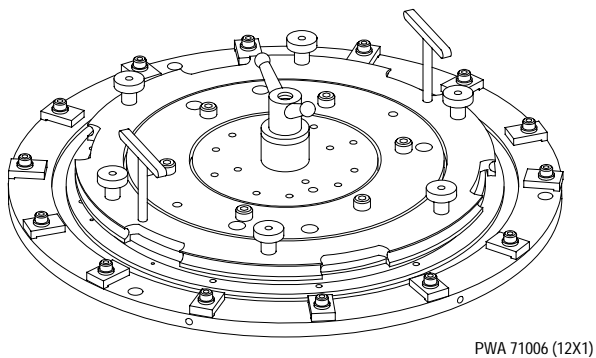


Figure T1. PWA 71006 FIXTURE

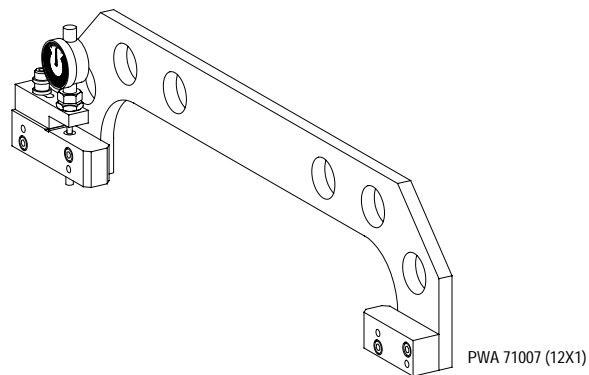


Figure T2. PWA 71007 GAGE

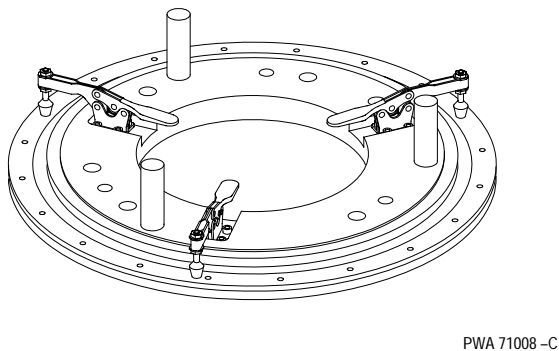


Figure T3. PWA 71008 FIXTURE

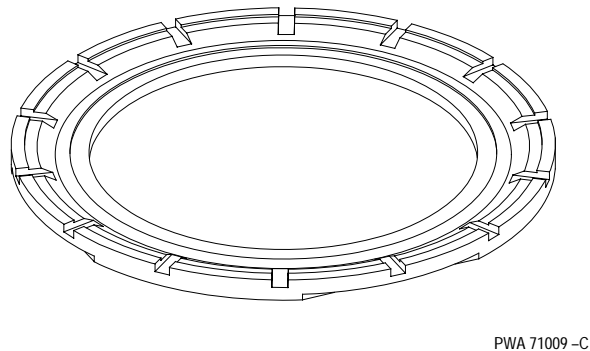


Figure T4. PWA 71009 FIXTURE

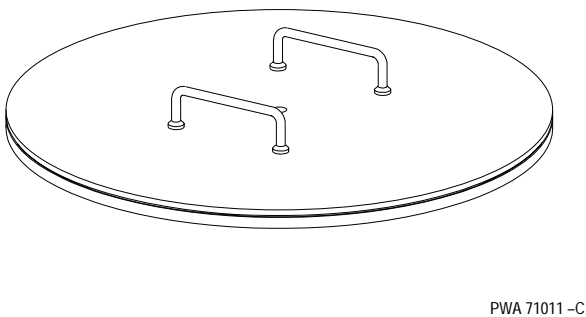


Figure T5. PWA 71011 MASK

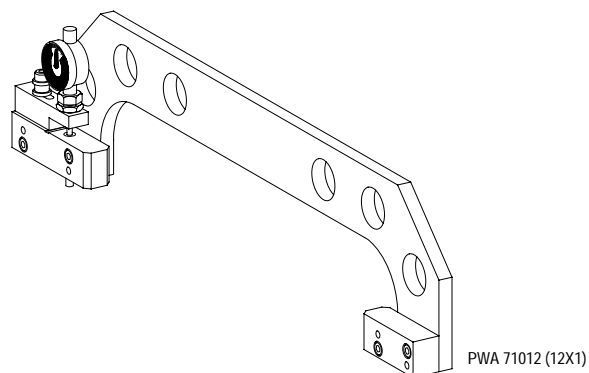


Figure T6. PWA 71012 GAGE

ILLUSTRATED SUPPORT EQUIPMENT (continued)

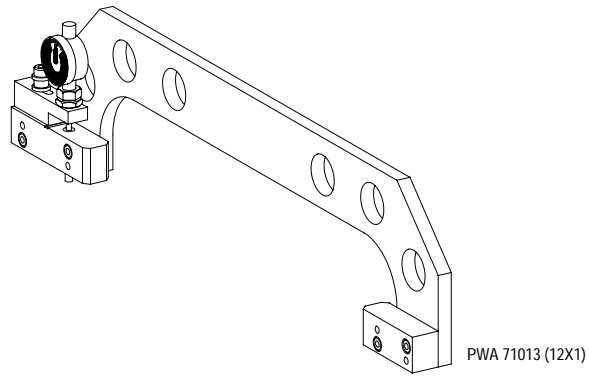


Figure T7. PWA 71013 GAGE

1. INTRODUCTION.

This work package contains instructions for repair of 3rd stage compressor stator shroud.

2. THIRD STAGE COMPRESSOR STATOR SHROUD - ANTIROTATION LUG REPAIR.

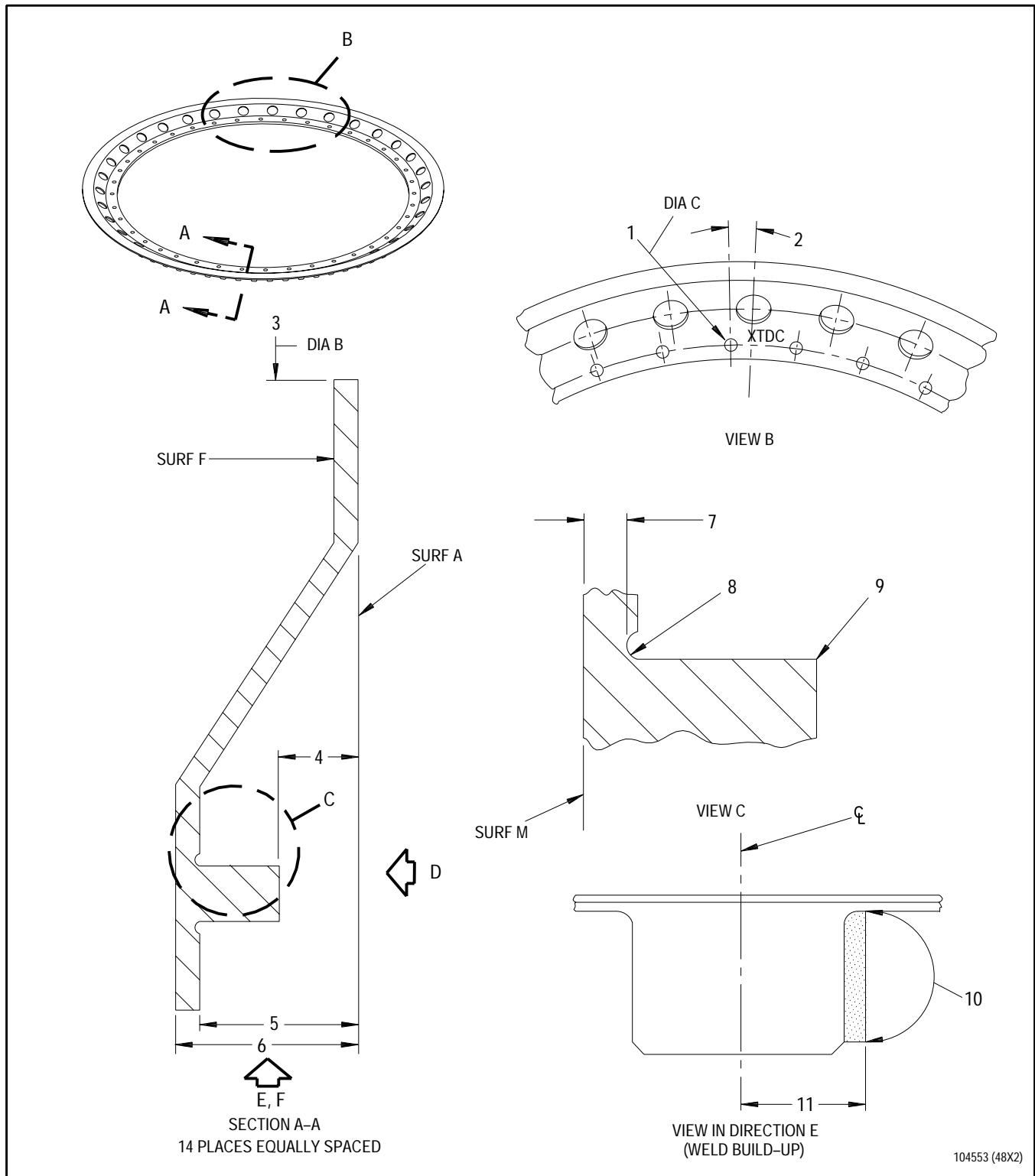
(See Figures 1 and 2.)

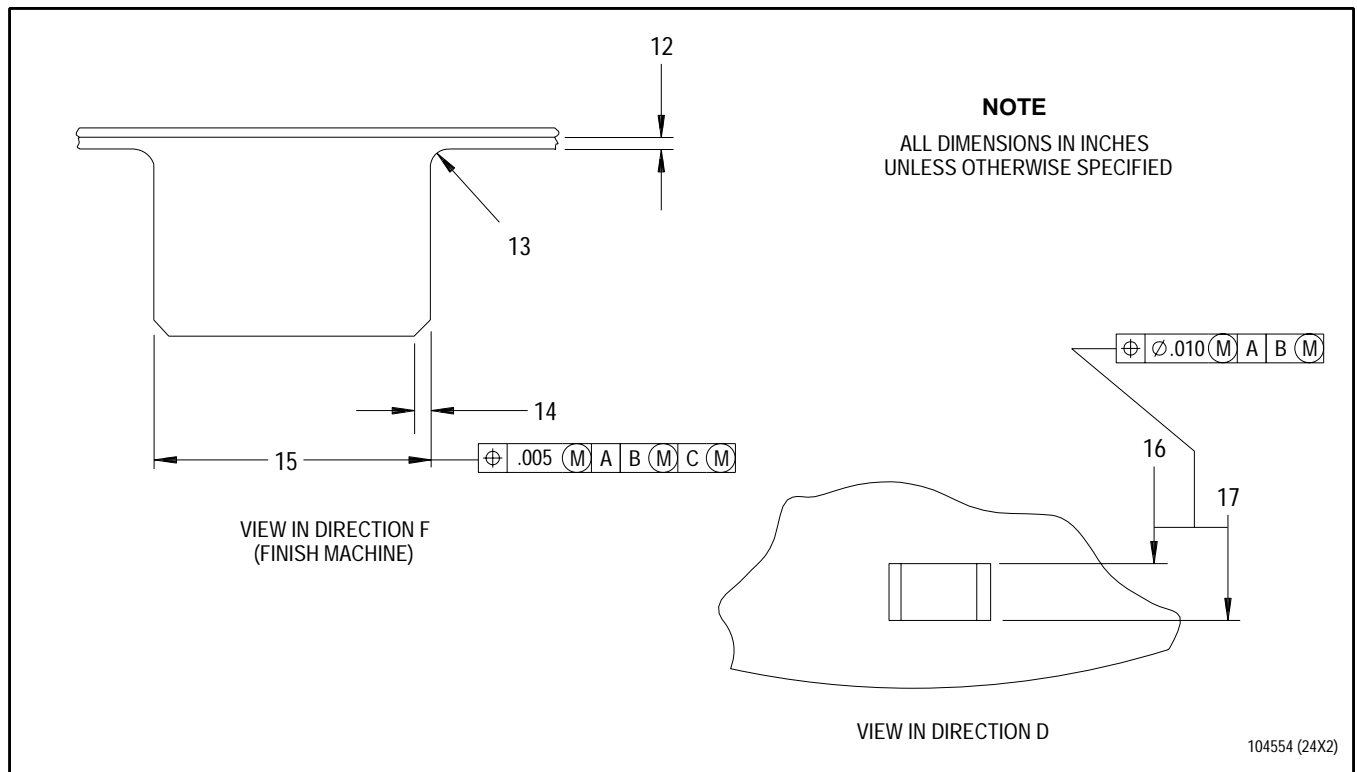
- a. Clean shroud per SPOP 208. Refer to T.O. 2-1-111.
- b. Install shroud in PWA 71008 weld fixture rear face up. Adjust toggle clamp pads to put minimal pressure on shroud. Secure shroud in place.
- c. Manual gas tungsten arc weld build up (GTAW-MA) lugs per View in Direction E, figure 1. Use AMS 4956 welding wire per PWA 16-66X. Refer to T.O. 2-1-111.
- d. Install shroud in PWA 71009 stress relief fixture rear face down, aligning antirotation lugs to fit into slots on fixture.
- e. Stress relieve shroud for two hours at 1135° to 1165°F (613° to 630°C) in suitable protective atmosphere per SPOP 464. Air cool or faster. Refer to T.O. 2-1-111.
- f. Radiographic inspect weld repaired areas. Refer to T.O. 33B-1-1. Evaluate to SXRS-33, except no cracks allowed. Refer to T.O. 2-1-111.
- g. Install shroud in PWA 71006 machining fixture as follows:
 - (1) Indicate inside TDC hole on fixture base to establish angular reference.
 - (2) Loosen six knurled knobs(5, figure 2) and remove clamp ring(4).
 - (3) Loosen speed handle(7) to retract jaws(6).
 - (4) Loosen six set screws(1) around outer diameter of base to unlock backup ring assembly(3).
 - (5) Loosen 14 strap clamps(8) and turn to load shroud(2).
 - (6) Place shroud(2) on fixture, rear face up, with TDC mark on shroud aligned with TDC hole on fixture, and Hole C(1, figure 1) of shroud over fixture spring loaded tapered pin. Engage fixed pin on fixture in hole near shroud 180-degree location.
 - (7) Place clamp ring(4, figure 2) over shroud but do not tighten knurled knobs. Ensure outer flange of shroud is flat on fixture base.
 - (8) Tighten speed handle(7) to actuate jaws(6) against shroud inner diameter.
 - (9) Secure shroud outer flange with 14 strap clamps(8).
 - (10) Tighten six set screws(1) to lock backup ring assembly(3).
 - (11) Tighten six knurled knobs(5) to secure clamp ring(4).

NOTE

Parent material is AMS 4928 titanium alloy.

- h. Machine repaired antirotation lugs per figure 1. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111.



**NOTE**

Unless otherwise specified, all dimensions apply when Surface A is flat within 0.003 inch, and Diameter B maintains a clearance envelope of 16.554 inches diameter in free state or constrained. Constraint contact allowed only on Surfaces A and F, and Diameter B.

1. 0.216 to 0.226 inch diameter Hole C, located next to TDC hole
2. 2°55'
3. 16.555 to 16.565 inches Diameter B
4. 0.212 to 0.232 inch, 14 places. Surface finish may be incomplete.
5. 0.469 to 0.475 inch
6. 0.532 to 0.542 inch, reference
7. 0.050 inch minimum
8. 0.031 to 0.062 inch modified radius, both sides
9. Break edges 0.003 to 0.015 inch.
10. Weld build both sides of lug per text.
11. 0.200 to 0.250 inch, both sides
12. 0.000 to 0.005 inch mismatch permissible between lugs
13. 0.030 to 0.045 inch modified radius, both sides
14. Chamfer 0.040 to 0.060 inch X 45°±5°, both sides.
15. 0.312 to 0.316 inch
16. 19.662 to 19.682 inches diameter. Surface finish may be incomplete.
17. 19.942 to 19.962 inches diameter. Surface finish may be incomplete.

Figure 1. Third Stage Compressor Stator Shroud - Antirotation Lug Repair (Sheet 2 of 2)

- i. Using PWA 71013 gage, ensure proper lug height is maintained as follows:

NOTE

It may be necessary to remove clamp ring from PWA 71006 fixture to access machined antirotation lug.

- (1) Adjust indicator dial to zero against gage block in area near flush pin.
- (2) Place gage on shroud, with flush pin contacting machined antirotation lug surface.
- (3) Read indicator dial. Height is out of tolerance if reading falls in red area of face dial.

- j. Use fine stones or crocus cloth, 15:1 length-to-depth ratio, or larger, to locally blend Surface M, as required to remove pits or high spots caused by weld penetration. Blend shall transition smoothly to adjacent surfaces, with no raised metal. Surface finish shall be equal to or better than original surface. Remove minimum material.

- k. Fluorescent penetrant inspect repaired areas per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.

Legend for figure 2

- 1. Set screw
- 2. Third stage compressor stator shroud
- 3. Backup ring assembly
- 4. Clamp ring
- 5. Knurled knob
- 6. Jaws
- 7. Speed handle
- 8. Strap clamp

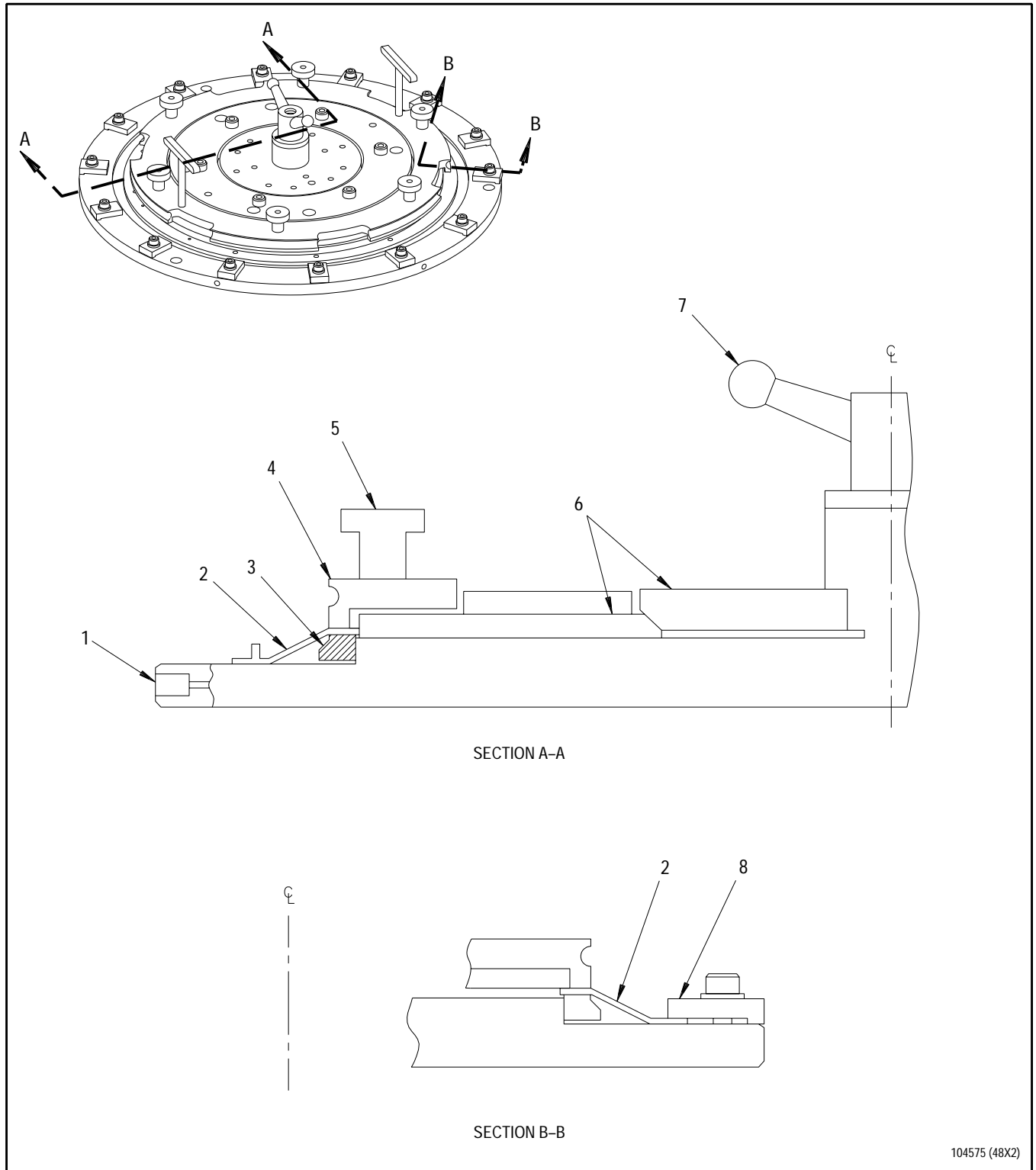


Figure 2. PWA 71006 Machining Fixture

**3. THIRD STAGE COMPRESSOR STATOR
SHROUD - FLANGE REPAIR.**

(See Figure 3.)

- a. Install shroud in PWA 71006 machining fixture per paragraph 2.

NOTE

Parent material is AMS 4928 titanium alloy.

- b. Machine worn flange per View B, figure 3. Remove minimum amount of material. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111. Measure dimension(4) using PWA 71007 gage.
- c. Fluorescent penetrant inspect machined areas per SPOP 62. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- d. Clean shroud per SPOP 208. Refer to T.O. 2-1-111.
- e. Mask area(6) using PWA 71011 mask. Ensure slots in mask outer flange align with shroud antirotation lugs.

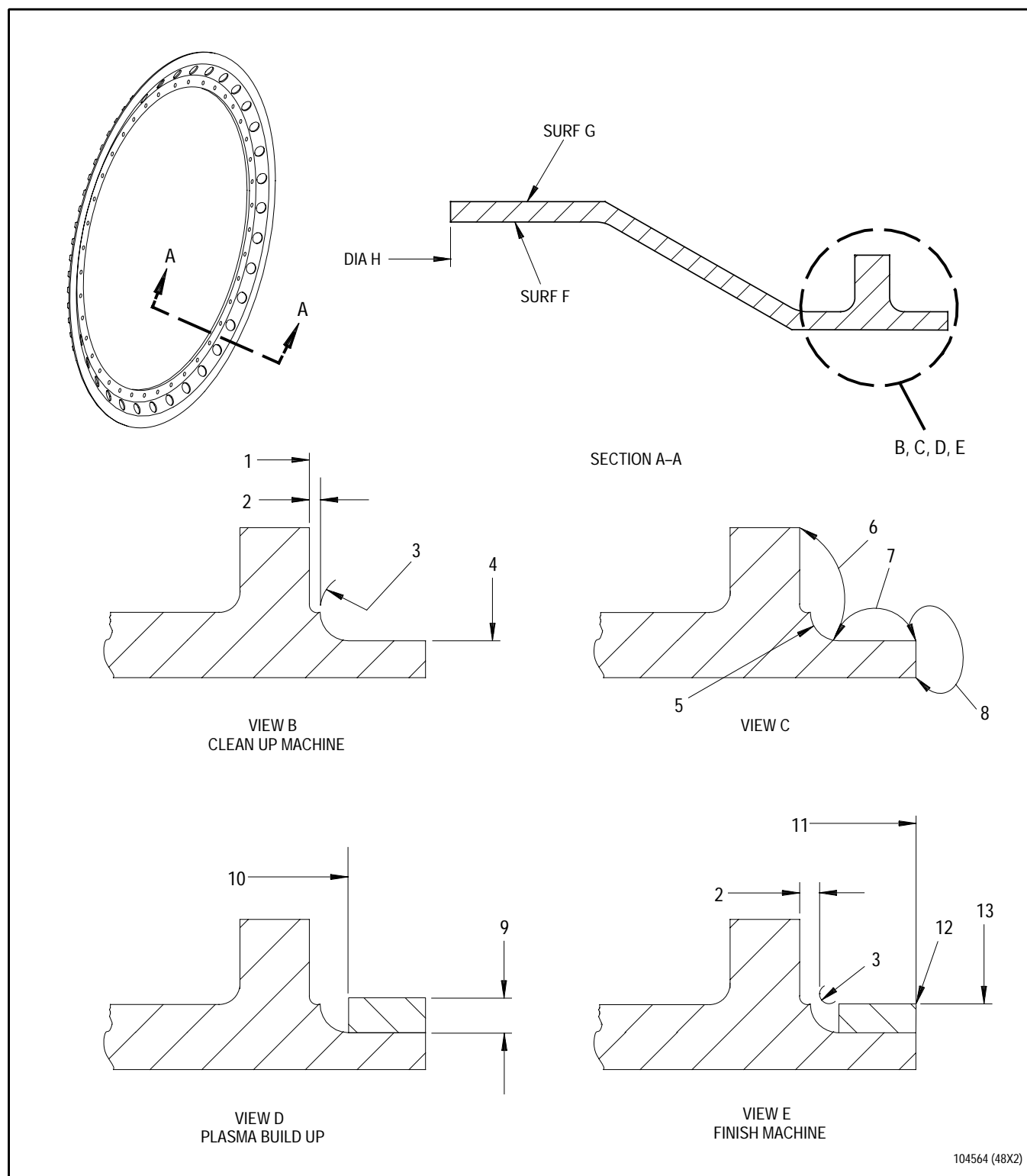
- f. Mask area(8) per SPOP 36. Refer to T.O. 2-1-111.
- g. Grit blast area(7) per SPOP 170. Refer to T.O. 2-1-111.
- h. Remove and replace masking as required to remove any trapped grit.
- i. Plasma spray area(7) per PWA 53-37. See View D. Refer to T.O. 2-1-111.
- j. Remove all masking and install shroud in PWA 71006 machining fixture per paragraph 2.
- k. Finish machine per View E. Measure dimension(13) using PWA 71012 gage.
- l. Permanently identify with beehive symbol using shallow etch in area near part number per SPOP 401. Refer to T.O. 2-1-111.

Legend for figure 3

NOTE

Unless otherwise specified, all dimensions apply when Surface G is flat within 0.003 inch, and Diameter H maintains a clearance envelope of 16.554 inch diameter in free state or constrained. Constraint contact allowed only on Surfaces G and F, and Diameter H.

- 1. 19.952 inches diameter, reference
- 2. 0.000 to 0.020 inch
- 3. 0.031 to 0.062 inch radius
- 4. 0.478 to 0.489 inch to Surface G
- 5. No grit blast or plasma spray permitted in radius
- 6. Mask per text.
- 7. Grit blast and plasma spray per text.
- 8. Mask all around per text.
- 9. 0.020 inch minimum plasma buildup
- 10. 20.140 to 20.180 inches diameter
- 11. 20.490 inches diameter, reference
- 12. Break edge 0.003 to 0.015 inch.
- 13. 0.469 to 0.475 inch to Surface G

**Figure 3. Third Stage Compressor Stator Shroud - Flange Repair**

TECHNICAL PROCEDURES

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	25

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Wet Glass Bead Blast (Suction-type Machine) (Air Force Only - Direct Pressure-type Machine Optional) - - - - -	SPOP 16
Removal of Paint, Antigallant and Varnish from Steel, Magnesium, and Titanium - - - - -	SPOP 250
Application of Antiseize Compound (PWA 36545) - - - - -	SPOP 748

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382

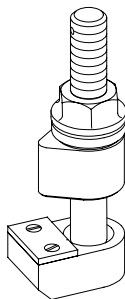
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
PIN, STRAIGHT, HEADLESS	647178	1

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR STATOR INLET SHROUD SET - PIN REPLACEMENT	
	PUSHER, PIN, REAR COMPRESSOR INLET STATOR SHROUD, -229 - - - - -	PWA 57896

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57896 -C

Figure T1. PWA 57896 PUSHER

1. INTRODUCTION.

- a. This work package contains instructions for repair of rear compressor stator inlet shroud set.

2. REAR COMPRESSOR STATOR INLET SHROUD SET - PIN REPLACEMENT.

(See Figure 1.)

NOTE

Shroud set should have been separated into two pieces during module disassembly. If not, separate pieces using 10-32 X 1.5 inch jackscrews.

- a. Using standard punch, remove pin from shroud.
- b. Discard pin.
- c. Strip antigalling compound per SPOP 250 or SPOP 16. Refer to T.O. 2-1-111.
- d. Using PWA 57896 pusher, insert new pin into hole on PN 4077450 as specified in figure 1, View B.
- e. Apply PWA 36545 antigalling compound per paragraph 3.

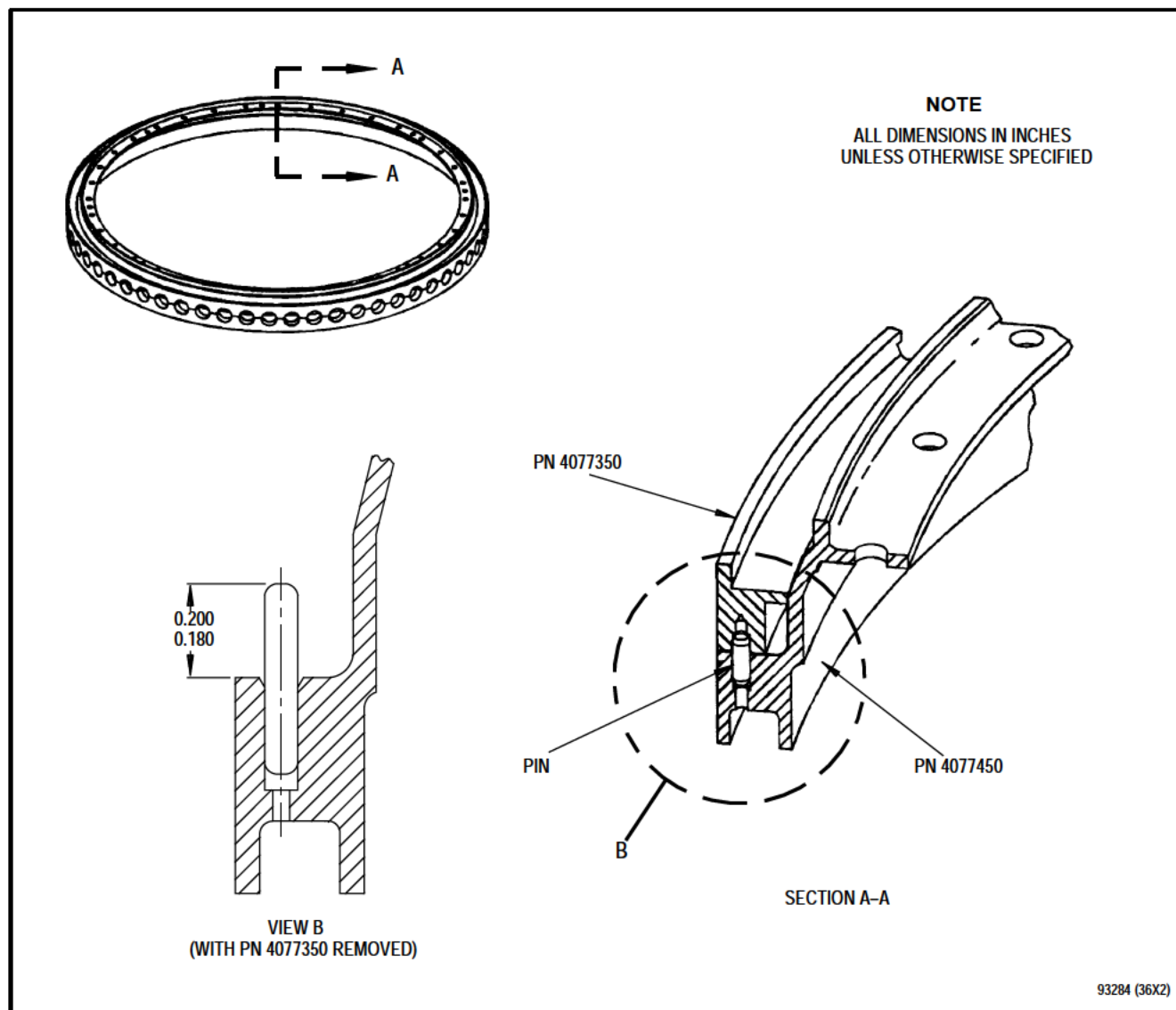
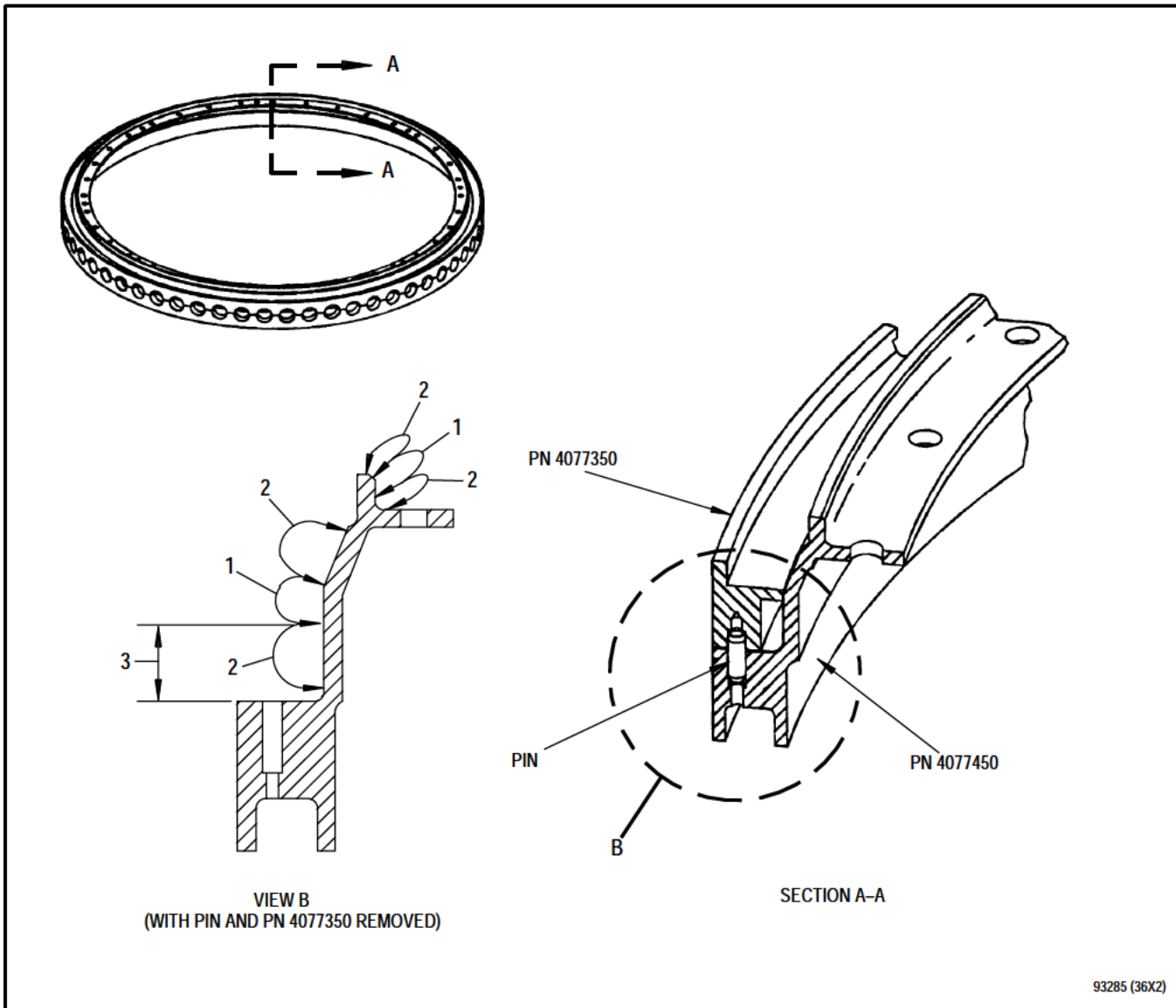


Figure 1. Rear Compressor Stator Inlet Shroud Set - Pin Replacement

3. REAR COMPRESSOR STATOR INLET SHROUD SET - ANTIGALLING COMPOUND APPLICATION.

(See Figure 2.)

- a. Apply PWA 36545 antigalling compound per SPOP 748 to areas shown in figure 2. Surface preparation is not required. Refer to T.O. 2-1-111.



93285 (36X2)

1. Apply antigalling compound per text
2. Coating optional and may be incomplete
3. 0.380 inch maximum

Figure 2. Rear Compressor Stator Inlet Shroud Set - Antigalling Compound Application

WORK PACKAGE**TECHNICAL PROCEDURES****SUPPORT ASSEMBLY, NO. 4 BEARING SEAL, FRONT -****REPAIR****EFFECTIVITY: ENGINE MODELS F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 56

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	24	21	18	38	24
2 - 3	18	22 - 28	16	39	16
4 - 6	24	29	18	40	24
6A - 6B Added	24	30 - 31	16	40A Added	24
7	24	32	24	40B Blank Added	24
8 - 12	16	33	16	41 - 44	16
13	20	34	24	45	18
14 - 15	16	34A - 34B Added	24	46	16
16	18	35 - 37	16	47	20
17 - 20	16			48 - 50	24

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking, General - - - - -	WP 023 00
Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Air Flow Check Using PWA 50047 Pneumatic Test Set - General Procedures - - - - -	WP 025 00
Air Flow Check Using Habco 1093005 Portable Air Flow Checker - General Procedures - - - - -	SWP 025 01
Cleaning, Vapor Degreasing (SPOP 3) - - - - -	SWP 031 01
Buffing, Power Denicking of Steel, Nickel, and Cobalt Parts (SPOP 533) - - - - -	SWP 091 02
Plating, Chromium, On Steel, Nickel, or Cobalt (SPOP 22)	SWP 092 06
Plating, Nickel, On Stainless Steel, Nickel, or Cobalt (SPOP 26) - - - - -	SWP 092 10
Welding, Inert Gas Fusion - - - - -	SWP 093 01
Heat Treatment: Solution, Stabilization, or Precipitation Cycles (SPOP 465) - - - - -	SWP 095 01
Plasma and Flame Spray Coating Procedures, General - - - -	WP 096 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
CLOTH, ABRASIVE CROCUS	P-C-458
COMPOUND, SEALING (PWA 36000-2) (HEAVY GRADE)	HYLOMAR PL-32
FLUID, LEAK CHECK	MIL-L-25567, TYPE I
GLOVES, NYLON	LINT-FREE
LOCKWIRE	MS 9226-04
STOPOFF	METCO ANTIBOND
TAPE, HEAT REFLECTIVE (PMC 4235)	FLUOROGLAS 2925-7 OR LAMART 390 OR 3M CO. 363
WAX, MASKING (PMC 9551)	MICRO WAX C562
WIRE, WELDING	AMS 5832, INCONEL 718

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
NUT, CLINCH	4078299	AR
PIN	4035860	AR
RIVET	AN123618	AR
RIVET	AN123637	AR

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
5	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - PIN REPLACEMENT	
	FLARING TOOL, NO. 4 BEARING SEAL PIN - - - - -	PWA 52424
6	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - CLINCH NUT REPLACEMENT	
	FLARING TOOL, NO. 10-32 SELF-LOCKING SHANK NUT - -	PWA 14266
7	NO. 4 BEARING FRONT SEAL CAST SUPPORT ASSEMBLY (PN 4074882) - SUMP (PN 4068407) REPLACEMENT	
	DRIFT, NO. 4 BEARING SUPPORT ASSEMBLY - - - - -	PWA 55147
	FIXTURE, POSITIONING, NO. 4 BEARING SUPPORT ASSEMBLY - - - - -	PWA 55137
	FIXTURE, AIR LEAK CHECK, DIFFUSER CASE OIL TUBES -	PWA 53370
	TEST SET, PNEUMATIC - - - - -	PWA 50047
		OR
	CHECKER, PORTABLE AIR FLOW - - - - -	HABCO 1093005
8	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY (Typical PN 4080082) - SUMP (PN 4053992) REPLACEMENT	
	DRILL JIG, NO. 4 BEARING SUPPORT ASSEMBLY - - - - -	PWA 55136
	DRIFT, NO. 4 BEARING SUPPORT ASSEMBLY - - - - -	PWA 55147
	FIXTURE, POSITIONING, NO. 4 BEARING SUPPORT ASSEMBLY - - - - -	PWA 55137
	FIXTURE, AIR LEAK CHECK, DIFFUSER CASE OIL TUBES -	PWA 53370
	TEST SET, PNEUMATIC - - - - -	PWA 50047
		OR
	CHECKER, PORTABLE AIR FLOW - - - - -	HABCO 1093005

APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
9	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - SUMP MATING DIAMETER NICKEL PLATING	
	FIXTURE, MACHINING, NO. 4 BEARING SEAL SUPPORT ASSEMBLY - - - - -	SAALC 8041753
	RING, SET MASTER - - - - -	SAALC 8041616
	ARBOR, GRINDING, NO. 4 BEARING SEAL SUPPORT ASSEMBLY - - - - -	SAALC 8041754
	FIXTURE, PLATING, NO. 4 FRONT BEARING SEAL SUPPORT ASSEMBLY, NICKEL PLATE - - - - -	SAALC 8041755
10	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - FRONT AIR SEALING RING MATING DIAMETER PLASMA SPRAY	
	FIXTURE, MACHINING, NO. 4 BEARING SEAL SUPPORT ASSEMBLY - - - - -	SAALC 8041753
	RING, SET MASTER - - - - -	SAALC 8041616
	MASK, GRIT BLAST PLASMA SPRAY, NO. 4 FRONT BEARING SEAL SUPPORT ASSEMBLY - - - - -	SAALC 8041756
	MASK, GRIT BLAST PLASMA SPRAY, NO. 4 BEARING SEAL SUPPORT ASSEMBLY - - - - -	SAALC 8041757
	SPOOL SET, REAR COMPRESSOR AIR SEALS, PLASMA SPRAY -	SAALC 7744900
11	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - REAR FLANGE FACE REPAIR	
	FIXTURE, MACHINING, NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY, REAR FLANGE - - - - -	PWA 71363
	FIXTURE, PLATING, NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY, REAR FLANGE - - - - -	PWA 71362
14	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - CHEVRON SEAL MATING SURFACE PLASMA SPRAY	
	FIXTURE, GRIND, NO. 4 BEARING FRONT SEAL SUPPORT, NO. 4 HOUSING DIAMETER - - - - -	PWA 71361
	FIXTURE, GRIT BLAST AND PLASMA SPRAY, BASE, NO. 4 SEAL SUPPORT, CHEVRON SEAL - - - - -	PWA 71365
	MASK, GRIT BLAST AND PLASMA, LOWER, NO. 4 SEAL SUPPORT CHEVRON SEAL - - - - -	PWA 71366
	MASK, GRIT BLAST AND PLASMA SPRAY, BASE, NO. 4 SEAL SUPPORT, CHEVRON SEAL - - - - -	PWA 71364

APPLICABLE SUPPORT EQUIPMENT (continued)

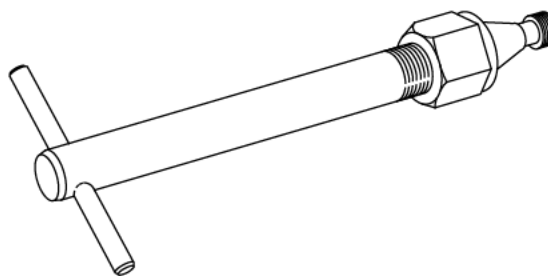
Paragraph	Function - Tool Nomenclature	Tool Number
18	NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - NO. 4 BEARING HOUSING MATING DIAMETER CHROMIUM PLATING	
	FIXTURE, GRIND, NO. 4 BEARING FRONT SEAL SUPPORT, NO. 4 HOUSING DIAMETER - - - - -	PWA 71361
	FIXTURE, PLATING, NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY, NO. 4 HOUSING DIAMETER - - - - -	PWA 71360

ILLUSTRATED SUPPORT EQUIPMENT



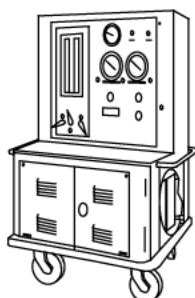
HABCO 1093005 -C

Figure T1. HABCO 1093005 CHECKER



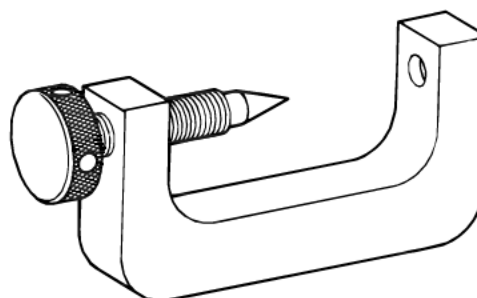
PWA 14266 -C

Figure T2. PWA 14266 FLARING TOOL



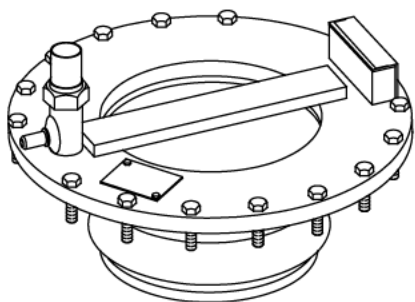
PWA 50047 -C

Figure T3. PWA 50047 TEST SET



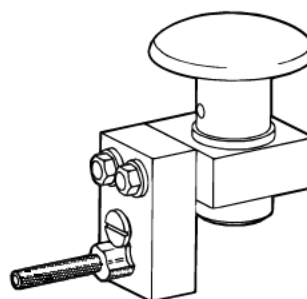
PWA52424-C

Figure T4. PWA 52424 FLARING TOOL



PWA 53370 -C

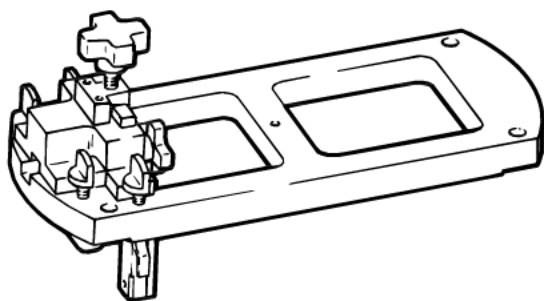
Figure T5. PWA 53370 FIXTURE



PWA 55136 -C

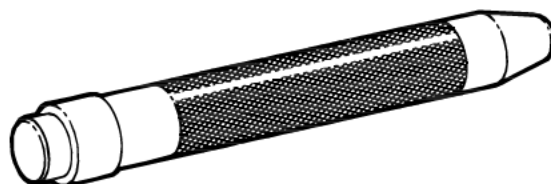
Figure T6. PWA 55136 DRILL JIG

ILLUSTRATED SUPPORT EQUIPMENT (continued)



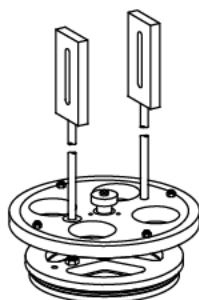
PWA 55137 -C

Figure T7. PWA 55137 FIXTURE



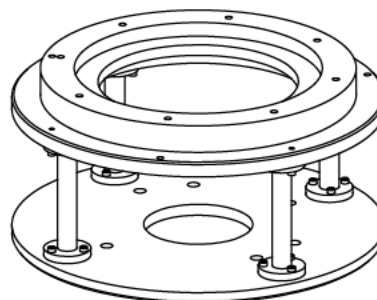
PWA 55147 -C

Figure T8. PWA 55147 DRIFT



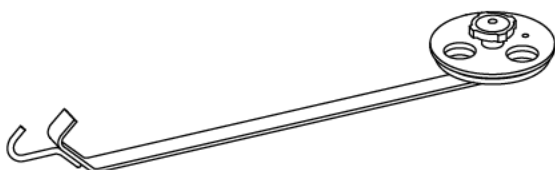
PWA 71360 -C

Figure T9. PWA 71360 FIXTURE



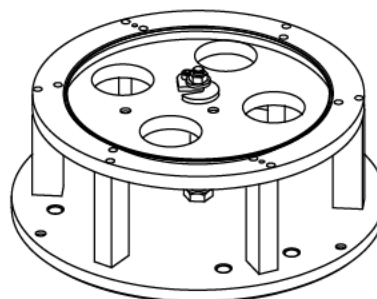
PWA 71361 -C

Figure T10. PWA 71361 FIXTURE



PWA 71362 -C

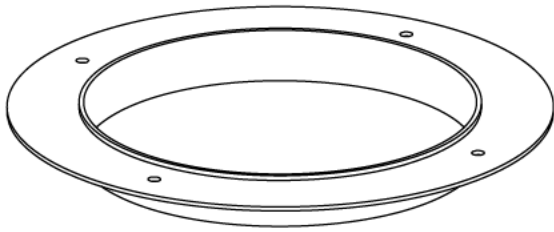
Figure T11. PWA 71362 FIXTURE



PWA 71363 -C

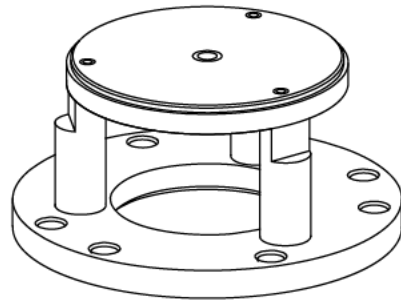
Figure T12. PWA 71363 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



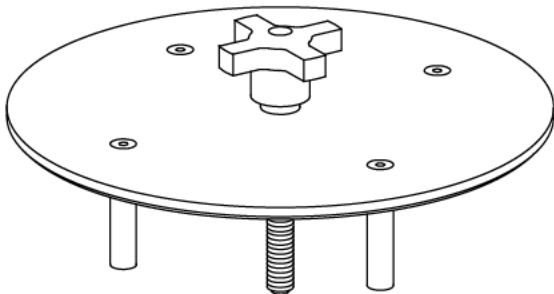
PWA 71364 -C

Figure T13. PWA 71364 MASK



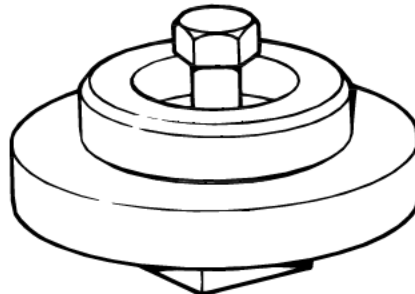
PWA 71365 -C

Figure T14. PWA 71365 FIXTURE



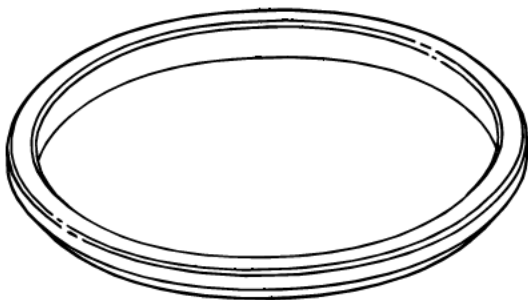
PWA 71366 -C

Figure T15. PWA 71366 MASK



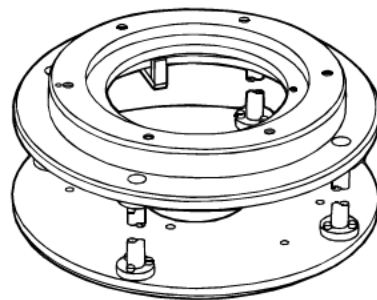
SAALC 7744900 -C

Figure T16. SAALC 7744900 SPOOL SET



SAALC 8041616 -C

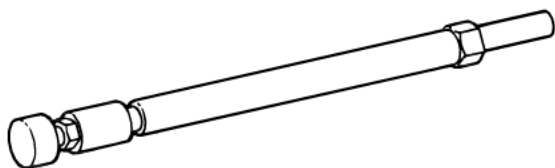
Figure T17. SAALC 8041616 RING



SAALC 8041753 -C

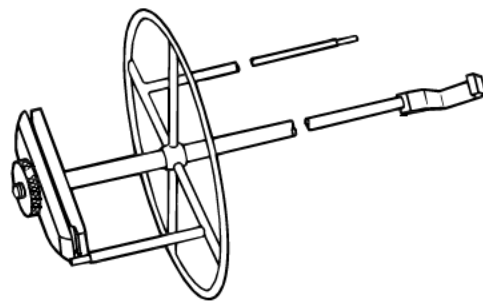
Figure T18. SAALC 8041753 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



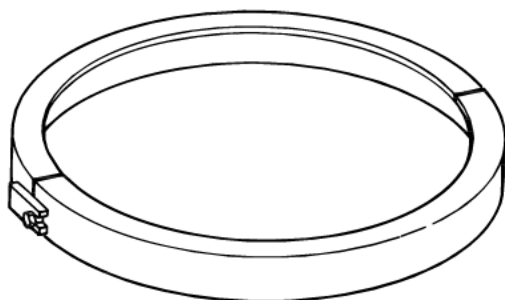
SAALC 8041754 -C

Figure T19. SAALC 8041754 ARBOR



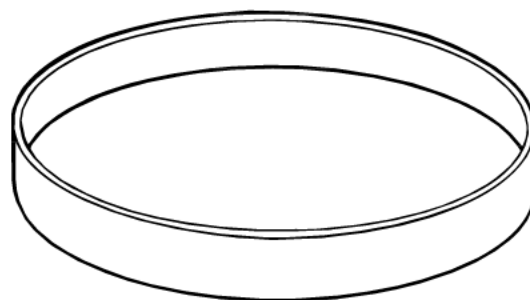
SAALC 8041755 -C

Figure T20. SAALC 8041755 FIXTURE



SAALC 8041756 -C

Figure T21. SAALC 8041756 MASK



SAALC 8041757 -C

Figure T22. SAALC 8041757 MASK

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing front seal support assembly.

2. GENERAL.

(See Figure 1.)

- a. Refer to figure 1 for repair index.

3. NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - PIN POLISHING.

- a. Hand polish pin with fine crocus cloth P-C-458. Polish in direction lengthwise with respect to pin.
- b. Pin diameter shall not be reduced more than 0.002 inch.

Legend for figure 1

Index No.	Type Repair	Paragraph
1.	Blend	4
2.	Replacement	6
3.	Polish	12
	Plasma spray	14
4.	Plasma spray	13
5.	Nickel Plate	11
6.	Replacement	
	Bolted sump PN 4068407 - - - - -	7
	Pinned sump PN 4053992 - - - - -	8
7.	Blend	4
	Weld	16
8.	Polish	3
	Replacement	5
9.	Plasma spray	10
10.	Blend	4
	Weld	17
11.	Nickel plate	9
12.	Chromium plate	18
13.	Blend	4
	Weld	16
14.	Machine piston ring oversize	15

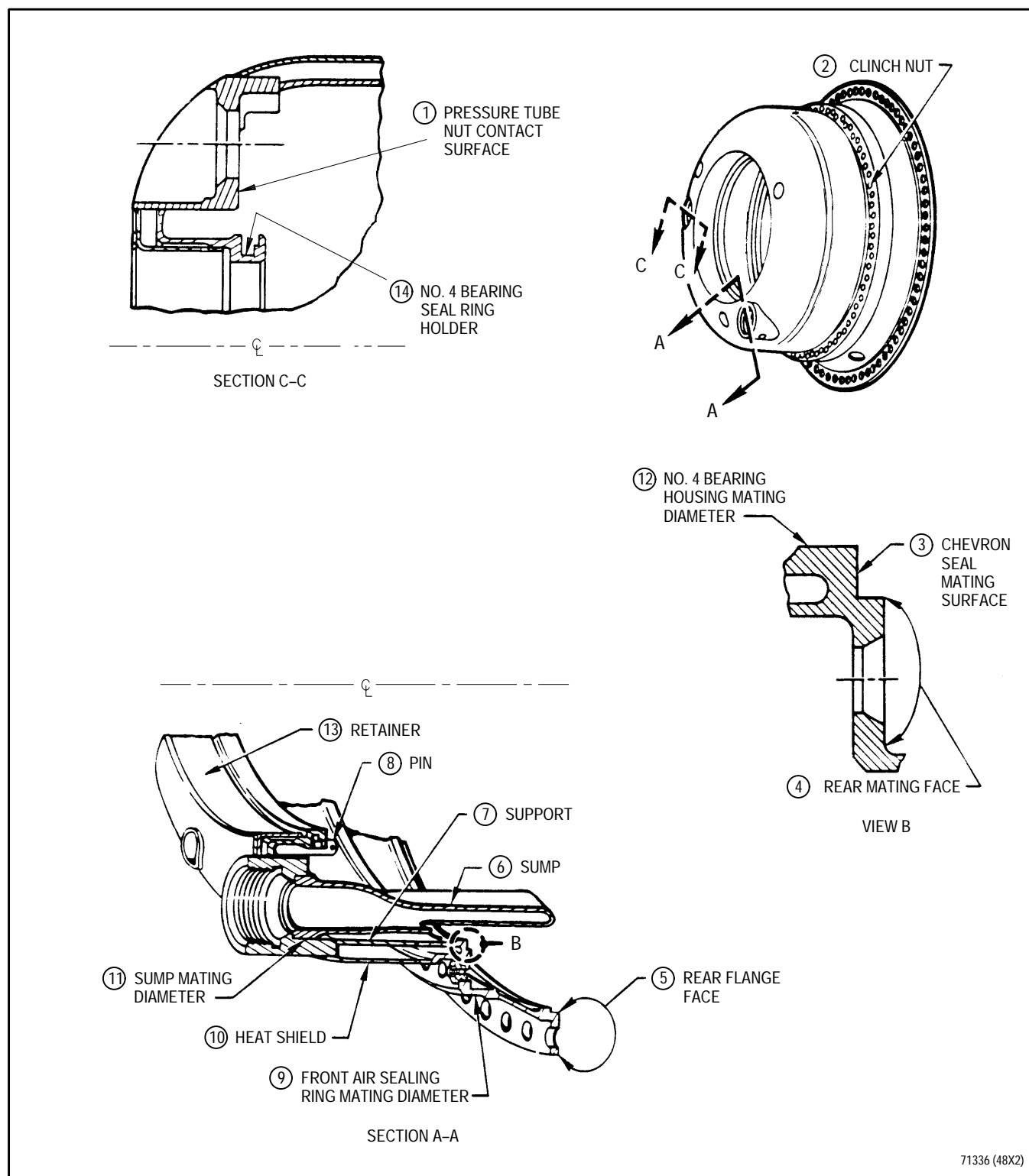


Figure 1. No. 4 Bearing Front Seal Support - Repair

**4. NO. 4 BEARING FRONT SEAL SUPPORT -
ASSEMBLY - BLEND REPAIR.**

(See Figure 2.)

- a. Blend damage within limits of figure 2 per T.O. 2J-F100-53-1, SWP 091 02 (SPOP 533).

(1) Eight repairs allowed per surface.

(2) 0.250 inch minimum shall exist between repairs.

(3) Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 82). No cracks allowed.

Legend for figure 2

	Area	Condition	Limits
1.	Conical seat	Nicks, dents	Not reparable
2.	Pressure tube nut contact	Nicks, dents, scratches	Up to 0.050 inch deep. Blend per paragraph 4.
3.	Chevron seal mating surface	Scratches or galling caused by metal seal edges	Pocket depth shall not exceed 0.112 inch. Polish per paragraph 12.
4.	Heat shield	Nicks, cracks, scratches and gouges with sharp indentations	Up to 0.010 inch depth. Blend per paragraph 4.
5.	Support	Nicks, cracks, scratches and gouges with sharp indentations	Up to 0.010 inch deep. Blend per paragraph 12.
6.	Pin	Wear	Diameter shall not be reduced more than 0.002 inch. Polish per paragraph 3.
7.	Retainer	Nicks, cracks, scratches and gouges wire sharp indentations	Up to 0.010 inch deep. Blend per paragraph 4.
	Areas other than 1 through 7	Nicks, cracks, scratches	Up to 0.025 inch deep. Blend per paragraph 4.

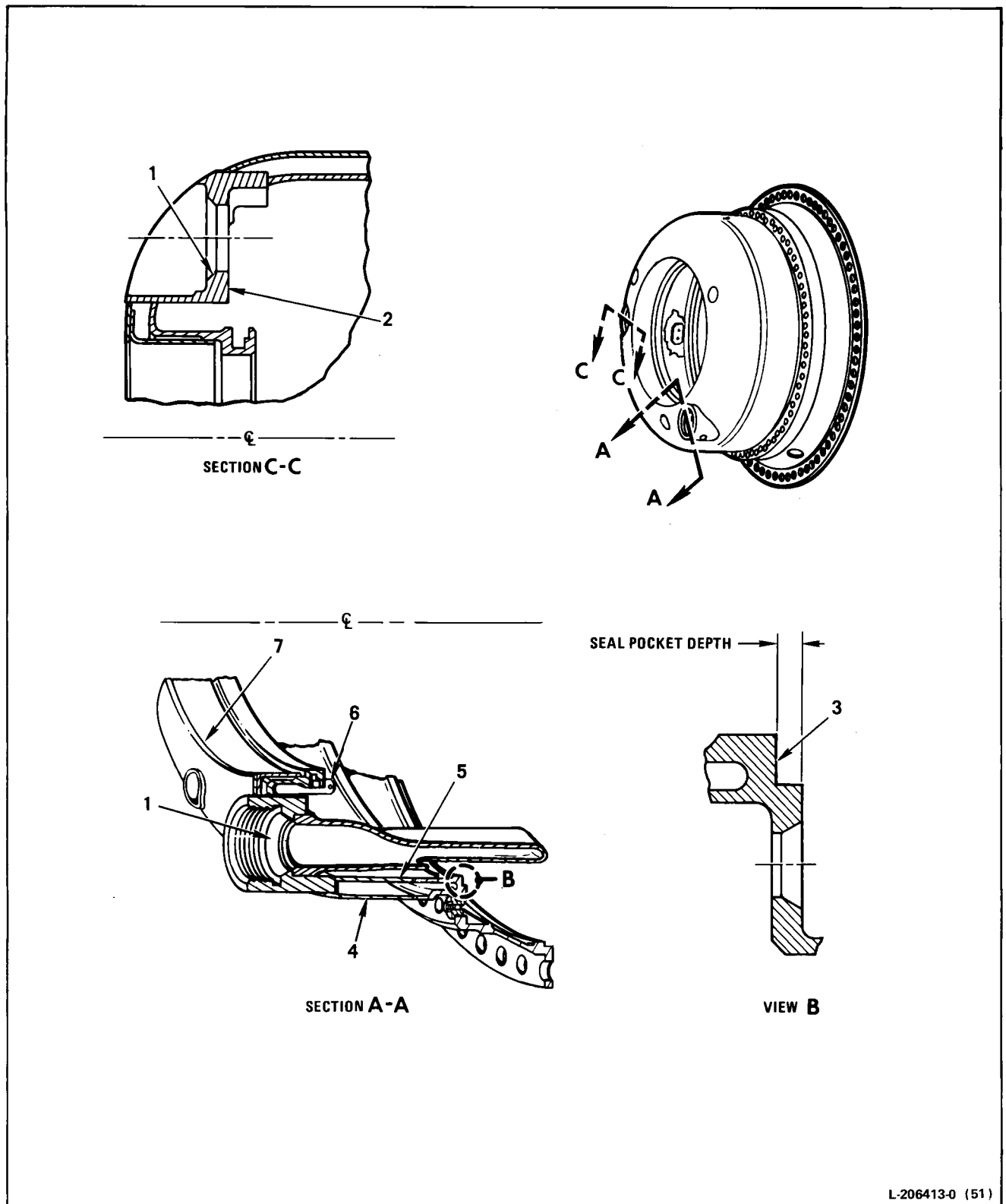


Figure 2. No. 4 Bearing Seal Support Assembly - Blend Repair

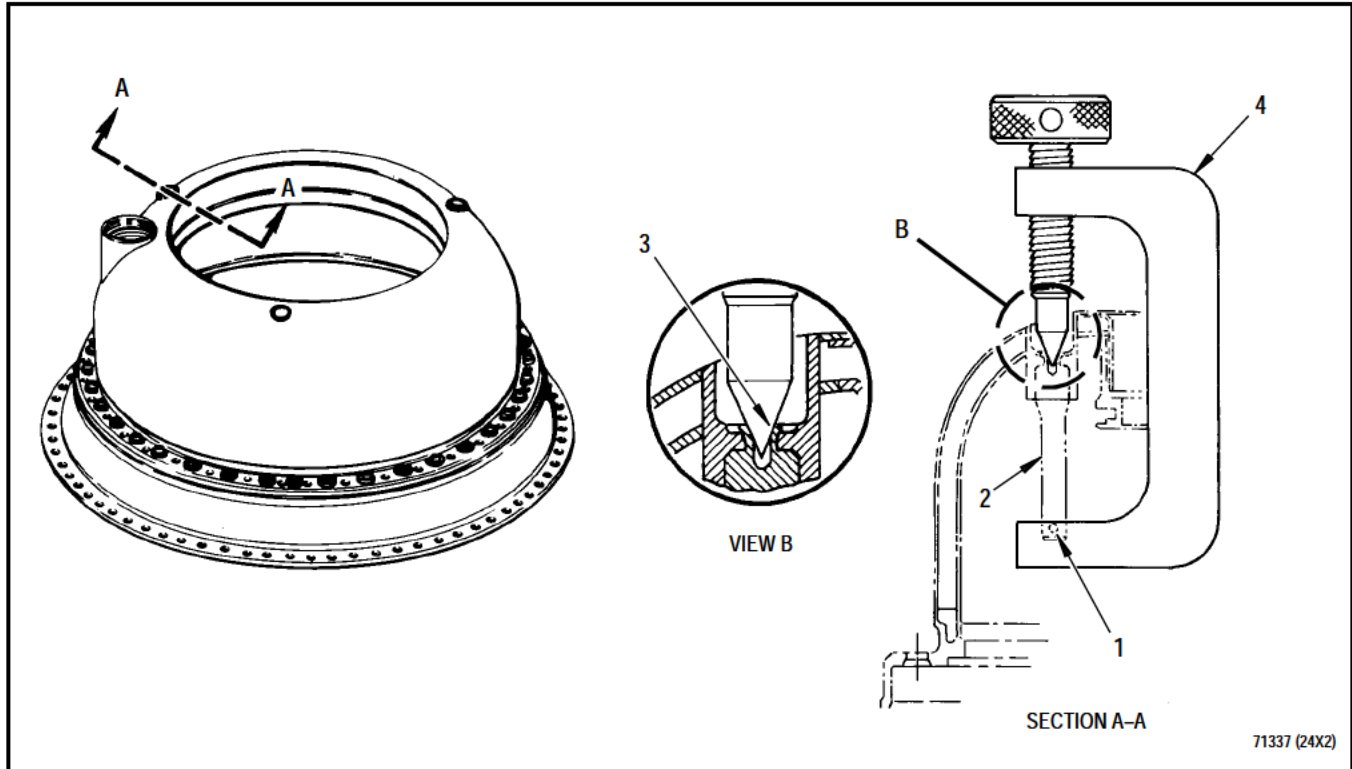
5. NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - PIN REPLACEMENT.

(See Figure 3.)



Do not hammer pins to remove them. Hammering may damage seal support assembly rendering part unserviceable.

- a. Remove unserviceable pin by drilling flared end. Press pins out.
- b. Chill replacement pin in dry ice for 30 minutes.
- c. Install pin. Use PWA 52424 flaring tool to flare pin as shown. (See figure 3.)



1. Assemble pins so that these holes are located as shown within 5° of true position.
2. PN 4035860 Pin, 3 required.
3. Flare securely. 30° ±5° inclusive with pin bottomed.
4. PWA 52424 flaring tool.

Figure 3. No. 4 Bearing Front Seal Support Assembly - Pin Replacement

**6. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - CLINCH NUT REPLACEMENT.**

(See Figure 4.)

- a. Remove damaged clinch nut as follows:



Failure to prevent drilling into support material when removing nut may damage seal support assembly rendering part unserviceable.

- (1) Use standard tools to drill out flare of clinch nut.
- (2) Use punch and mallet to remove clinch nut entirely.
- (3) Ensure clinch nut hole is not damaged.

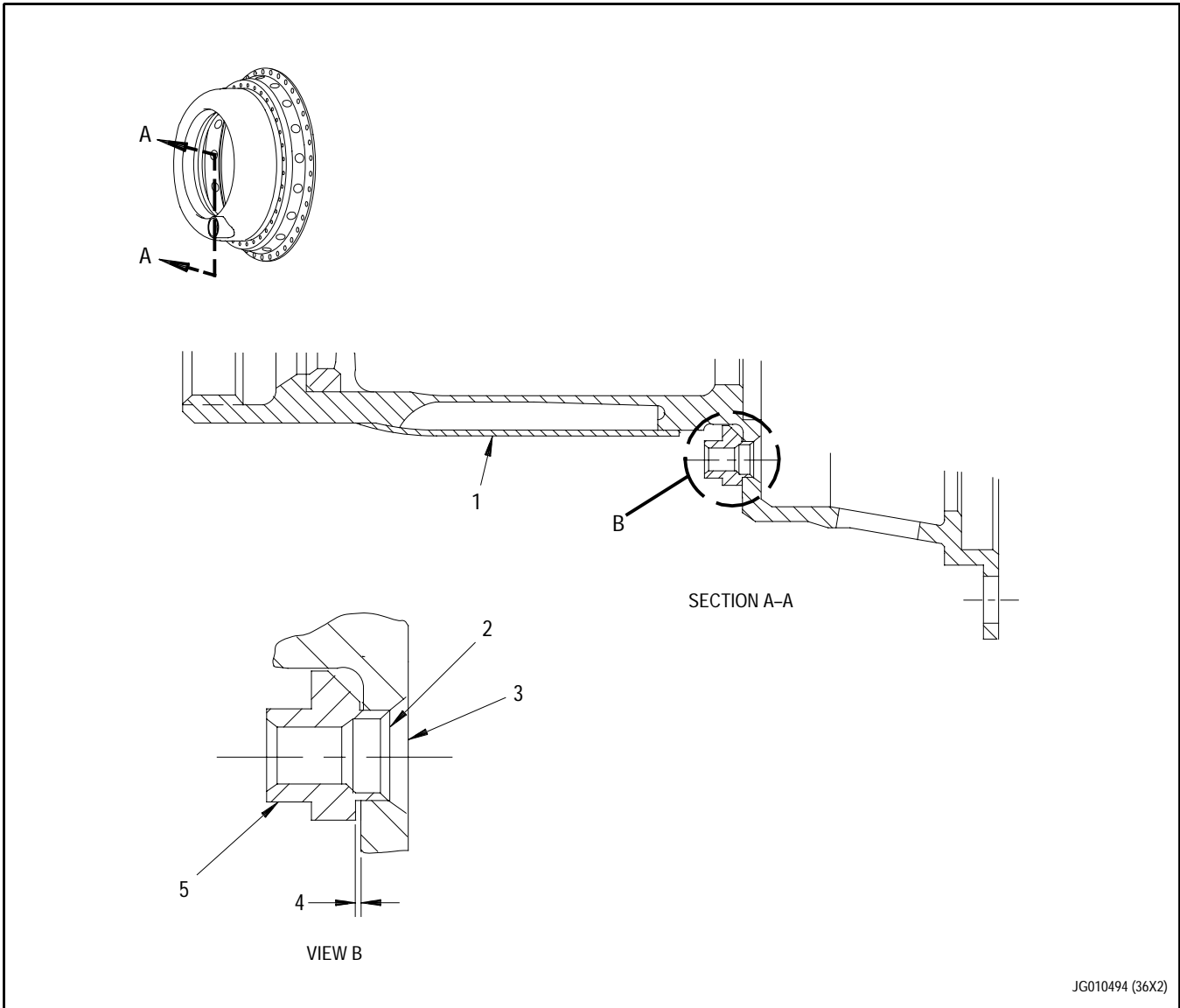
- b. Install new clinch nut as follows:

- (1) Position clinch nut in hole of support with antirotation feature of nut against wall of support.



Failure to prevent threading flaring tool into self-locking feature of nut will result in damage to nut.

- (2) Install PWA 14266 flaring tool into clinch nut. Do not thread flaring tool into self-locking feature of nut.
 - (3) Tighten nut detail of flaring tool, while holding T-handle, to flare end of clinch nut.
 - (4) Remove flaring tool. Ensure flare of nut meets requirements of figure 4.
- c. Repeat procedure for remaining damaged clinch nuts.



1. No. 4 bearing front seal support
2. Flared nut shank
3. Nut shank will be 0.010 inch minimum below this surface after flaring.
4. 0.000 to 0.010 inch
5. Clinch nut

Figure 4. No. 4 Bearing Front Seal Support Assembly - Clinch Nut Replacement

**7. NO. 4 BEARING FRONT SEAL CAST
SUPPORT ASSEMBLY (PN 4074882) -
SUMP (PN 4068407) REPLACEMENT.**

(See Figure 5.)

- a. Support seal support assembly on flange C.
- b. Remove bolt(4, figure 5) and washer(5).
- c. Remove sump assembly(2) using PWA 55147 drift. Retain sump for reinstallation after repair.
- d. Clean boss and inside diameter per WP 201 00.
- e. Install sump assembly(2) in boss of support assembly as follows:
 - (1) Install support assembly in PWA 55137 fixture.
 - (a) Remove detail-14 assembly from PWA 55137 fixture by loosening four half-turn screws.
 - (b) Place detail-1 locating plate on bench with half-turn screws down.
 - (c) Place support assembly flange down on locating plate, aligning sump boss with keyway on locating plate.
 - (d) Install and tighten four socket head cap screws.
 - (2) Heat locating plate of PWA 55137 fixture and support assembly in oven at 500°F (260°C) for 30 minutes.
 - (3) Place sump assembly(2) in detail-14 sump holding assembly of PWA 55137 fixture and secure with holding clamp.
 - (4) Chill end of sump assembly(2) in dry ice for 30 minutes.

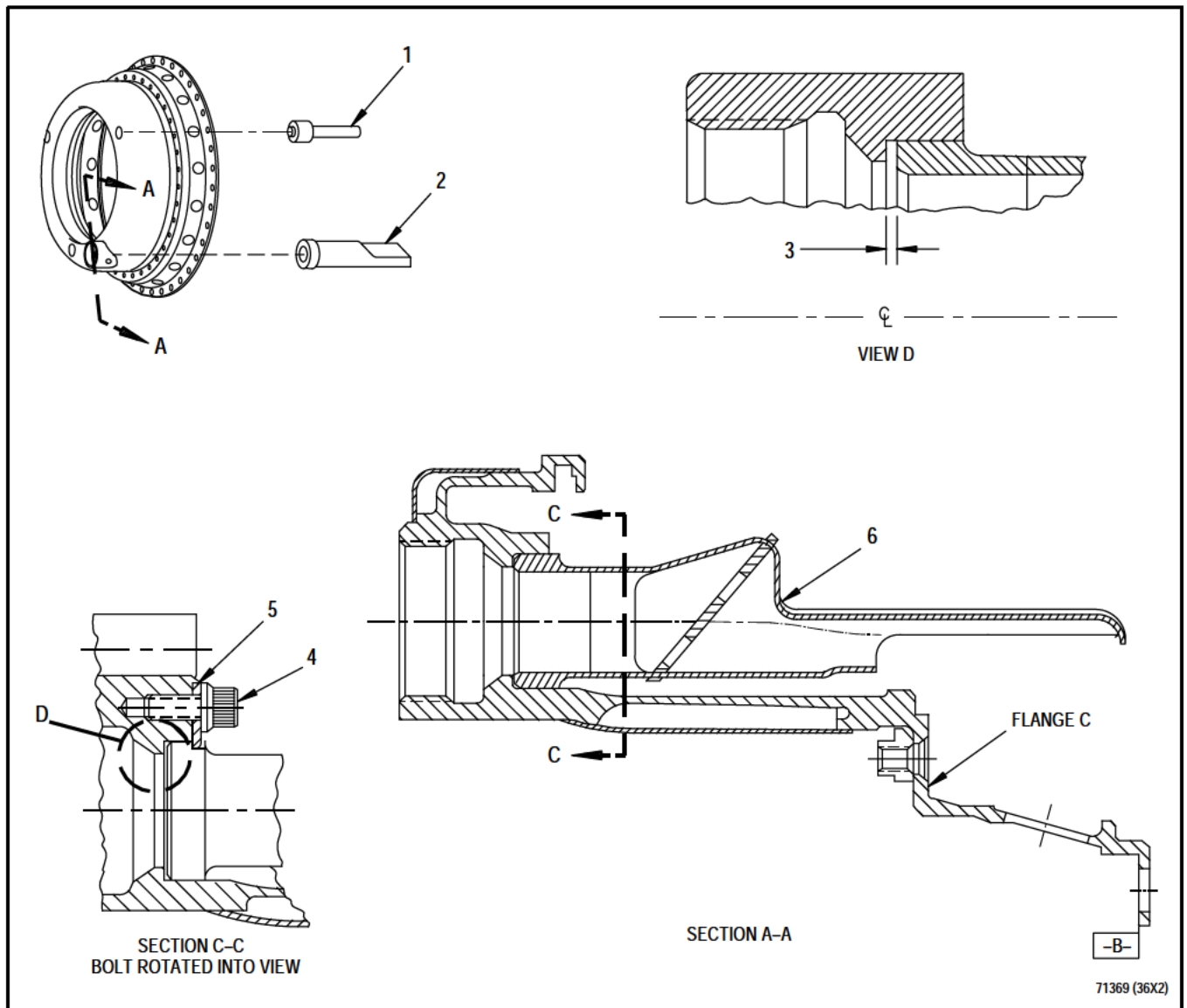
NOTE

The hand knob screw on sump holding detail is used only to support sump assembly(2) after installation in support assembly, and is not to be used to force sump assembly into support assembly.

- (5) Work quickly to install sump assembly(2) and holding detail onto locating plate. Secure half-turn and move slide and sump assembly(2) into boss of support assembly until slide bottoms.
- (6) Handtighten knob screw to hold sump assembly(2) in position. Allow temperatures to normalize.
- (7) Remove detail-14 holding assembly of PWA 55137 fixture.
- (8) Inspect seating dimension(3).
- (9) Reinstall washer and bolt. Lockwire in place with MS9226-04 lockwire.

f. Perform leak test as follows:

- (1) Install PWA 53370 fixture onto rear of support assembly. Align offset boltholes at 12 o'clock and secure with bolts provided.
- (2) Attach air supply and pressure gage line from PWA 50047 test set or Habco 1093005 checker to appropriate fittings on PWA 53370 fixture.
- (3) Refer to T.O. 2J-F100-53-1, WP 025 00 for PWA 50047 test set operating instructions or SWP 025 01 for Habco 1093005 checker operating instructions.
- (4) Apply 10 psig air to pressurize support assembly.
- (5) Apply MIL-L-25567 leak check fluid to sump retaining pin plug weld, No. 4 bearing internal pressure tube fitting, and No. 4 bearing left scavenge tube fitting. No leakage allowed.



1. Pin
2. No. 4 bearing sump assembly
3. 0.000 to 0.005 inch seating dimension
4. Bolt, PN 4038010 (Lockwire MS9226-04)
5. Washer, PN 4076772
6. No. 4 bearing sump assembly installed

Figure 5. No. 4 Bearing Front Seal Cast Support Assembly (PN 4074882) - Sump (PN 4068407) Replacement.

**8. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY (Typical PN 4080082) -
SUMP (PN 4053992) REPLACEMENT.**

(See Figures 6 and 7.)

NOTE

- Support assembly may have pin installed in either right or left hand position at an angle of 30 degrees or 45 degrees. See figure 7, sheet 1.
- If plug weld is visible instead of pin hole, machine weld and remove rivet. Perform step d. of this procedure to remove sump. Proceed to step m. for sump installation.
 - a. Remove stake(4, figure 6).
 - b. Attempt to shake pin(6) out of support assembly.
 - c. If pin(6) will not fall out, use PWA 55136 drill jig and drill out pin. Maintain dimensions per figure 6. Do not drill into support assembly wall.
 - d. Support seal support assembly on Flange C. Ensure pin(6) is removed and remove sump assembly(8) using PWA 55147 drift.

NOTE

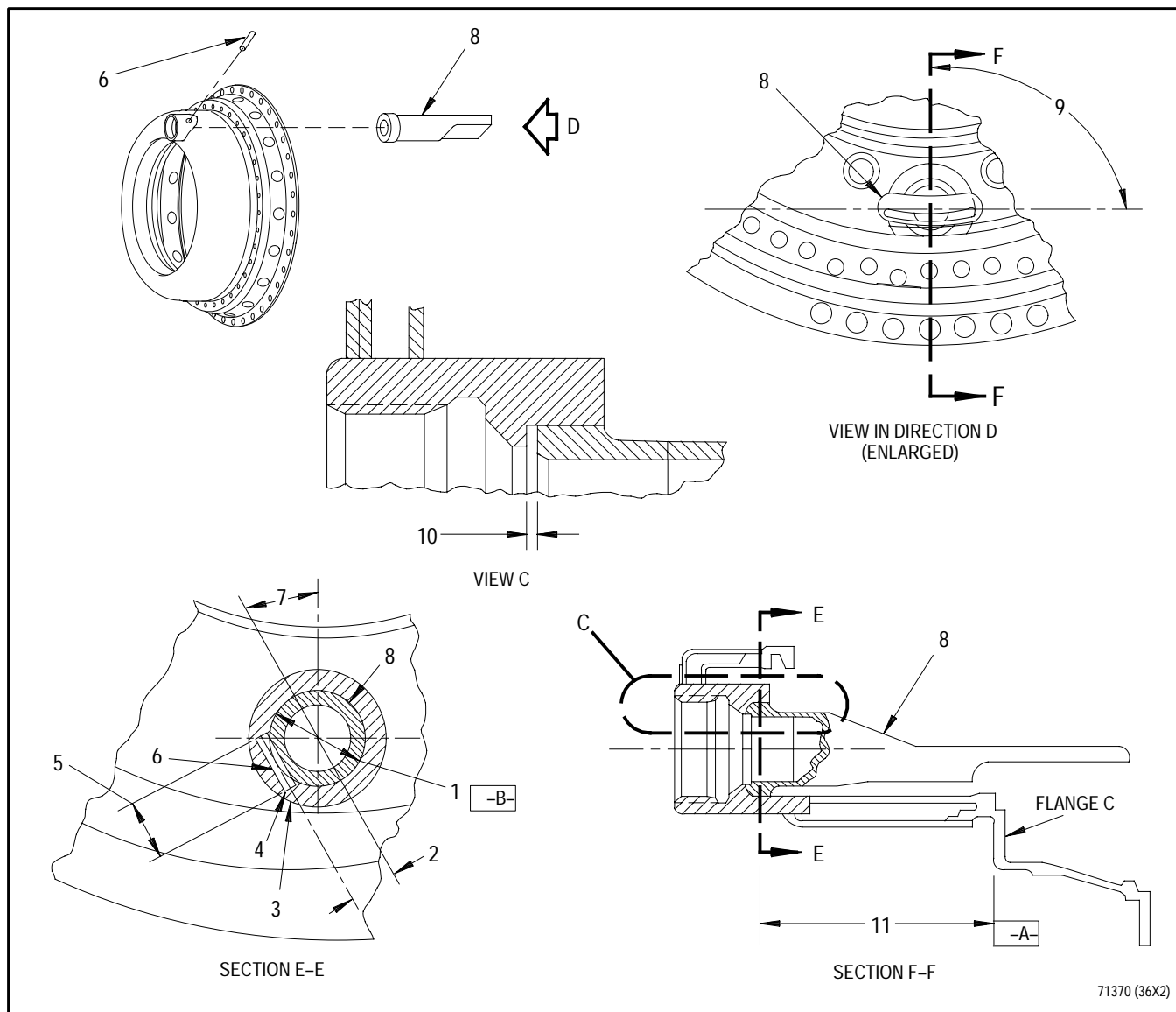
If weld repair affects a plated surface or plating surface temperature exceeds 750°F (399°C), plating shall be stripped. Strip nickel plating Refer to T.O. 2J-F100-53-1, SWP 092 10. Strip chromium plating. Refer to T.O. 2J-F100-53-1, SWP 092 06.

- e. Clean boss and Diameter B per WP 201 00.

NOTE

If support passed leak test prior to weld repair, only outboard end of pin hole an outboard end of slot in boss ID will require weld closure after pin removal.

- f. Place protective disk in support assembly boss. See figure 7, sheet 2.
- g. Manual gas tungsten arc (TIG) plug weld pin hole. Use AMS 5832 filler metal. Parent material of boss is AMS 5662 nickel alloy. Weld prep for access is permissible. See figure 7, sheet 3.



- | | |
|---|---|
| 1. 1.0000 to 1.0005 inch diameter reference | 7. 30° or 45° |
| 2. 0.520 inch | 8. No. 4 bearing sump assembly |
| 3. Machine to 0.142 inch maximum diameter | 9. 90° ±2° |
| 4. Stake | 10. 0.000 to 0.005 inch seating dimension |
| 5. 0.840 to 0.860 inch | 11. 2.838 inch |
| 6. Pin | |

Figure 6. No. 4 Bearing Front Seal Support Assembly - Sump Replacement

- h. Heat treat weld area. Refer to T.O. 2J-F100-53-1, SWP 095 01 (SPOP 465) except heat treat part locally instead of in an oven.
- i. Remove protective disk.
- j. Machine boss ID as shown in figure 7, sheet 3 removing weld material only. Use SAALC 8041616 set master ring and SAALC 8041753 machining fixture.
- k. Fluorescent penetrant inspect weld areas. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.
- l. Replate surfaces stripped prior to weld repair. Refer to paragraph 9.
- m. Install sump assembly(8, figure 6) in boss of support assembly as follows:
 - (1) Install support assembly in PWA 55137 fixture.
 - (a) Remove detail-14 assembly from PWA 55137 fixture by loosening four half-turn screws.
 - (b) Place detail-1 locating plate on bench with half-turn screws down.
 - (c) Place support assembly flange down on locating plate, aligning sump boss with keyway on locating plate.
 - (d) Install and tighten four socket head cap screws.
 - (2) Heat locating plate of PWA 55137 fixture and support assembly in oven at 500°F (260°C) for 30 minutes.
 - (3) Place sump assembly(8) in detail-14 sump holding assembly of PWA 55137 fixture and secure with holding clamp.
 - (4) Chill end of sump assembly(8) in dry ice for 30 minutes.

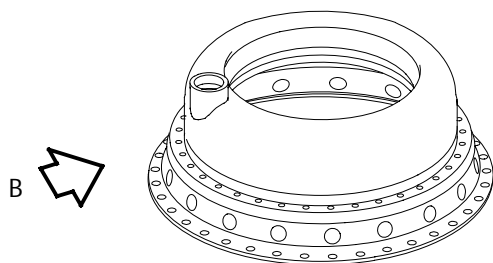
NOTE

The hand knob screw on sump holding detail is used only to support sump assembly(8) after installation in support assembly, and is not to be used to force sump assembly into support assembly.

- (5) Work quickly to install sump assembly(8) and holding detail onto locating plate. Secure half-turn and move slide and sump assembly(8) into boss of support assembly until slide bottoms.

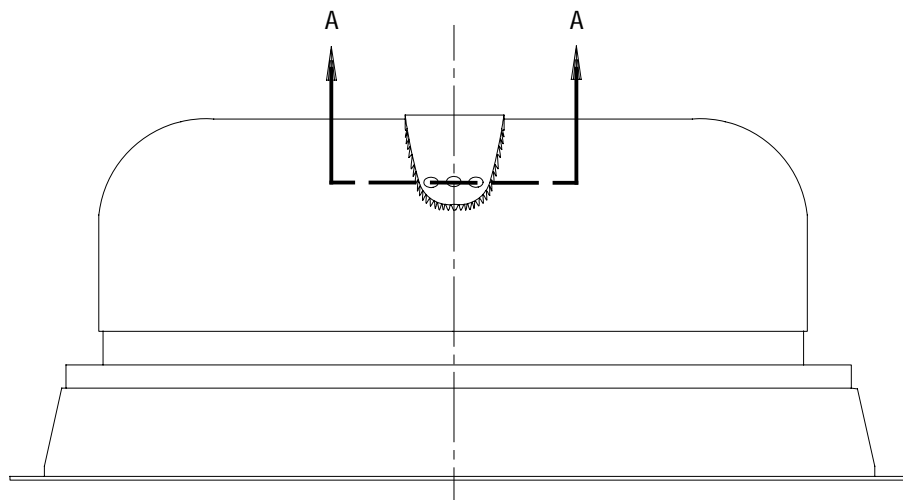
- (6) Handtighten knob screw to hold sump assembly(8) in position. Allow temperatures to normalize.
- (7) Remove detail-14 holding assembly of PWA 55137 fixture.
- (8) Inspect seating dimension(10).
- n. Drill 0.128 to 0.132 inch diameter hole(4, figure 7, sheet 4) and countersink(6).
- o. Clean rivet(3) and hole. Refer to WP 201 00.
- p. Insert PN AN123637 rivet(3) into hole until firmly seated. Head of rivet should not protrude from hole.
- q. Manual gas tungsten arc (TIG) plug weld rivet head. Use AMS 5832 filler metal. Parent material of boss is AMS 5662 nickel alloy. Refer to figure 7, sheet 4.
- r. Heat treat weld area. Refer to T.O. 2J-F100-53-1, SWP 095 01 (SPOP 465) except heat treat part locally instead of in an oven.
- s. Machine plug weld to requirements of figure 7, sheet 4.
- t. Fluorescent penetrant inspect weld areas. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.
- u. Perform leak test as follows:
 - (1) Locally manufacture plugs from scrapped No. 4 bearing internal pressure tube and No. 4 bearing left scavenge tube.
 - (2) Install No. 4 bearing internal pressure tube plug and No. 4 bearing left scavenge tube plug into appropriate port in No. 4 bearing front seal support assembly.
 - (3) Install PWA 53370 fixture onto rear of support assembly. Align offset boltholes at 12 o'clock and secure with bolts provided.
 - (4) Attach air supply and pressure gage line from PWA 50047 test set or Habco 1093005 checker to appropriate fittings on PWA 53370 fixture.
 - (5) Refer to T.O. 2J-F100-53-1, WP 025 00 for PWA 50047 test set operating instructions or SWP 025 01 for Habco 1093005 checker operating instructions.
 - (6) Apply 10 psig air to pressurize support assembly.
 - (7) Apply MIL-L-25567 leak check fluid to sump retaining pin plug weld, No. 4 bearing internal pressure tube fitting, and No. 4 bearing left scavenge tube fitting. No leakage allowed.

v.

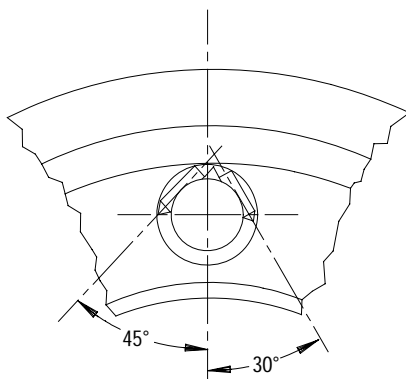


NOTE

- IF HOLE IS LEFT OR RIGHT OF CENTER ADJACENT TO WELD BEAD, THIS INDICATES A 30° PIN HOLE.
- IF HOLE IS NEAR CENTER OF AREA BETWEEN WELDS, HOLE IS DRILLED AT 45°.



VIEW IN DIRECTION B



SECTION A-A
(BEFORE REPAIR)

FG143 (51X2)

Figure 7. No. 4 Bearing Front Seal Support Assembly - Weld Repair (Sheet 1 of 4)

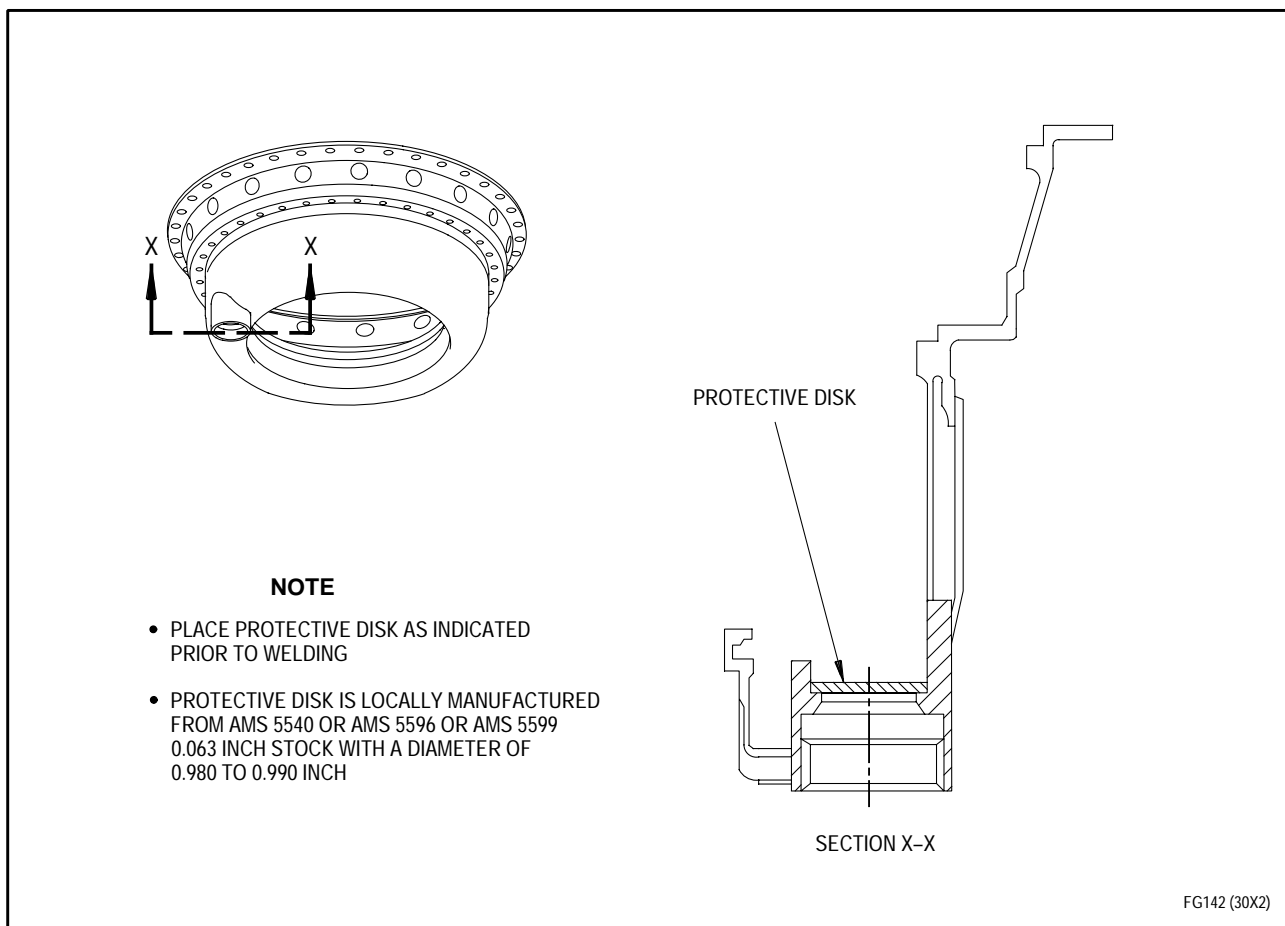


Figure 7. No. 4 Bearing Front Seal Support Assembly - Weld Repair (Sheet 2 of 4)

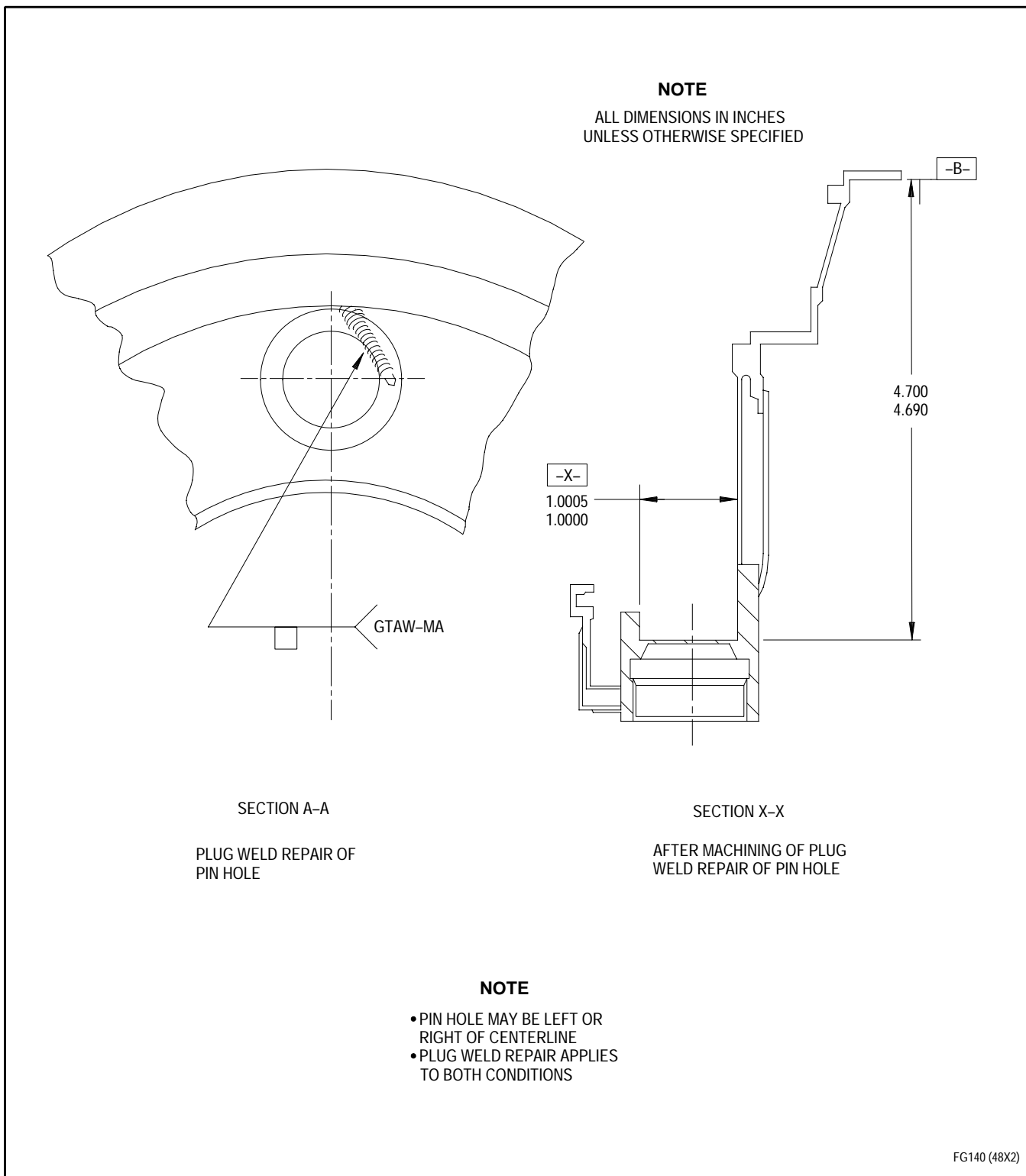
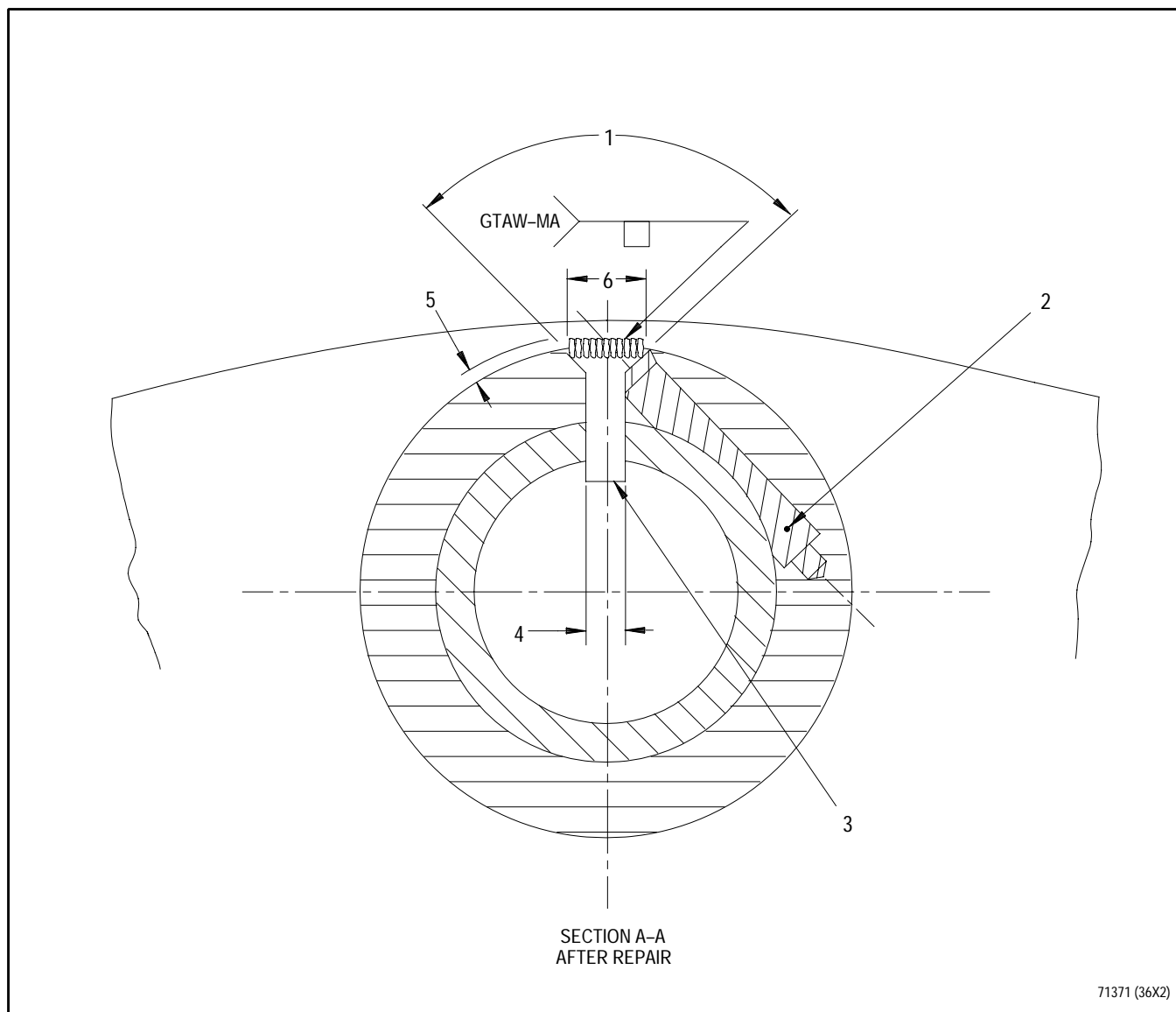


Figure 7. No. 4 Bearing Front Seal Support Assembly - Weld Repair (Sheet 3 of 4)



1. 98°30' to 101°30'
2. Existing hole plug welded - maybe left or right of centerline
3. Rivet PN AN123637
4. 0.128 to 0.132 inch diameter hole
5. 0.030 inch maximum
6. 0.290 to 0.300 inch diameter (countersink)

Figure 7. No. 4 Bearing Front Seal Support Assembly - Weld Repair (Sheet 4 of 4)

**9. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - SUMP MATING DIAMETER NICKEL
PLATING.**

(See Figure 8.)

- a. Remove sump and its retaining pin per paragraph 8 or sump with bolt per paragraph 7. Retain sump for reinstallation.

- b. Machine Diameter S per figure 8 and as follows:

- (1) Place SAALC 8041753 fixture onto machining table.

NOTE

Adjust actuating screw only when master or support assembly is installed.

- (2) Install SAALC 8041616 master into fixture ID. Turn actuating screw while rotating master by hand until secure.
- (3) Centralize fixture on machine table by indicating on master. When desired runout is obtained, secure fixture.
- (4) Remove master and place support in fixture front or small end down, so that outer front Diameter A engages fixture chuck and 0.202 to 0.203 inch diameter flange hole engages detail-10 diamond pin.

- (5) Actuate hydraulic chuck until screw bottoms.

- (6) Install SAALC 8041754 grinding arbor in spindle of No. 3 Moore jig grinder.

- (7) Machine Diameter S to dimensions specified prior to finishing.

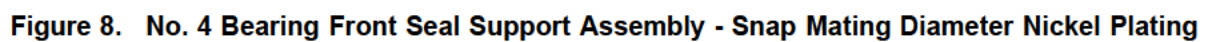
- (8) Remove support from machining setup.

- c. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 62. No cracks allowed.

- d. Using SAALC 8041755 fixture, nickel plate support as follows:

- (1) Assemble detail-1 locating assembly, detail-4 anode assembly, detail-5 hook assembly and detail-6 bushing of fixture.

- (2) Apply PMC 4235 heat reflective tape, to support surfaces to be plated, so that hot wax dip will not coat repair area. (See figure 8.)



- (3) Install previously assembled fixture details onto support rear ID. Engage locating assembly with support ID and anode assembly, engaging Diameter T.
 - (4) Install detail-3 clamp over locating assembly and into ID of support.
 - (5) Thread detail-2 knurled nut onto locating assembly and against clamp to secure.
 - (6) Dip entire assembly in hot wax as required.
 - (7) Remove masking material and check anode assembly in Diameter T. Adjust as necessary.
 - (8) Immerse assembly into nickel plate tank, engaging hook onto tank bus bar. Refer to T.O. 2J-F100-53-1, SWP 092 10(SPOP 26).
 - (9) Attach anode lead to contact and nickel plate to Dimension U. Refer to T.O. 2J-F100-53-1, SWP 092 10.
 - (10) Remove support from plating setup and bake after plating at 365° to 385°F (185° to 196°C) for 3 hours.
- e. Finish support to Diameter T per figure 8 and as follows:
- (1) Set up support for machining per step b.(1) through (6).
 - (2) Machine support to Diameter T.
 - (3) Remove support from machining setup.
- f. Reinstall sump and pin per paragraph 8 or sump with bolt per paragraph 7.
- g. Permanently identify part with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02(SPOP 401).

**10. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - FRONT AIR SEALING RING
MATING DIAMETER PLASMA SPRAY.**

(See Figure 9.)

- a. Machine Diameter L per figure 9 and as follows:

- (1) Place SAALC 8041753 onto machining table.

NOTE

Adjust actuating screw only when master or support assembly is installed.

- (2) Install SAALC 8041616 master into fixture ID. Turn actuating screw while rotating in master by hand until secure.
- (3) Centralize fixture on machine table by indicating on master. When desired runout is obtained, secure fixture.
- (4) Remove master and insert support, front or small end up, between detail-2 uprights. Lift upward until front Diameter A engages the ID of detail-8 hydraulic chuck.
- (5) Move detail-9 clamps into position and tighten by hand to secure.

- (6) Actuate screw while manually rotating support until secure.

- (7) Tighten clamps in proper sequence.

- (8) Machine Diameter L to dimensions specified prior to finishing.

- (9) Remove support from machining setup.

- b. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 62. No cracks allowed.

- c. Grit blast support repair area as follows:

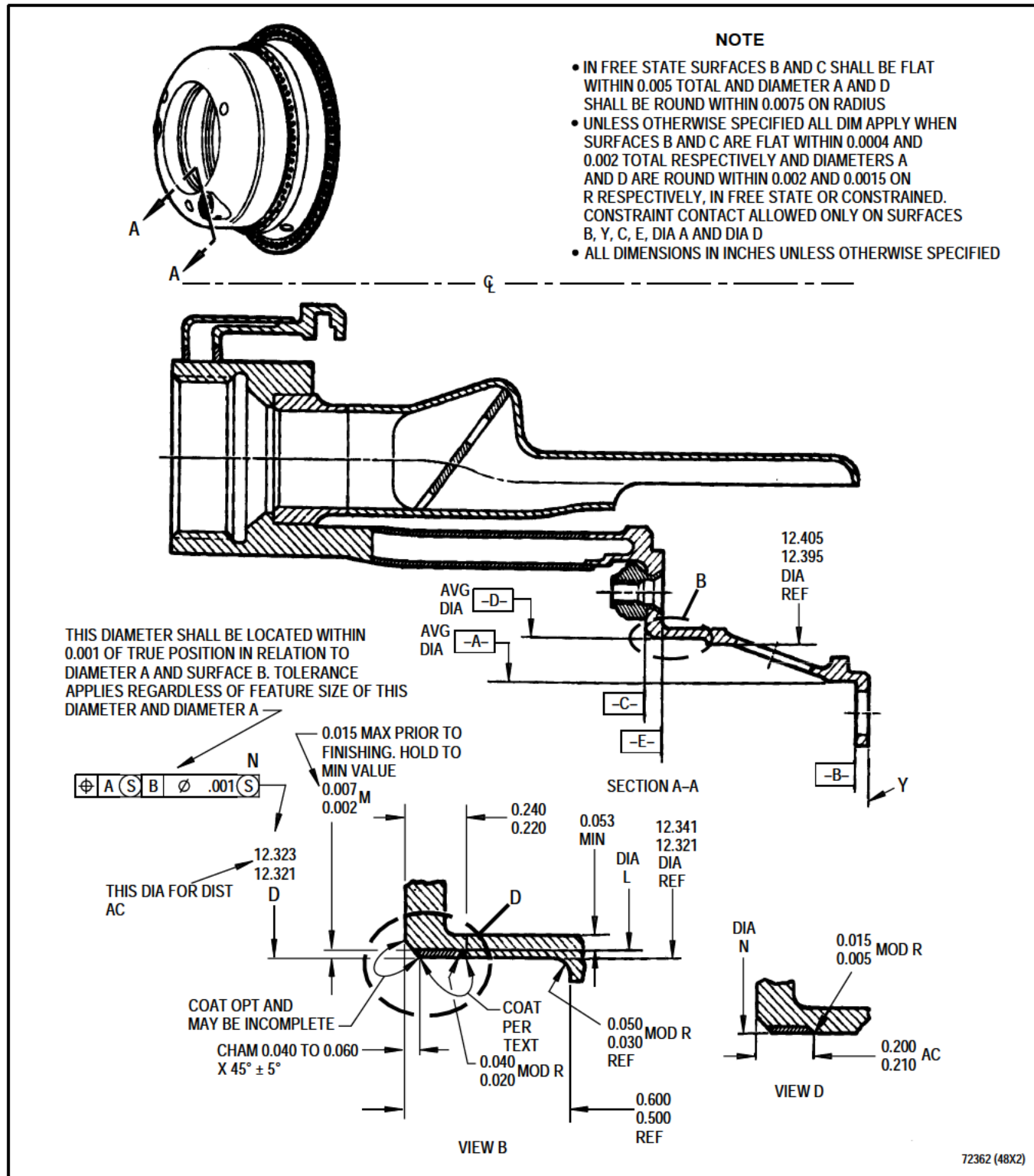
- (1) Install SAALC 8041756 mask as follows:

NOTE

Handle cleaned surfaces with clean white gloves.

- (a) Loosen detail-2 screws and separate halves of mask.

- (b) Install mask over support with flanged end contacting the 12.320 to 12.330 inch OD. Opposite end of mask shall locate on front outer flange Surface B.



**Figure 9. No. 4 Bearing Front Seal Support Assembly -
Front Air Sealing Ring Mating Diameter Plasma Spray**

- (c) Secure mask halves with detail-2 screws.
- (d) Apply PMC 4235 heat reflective tape over split areas and screw heads.
- (2) Install SAALC 8041757 mask over support with ID of mask locating on OD of clinch nuts and Surface C.
- (3) Grit blast area to be plasma sprayed. Refer to T.O. 2J-F100-53-1, WP 096 00.
- d. Remove masks and clean mask and support. T.O. 2J-F100-53-1, SWP 031 01 (SPOP 3).
- e. Reinstall masks per step c.(1) and (2) above. Apply Stopoff, Metco Antibond, to exposed surfaces of masks to aid in removal of excess plasma coat.
- f. Place SAALC 7744900 spool set in slots of Metco spray table, or equivalent, and center.
- g. Position spacer central to table. Slide spools toward ID of support until spacer is located against small OD of spools and on adjacent surfaces. Adjust spools and spacer until desired runout is obtained.
- h. Plasma coat repair area to Dimension M per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00. See figure 9.
- i. Remove tape and masks from support and remove support from spray table. Strip excess plasma from masks per nickel strip salt method. Refer to T.O. 2-1-111, (SPOP 48).
- j. Finish machine support as follows:
 - (1) Set up support for machining per steps a.(1) through (7).
 - (2) Finish machine support to dimensions shown in figure 9.
 - (3) Remove support from machining setup.
- k. Permanently identify part with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02 (SPOP 401).

**11. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - REAR FLANGE FACE REPAIR.**

(See Figures 10, 10A, and 10B.)

- a. Install No. 4 bearing front seal support assembly into PWA 71363 fixture as follows:

- (1) Loosen flange nut(1, figure 10A) and swing C-washer(2) away from center post(6).
- (2) Remove clamp ring(3).
- (3) Place detail-10 stop ring(5) on center post(6).
- (4) Load seal support assembly(4) into fixture as shown, resting rear flange on support blocks(7).
- (5) Install clamp ring(3) over support assembly.
- (6) Swing C-washer(2) over center post(6) and secure with flange nut(1).

- b. Machine flange Surface AB to Dimension F. See figure 10.
- c. Remove seal support assembly from PWA 71363 fixture.
- d. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 62. No cracks allowed.
- e. Install seal support assembly into PWA 71362 fixture as follows:

- (1) Remove hand knob(4, figure 10B) and clamp plate(5).
- (2) Place hanger assembly(1) on flat surface with locator plate(6) facing up.

- (3) Place seal support assembly(2), on locator plate(6).

- (4) Install clamp plate(5) and secure with hand knob(4).

- f. Nickel plate to Dimension G. See figure 10. Refer to T.O. 2J-F100-53-1, SWP 092 10, SPOP 26.
- g. Bake at 365°F to 385°F (185°C to 197°C) for 3 hours.
- h. Remove seal support assembly from PWA 71362 fixture.
- i. Install seal support assembly into PWA 71363 fixture per step a.
- j. Finish machine flange surface to Dimension J. See figure 10.
- k. Remove seal support assembly from PWA 71363 fixture.
- l. Permanently identify seal support assembly with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02, SPOP 401.

**12. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - CHEVRON SEAL MATING
SURFACE POLISHING.**

(See figure 2.)

- a. Hand polish pin with fine crocus cloth, P-C-458.
- b. Complete surface flatness is not required. Seal pocket depth shall not exceed 0.112 inch after polishing.

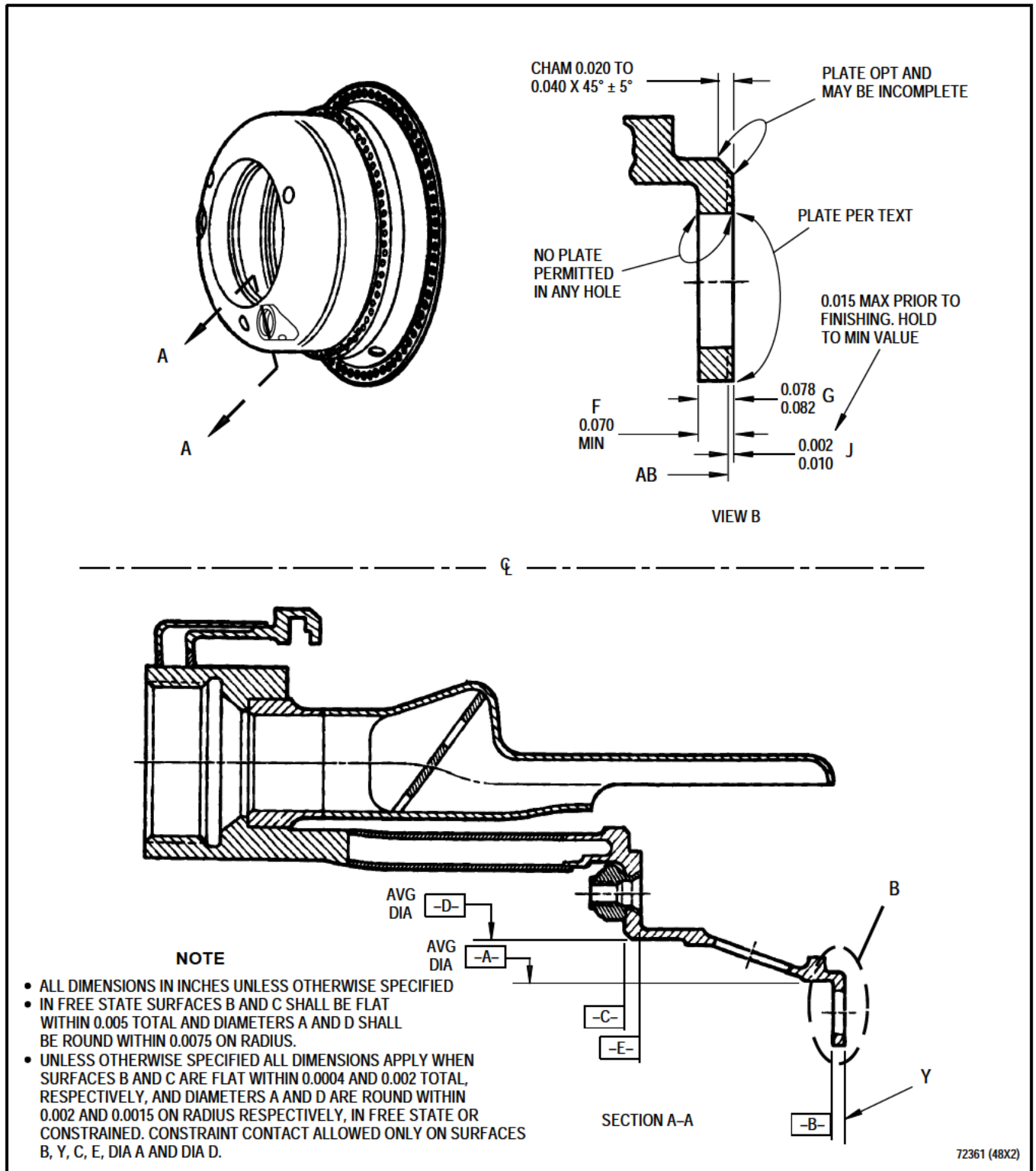
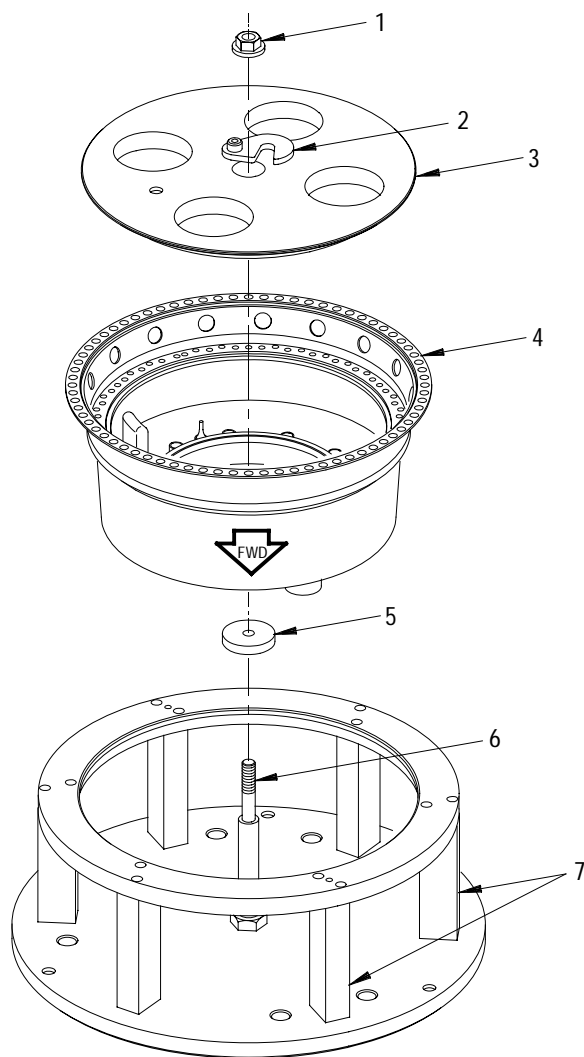


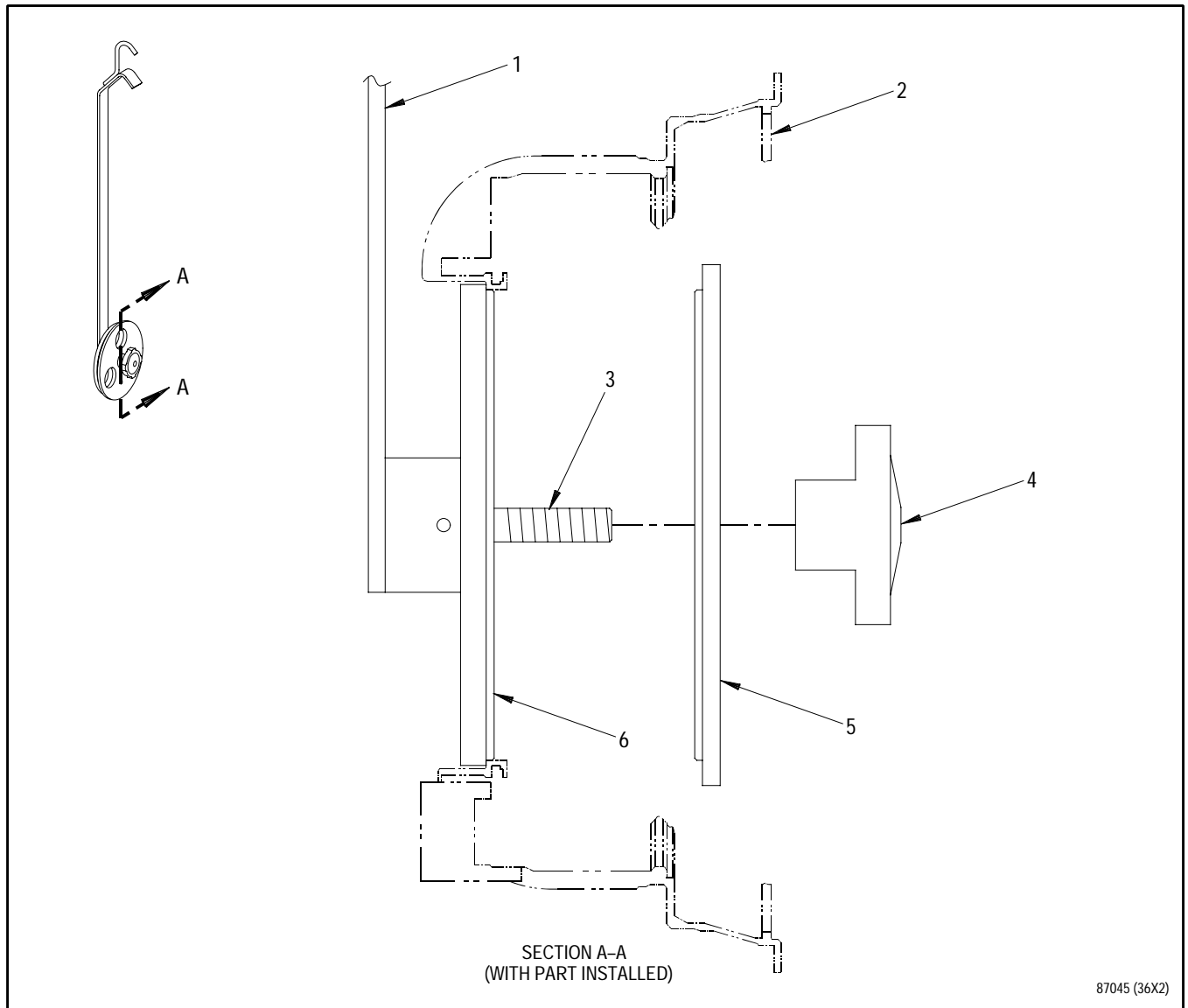
Figure 10. No. 4 Bearing Front Seal Support Assembly - Rear Flange Face Nickel Plating



87043 (36X2)

1. Flange nut
2. C-washer
3. Clamp ring
4. No. 4 bearing front seal support assembly
5. Stop ring, detail-10
6. Center post
7. Support blocks

Figure 10A. No. 4 Bearing Front Seal Support Assembly - Installation into PWA 71363 Fixture



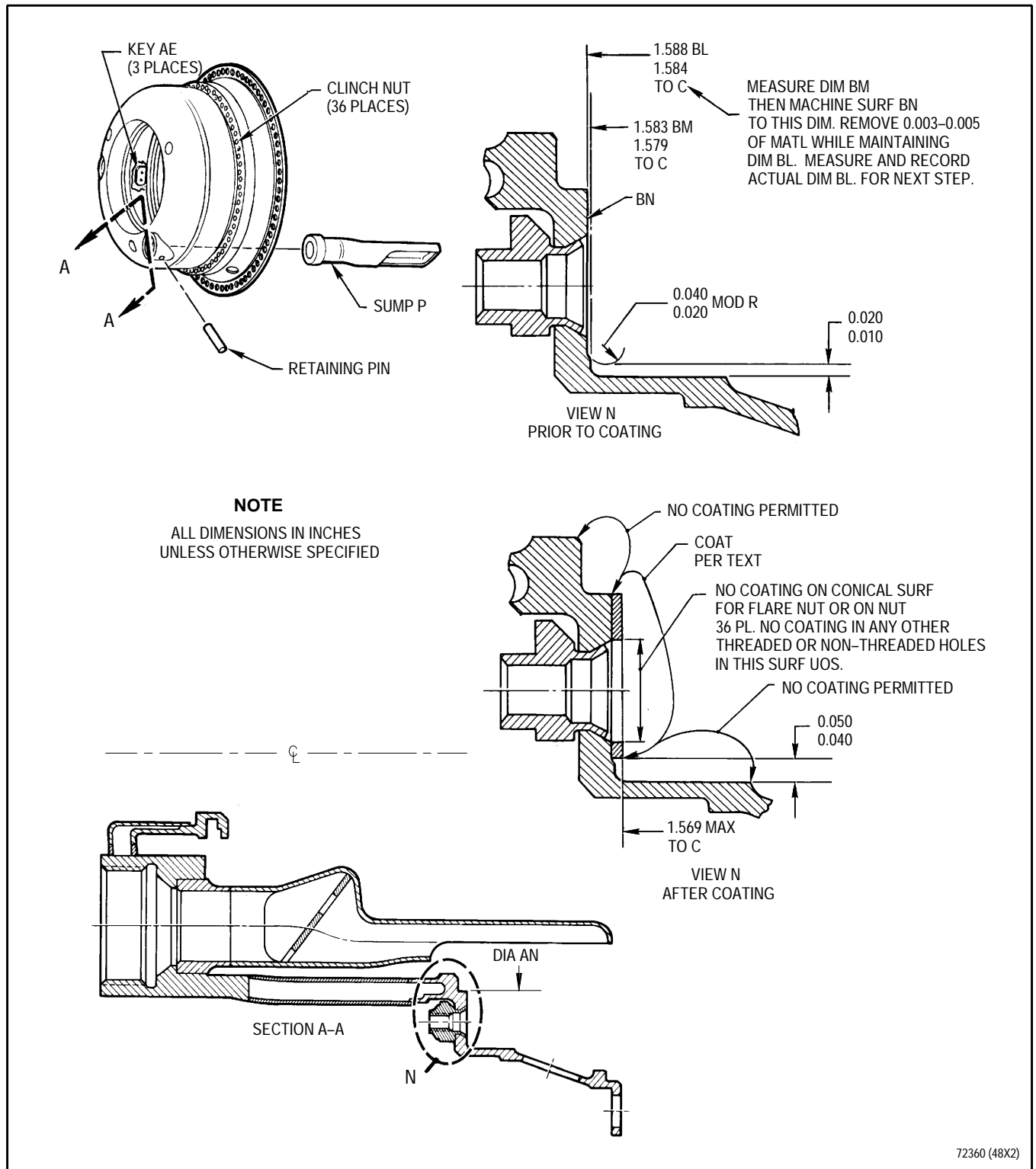
1. Hanger assembly
2. No. 4 bearing front seal support assembly
3. Threaded post
4. Hand knob
5. Clamp plate
6. Locator plate

Figure 10B. No. 4 Bearing Front Seal Support Assembly - Installation into PWA 71362 Fixture

**13. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - REAR MATING FACE PLASMA
SPRAY.**

(See Figure 11.)

- a. Remove Sump P and its retaining pin per paragraph 8 or Sump P with bolt per paragraph 7. Retain Sump P for reinstallation.
- b. If present, remove Key AE. Note location of removed key. Inspect key. Retain serviceable keys for reinstallation. Discard unserviceable keys.
- c. Degrease support. Refer to T.O. 2J-F100-53-1, SWP 031 01, SPOP 3.
- d. Measure Dimension BM and record it. Machine support face to prior to coating dimensions.
- e. Fluorescent penetrant inspect machined area. Refer to T.O. 2-1-111, SPOP 82.
- f. Inspect clinch nuts for security. Replace any damaged clinch nuts per paragraph 6.
- g. Plasma coat machined surface to after coating dimensions per PWA 53-18 as follows:
 - (1) Mask Diameter AN if this diameter was previously repaired with chromium plate.
 - (2) Refer to 2J-F100-53-1, WP 096 00 for plasma spray procedure.
 - (3) Prior to spraying, grit blast coat area with No. 60 silicon carbide grit using 30 to 70 psi blasting pressure. No coating or grit blasting allowed outside coat area.
- h. Machine coated area. If necessary, machine pockets as shown in Section S-S.
- i. Fluorescent penetrant inspect reworked area. Refer to T.O. 2-1-111, SPOP 82.
- j. Replace removed clinch nuts per paragraph 6.
- k. Reinstall Sump P with pin per paragraph 8 or Sump P with bolt per paragraph 7.
- l. Permanently identify part with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02, SPOP 401. Multiple marking with repair code is permitted.



**Figure 11. No. 4 Bearing Front Seal Support Assembly - Rear Mating Face Plasma Spray
(Sheet 1 of 3)**

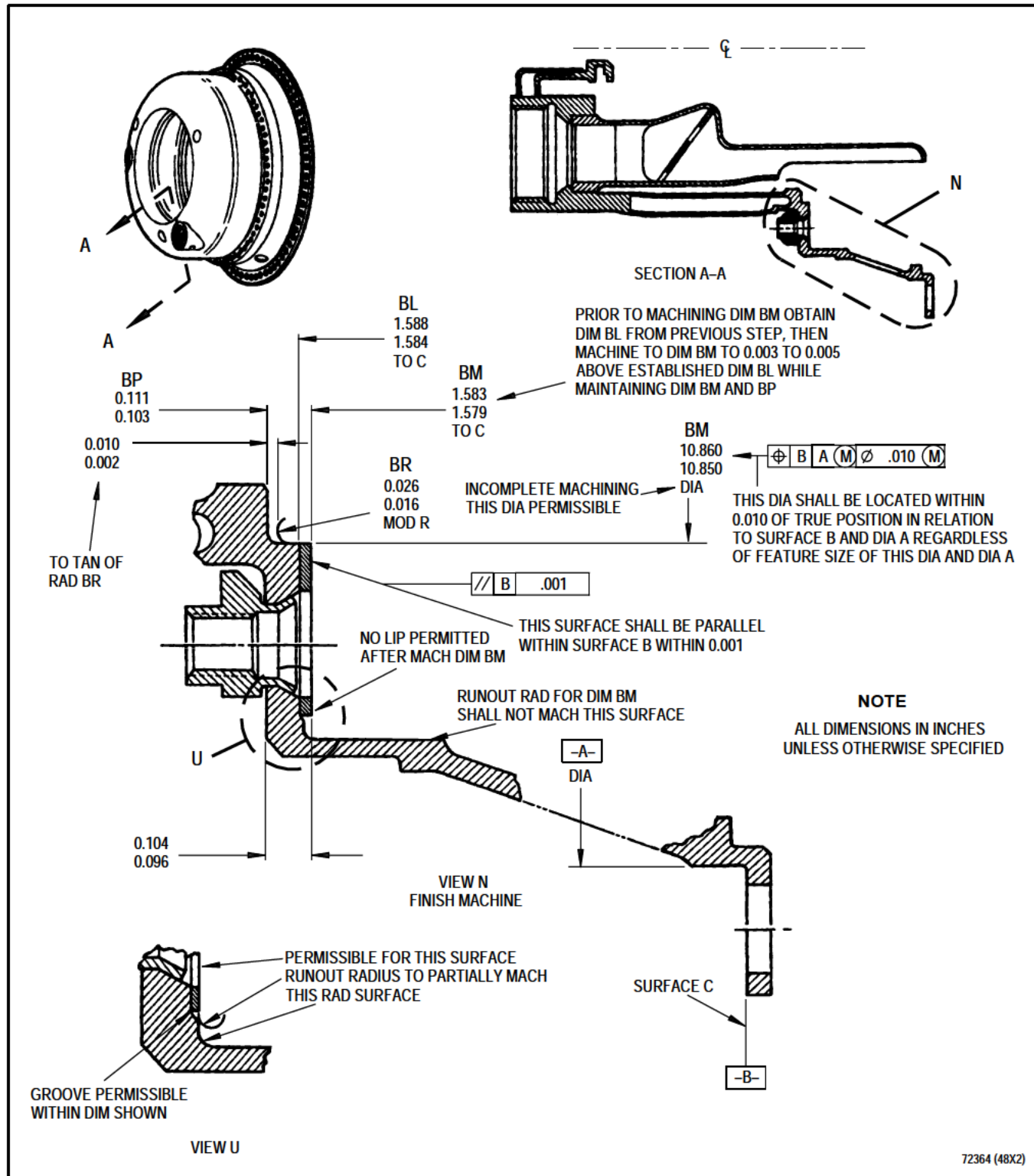


Figure 11. No. 4 Bearing Front Seal Support Assembly - Rear Mating Face Plasma Spray
(Sheet 2 of 3)

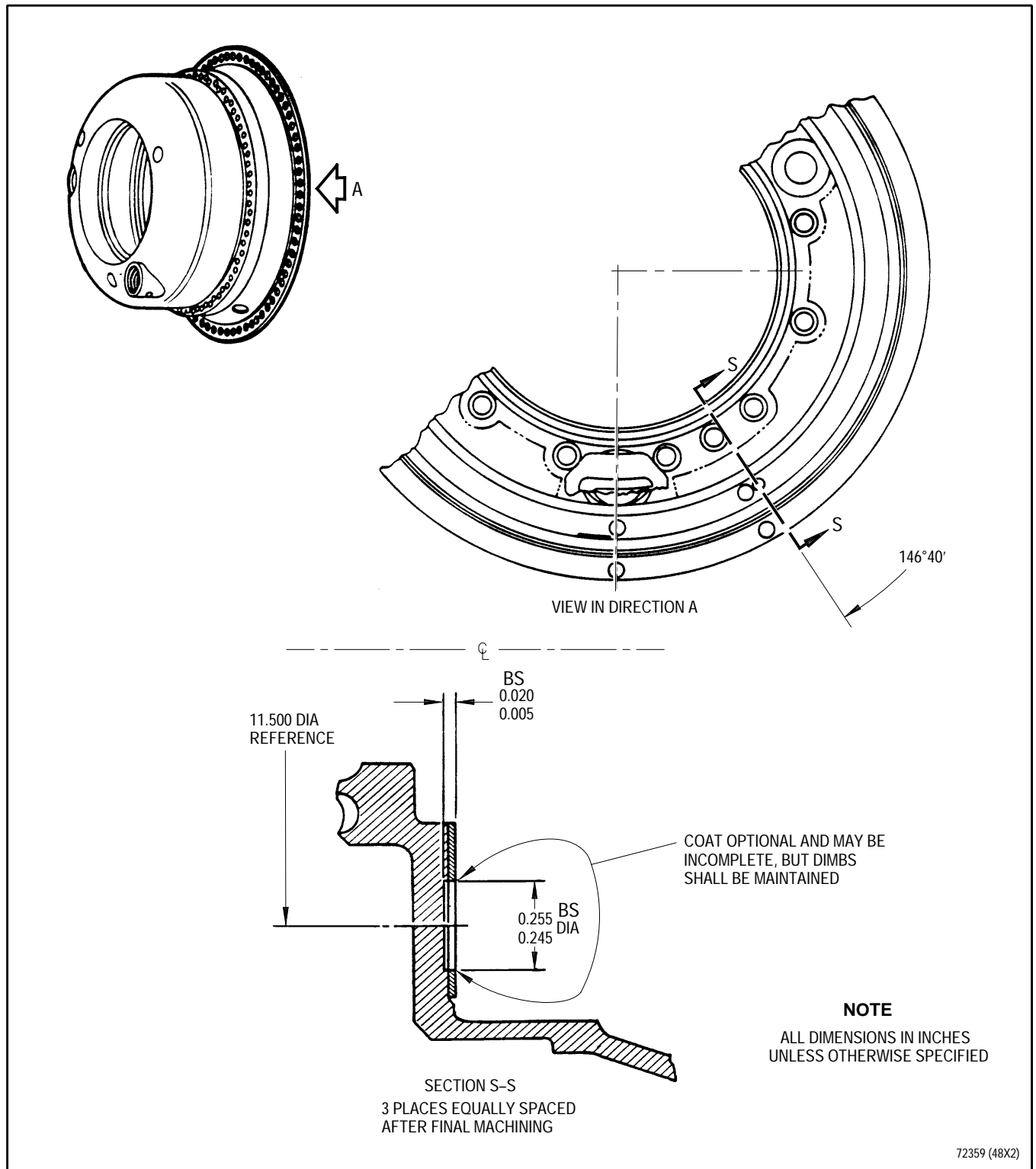


Figure 11. No. 4 Bearing Front Seal Support Assembly - Rear Mating Face Plasma Spray
(Sheet 3 of 3)

**14. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - CHEVRON SEAL MATING
SURFACE PLASMA SPRAY.**

(See Figures 12 and 12A.)

- a. Remove Sump P and its retaining pin per paragraph 8 or Sump P with bolt per paragraph 7. Retain Sump P for reinstallation. See figure 12.
- b. Install No. 4 bearing front seal support assembly into PWA 71361 fixture as follows:
 - (1) Install detail 4-2 set master into chuck and secure. Use dial indicator on master OD to center fixture on machine (0.0005 inch TIR).
 - (2) Remove master from chuck and place seal support assembly into chuck until flange rests on top surface.
 - (3) While slowly rotating seal support assembly by hand, rotate allen head clamp actuation screw, located on side of chuck, clockwise to cause jaw to expand and contact seal support assembly.
 - (4) When seal support assembly stops rotating, rotate clamp actuation screw approximately 1 1/2 turns to secure.
- c. Machine damaged surface, as required, to uniform depth to dimension shown prior to coating. See figure 12.
- d. Remove seal support assembly from PWA 71361 fixture.
- e. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- f. Install seal support assembly in PWA 71365 fixture as shown in figure 12A. Install PWA 71366 mask to mask Diameter AN, and PWA 71364 mask over rear flange. Fasten with work bolts or tape around flange and side wall.
- g. Plasma coat to after coating dimension per PWA 53-18 as follows:
 - (1) Mask Diameter AN if this diameter was previously repaired with chromium plate. See figure 12.
 - (2) Refer to T.O. 2J-F100-53-1, WP 096 00 for plasma spray procedure.
 - (3) Prior to spraying, grit blast coat area with No. 60 silicon carbide grit. Use 30 to 70 psi blasting pressure. No coating or grit blast allowed outside coat area.
- h. Remove seal support assembly from masks and fixture.
- i. Install seal support assembly in PWA 71361 fixture per step b.
- j. Final machine to Depth N and other dimensions as required per View R, figure 12.
- k. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- l. Reinstall Sump P with pin per paragraph 8 or Sump P with bolt per paragraph 7.
- m. Permanently identify seal support assembly with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02, SPOP 401. Multiple marking with repair code is permitted.

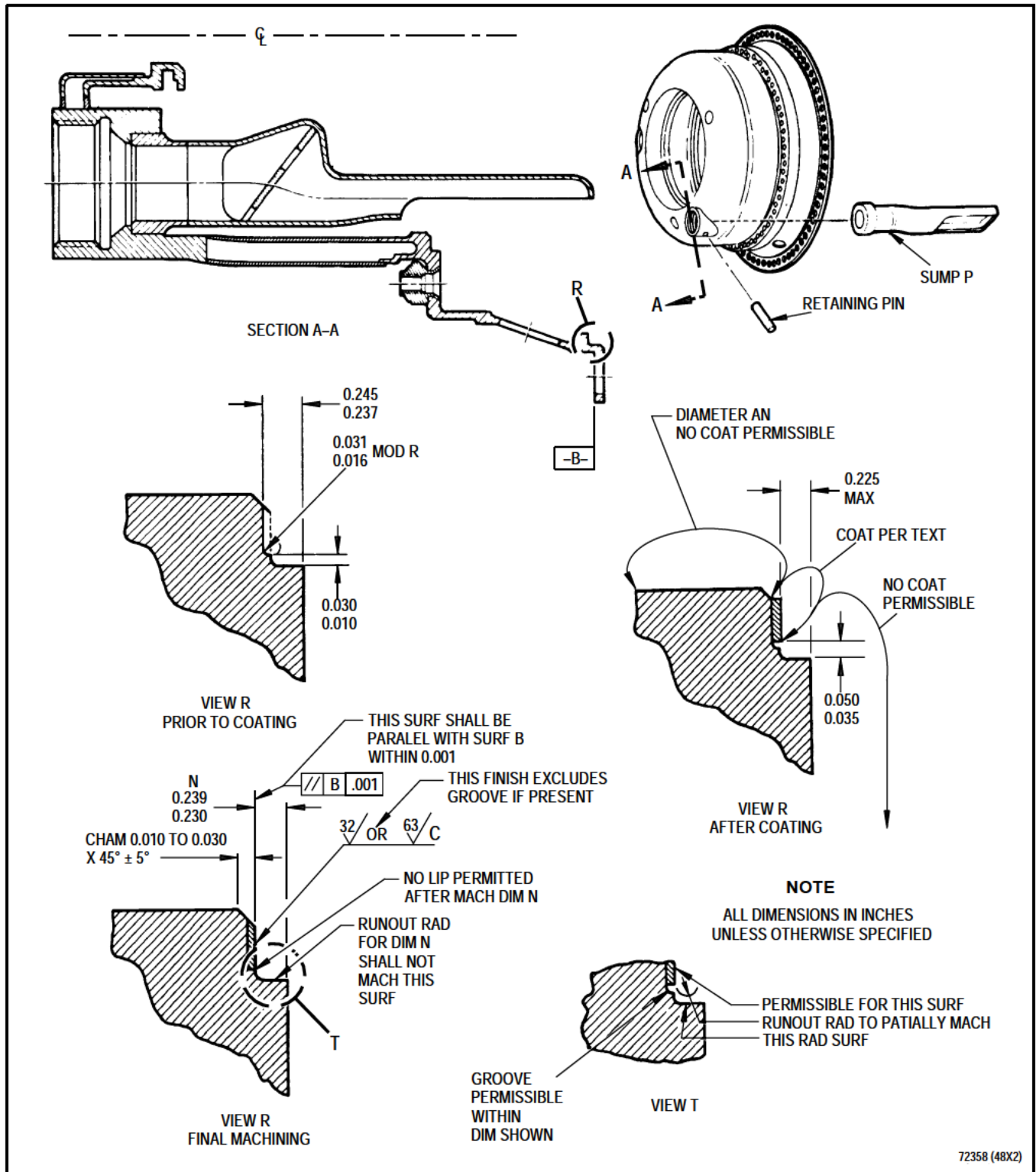
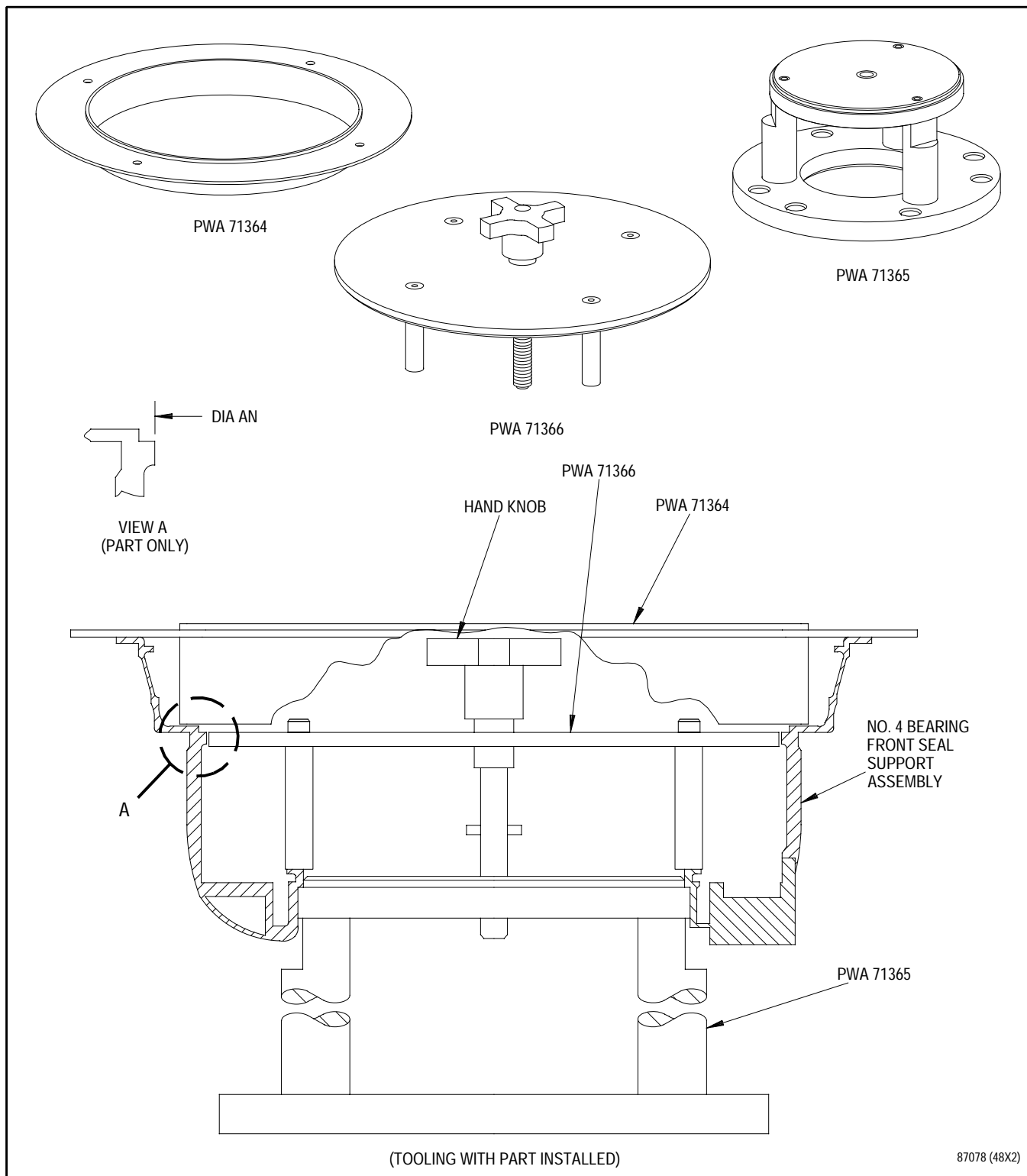


Figure 12. No. 4 Bearing Front Seal Support Assembly - Chevron Seal Mating Surface Plasma Spray



87078 (48X2)

**Figure 12A. No. 4 Bearing Front Seal Support Assembly -
Installation into PWA 71365 Fixture with PWA 71366 Mask and PWA 71364 Mask**

15. NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - SEAL RING GROOVE REPAIR.

(See Figure 13.)

- a. Remove three guide pins (PN 4035860) from support assembly per paragraph 5. Discard guide pins.
- b. Remove sump and sump retaining pin per paragraph 8 or sump with bolt per paragraph 7. Retain sump for reinstallation.
- c. Inspect Dimension BG prior to machining.
- d. If Dimension BG is less than 0.058 inch, repair part per paragraph 16.
- e. If Dimension BG is 0.063 inch or more, including wear areas, repair as follows:
 - (1) Machine Surface BF to Chart BJ oversize seal ring groove dimension. Maintain Dimension BG.
 - (2) Remove only enough material to remove all evidence of steps or wear, while maintaining Dimension BG and other dimensions and controls shown.
 - (3) Measure and record resulting Dimension BK.
- f. Fluorescent penetrant inspect reworked area. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- g. Install sump per paragraph 8 or per paragraph 7. Replace guide pins per paragraph 5.

NOTE

- It is permissible to machine seal ring groove 0.005 inch oversize and still use standard size seal ring.
- If groove is enlarged in future repair, mark out old size code and replace with new size code.
- h. Mark USE OVERSIZE RING and size code, on part in area adjacent to part number marking. Use measurement recorded in step e.(3) to determine size code. Refer to T.O. 2J-F100-53-1, WP 023 00. Use deep electrolytic etch.

Example: Measurement from step e.(3) is 0.172 inch will require following part marking: USE OVERSIZE RING P15.
- i. If groove is enlarged again, mark out old size code and mark new size code.

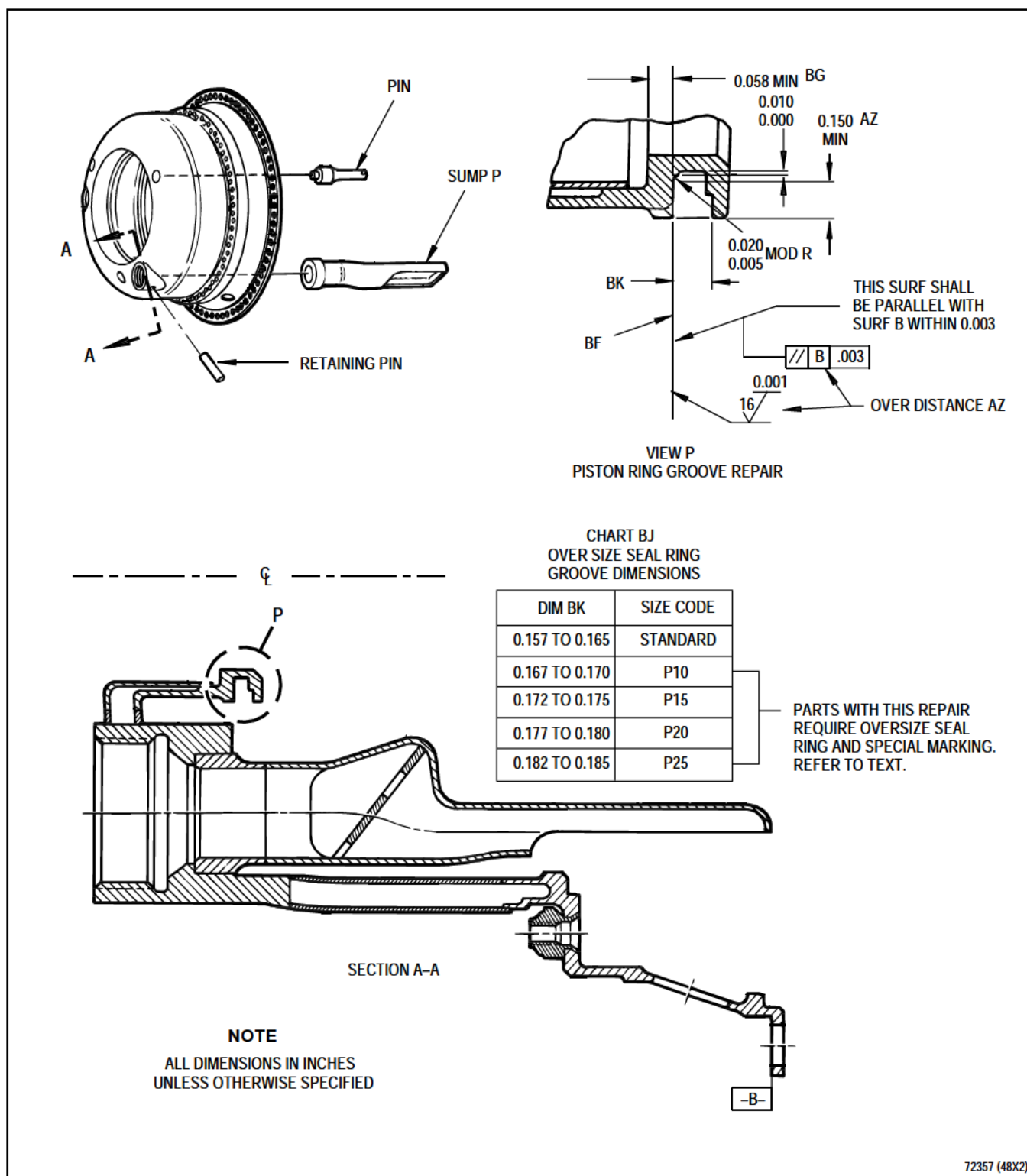


Figure 13. No. 4 Bearing Front Seal Support Assembly (Typical PN 4080082) - Machining Piston Ring Groove Oversize

**16. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - WELD REPAIR OF NICKS,
CRACKS, SCRATCHES, AND GOUGES.**

(See Figure 14.)

- a. This repair applies to Retainer BD, Support BC, and Heat Shield BB.
- b. Weld repair nicks, cracks, scratches, and gouges exceeding 0.010 inch in depth but less than six inches long and not over 0.050 inch wide.
 - (1) Two repairs maximum per surface.
 - (2) One inch minimum distance between repairs.
- c. Fluorescent penetrant inspect to determine size of damage area. Fluorescent penetrant inspect. Refer to T.O. 2-1-111 (SPOP 82).
- d. Rout out crack or nick between holes to minimum width. Root opening shall be 0.060 inch maximum.
- e. Fluorescent penetrant inspect routed area. Refer to T.O. 2-1-111 (SPOP 82). No cracks allowed.
- f. Manual gas tungsten arc (TIG) weld routed out area and stop drilled holes. Use AMS 5832 filler metal. Refer to T.O. 2J-F100-53-1, SWP 093 01.

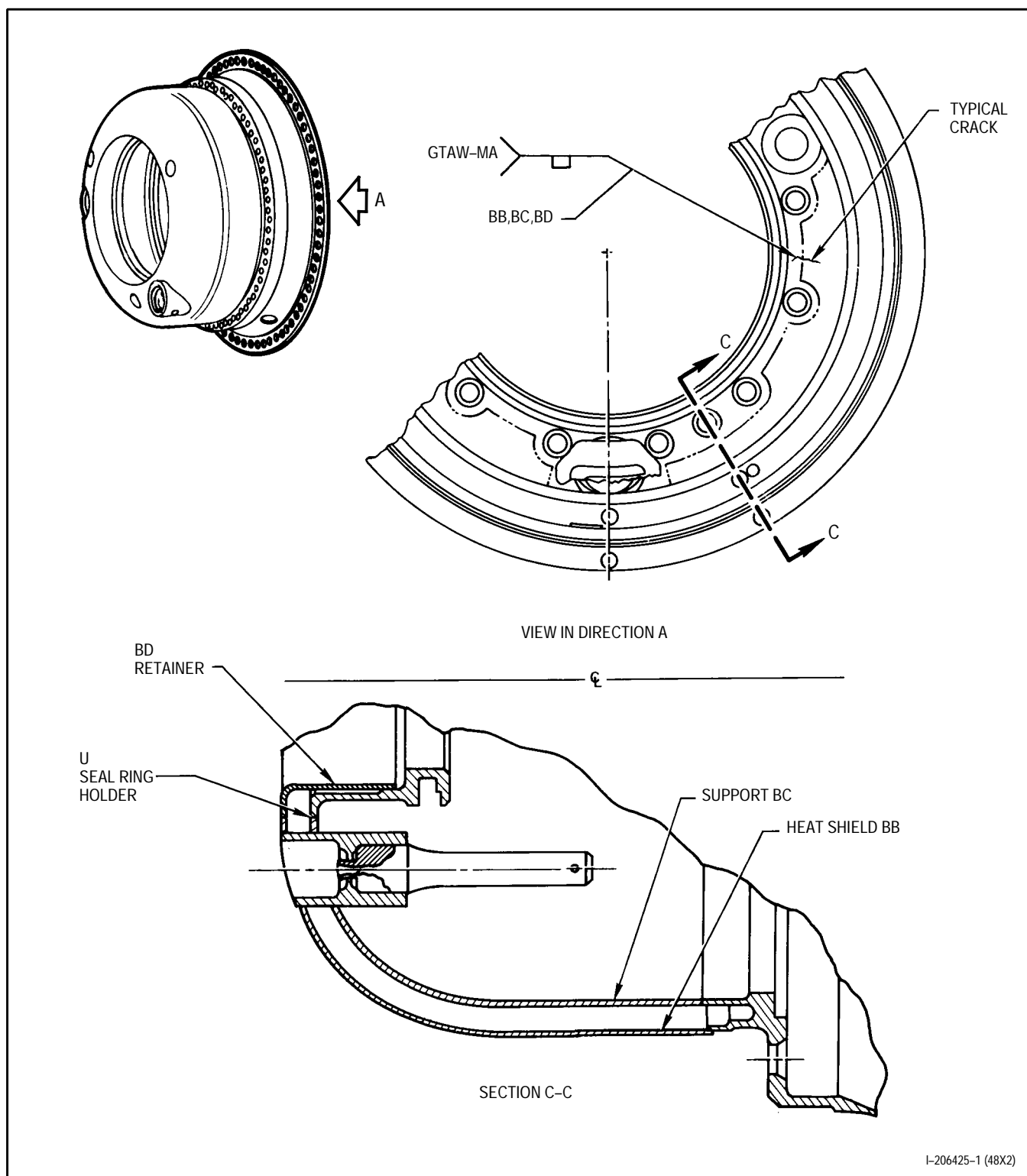


Figure 14. No. 4 Bearing Front Seal Support Assembly - Weld Repair of Nicks, Cracks, Scratches, and Gouges

- g. Heat treat weld area per SPOP 465 except heat part locally instead of in an oven. Refer to T.O. 2J-F100-53-1, SWP 095 01 (SPOP 465).
 - (1) If local heating affects plated surface and surface temperature exceeds 750°F (399°C) plating shall be stripped per steps (2) and (3).
 - (2) Determine if part was previously chromium or nickel plated.
 - (a) Check part in area of part number for beehive symbol.
 - (b) Refer to T.O. 2J-F100-53-1, WP 023 00 for interpretation of beehive symbol.
 - (3) Strip previous chromium or nickel plating. Refer to T.O. 2J-F100-53-1, SWP 092 06 (SPOP 22) for chromium plate. Refer to T.O. 2J-F100-53-1, SWP 092 10 (SPOP 26) for nickel plate.
- h. If necessary, replace chromium and nickel plating, stripped in previous step. Replace plating per applicable paragraph in this work package.

- i. Local fluorescent penetrant inspect weld and heat affected area. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.

17. NO. 4 BEARING FRONT SEAL SUPPORT ASSEMBLY - HEAT SHIELD DENT WELD REPAIR.

(See Figure 15.)

- a. This repair applies to dents in Area AR of Heat Shield BB.

NOTE

Do not drill into Support BC. Drill point in Support BC is not permitted.

- b. Drill hole in center of dent with carbide or cobalt drill. Maintain requirements of View M, Sheet 2.
- c. Use dent puller to pull out dent. Part may be heated per next step to ease dent removal.
 - (1) Recontoured area shall be within 0.050 inch total of original part contour.
 - (2) Maintain dimensional requirements of figure 16.

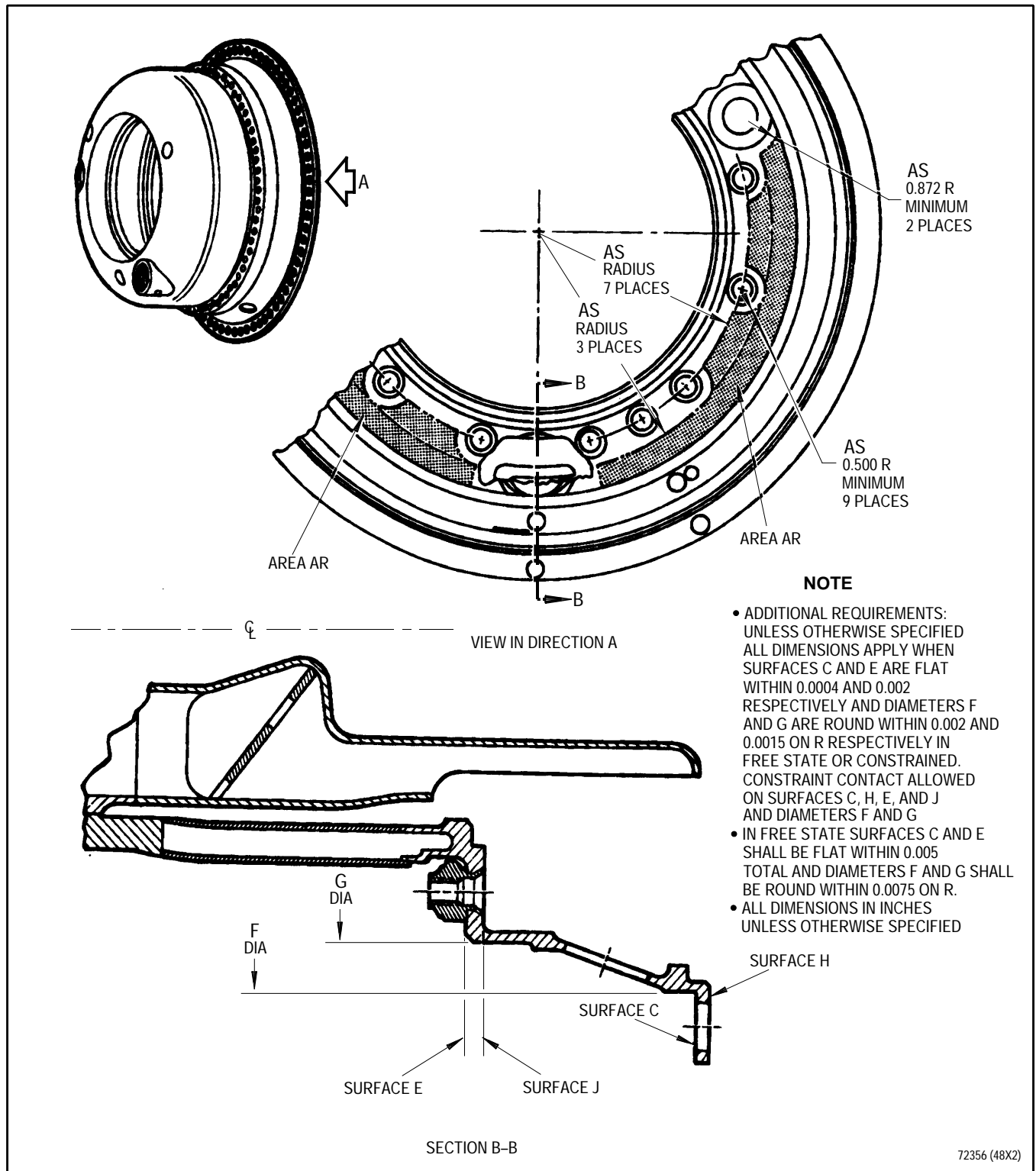


Figure 15. No. 4 Bearing Front Seal Support Assembly - Heat Shield Dent Weld Repair
(Sheet 1 of 2)

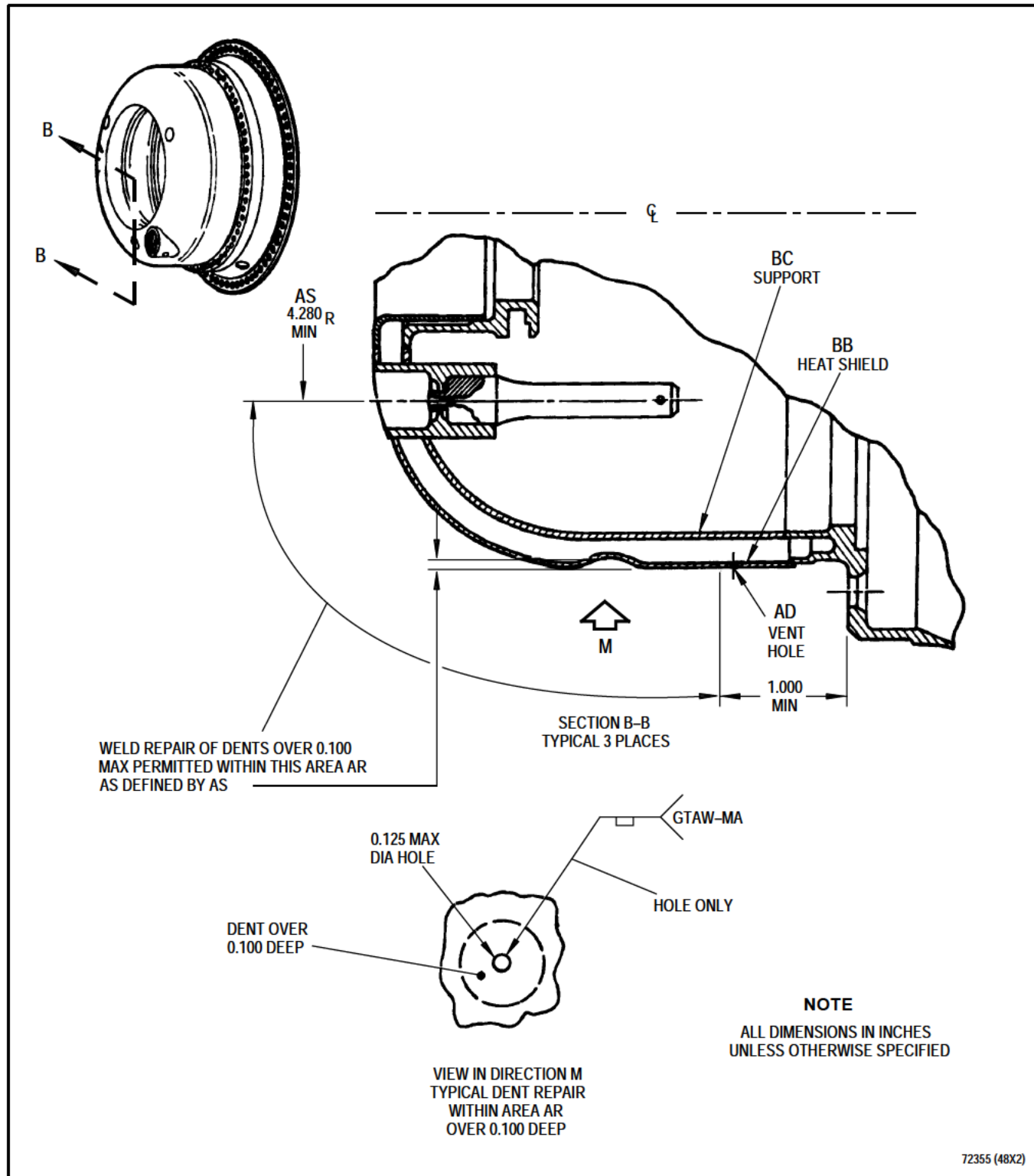


Figure 15. No. 4 Bearing Front Seal Support Assembly - Heat Shield Dent Weld Repair
(Sheet 2 of 2)



Torch heating is not permitted;
it may cause damage.

- d. Locally heat dent area. Do not exceed 1100°F (593°C) for unplated parts or 750°F (399°C) for plated parts. Determine if parts are chromium or nickel plated as follows:

- (1) Check part in area of part number for beehive symbol.
- (2) Refer to T.O. 2J-F100-53-1, WP 023 00 for interpretation of beehive symbol.

- e. Fluorescent penetrant inspect reworked area. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.

- f. Clean reworked area with a stainless steel brush.

NOTE

Parent material is AMS 5662 and AMS 5596.

- g. Manual gas tungsten (TIG) plug weld holes. Use AMS 5832 filler metal. Do not weld vent holes AD. (See Sheet 2.) Refer to T.O. 2J-F100-53-1, SWP 093 01.

- h. Heat treat weld area by heating part locally instead of in an oven. Refer to T.O. 2-1-111, SPOP 465.

- (1) If local heating affects a plated surface and surface temperature exceeds 750° (399°C) plating shall be stripped per steps (2) and (3).

- (2) Determine if part was previously chromium or nickel plated as follows:

- (a) Check part in area of part number for beehive symbol.

- (b) Refer to T.O. 2J-F100-53-1, WP 023 00 for interpretation of beehive symbol.

- (3) Strip previous chromium or nickel plating. Refer to T.O. 2J-F100-53-1, SWP 092 06 (SPOP 22) for chromium plate. Refer to T.O. 2J-F100-53-1, SWP 092 10 (SPOP 26) for nickel plate.

- i. If necessary, replace chromium and nickel plate stripped in previous step. Replace plating per applicable paragraph in this work package.

- j. Local fluorescent penetrant inspect weld and heat affected area. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.

**18. NO. 4 BEARING FRONT SEAL SUPPORT
ASSEMBLY - NO. 4 BEARING HOUSING MATING
DIAMETER CHROMIUM PLATING.**

(See Figures 16 and 17.)

- a. Remove sump and its retaining pin per paragraph 8 or sump with bolt per paragraph 7. Retain sump for reinstallation. See figure 16.
- b. Install No. 4 bearing front seal support assembly in PWA 71361 fixture as follows:
 - (1) Install detail 4-2 set master into chuck and secure. Use dial indicator on master OD to center fixture on machine (0.0005 inch TIR).
 - (2) Remove master from chuck and place seal support assembly into chuck until flange rests on top surface.
 - (3) While slowly rotating seal support assembly by hand, rotate allen head clamp actuation screw, located on side of chuck, clockwise to cause jaw to expand and contact seal support assembly.
 - (4) When seal support assembly stops rotating, rotate clamp actuation screw approximately 1 1/2 turns to secure.
- c. Machine diameter to before plate dimensions shown in figure 16.
- d. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- e. Install seal support assembly in PWA 71360 fixture as follows:
 - (1) Remove knurled knob(2, figure 17) to separate clamp ring assembly(4) from rest of fixture.
 - (2) Place clamp ring assembly(4) on flat surface and place seal support assembly(1) over center post as shown.
 - (3) Install rest of fixture over part while aligning dowel pin(5) on locator ring(3) with clearance hole in clamp ring assembly(4).
 - (4) Install and tighten knurled knob(2).
- f. Chromium plate 0.003 to 0.008 inch thick. Refer to T.O. 2J-F100-53-1, SWP 092 06, SPOP 22. See figure 16.
- g. Bake at 745° to 765°F (392°C to 406°C) for 2 hours only.
- h. Install seal support assembly in PWA 71361 fixture per step b.
- i. Finish machine diameter as shown in figure 16.
- j. Fluorescent penetrant inspect. Refer to T.O. 2-1-111, SPOP 82. No cracks allowed.
- k. Reinstall sump per paragraph 8 or paragraph 7.
- l. Permanently identify seal support assembly with beehive symbol. Refer to T.O. 2J-F100-53-1, WP 023 00. Use shallow electrolytic etch in area near part number. Refer to T.O. 2J-F100-53-1, SWP 023 02, SPOP 401. Multiple marking with repair code is permitted.

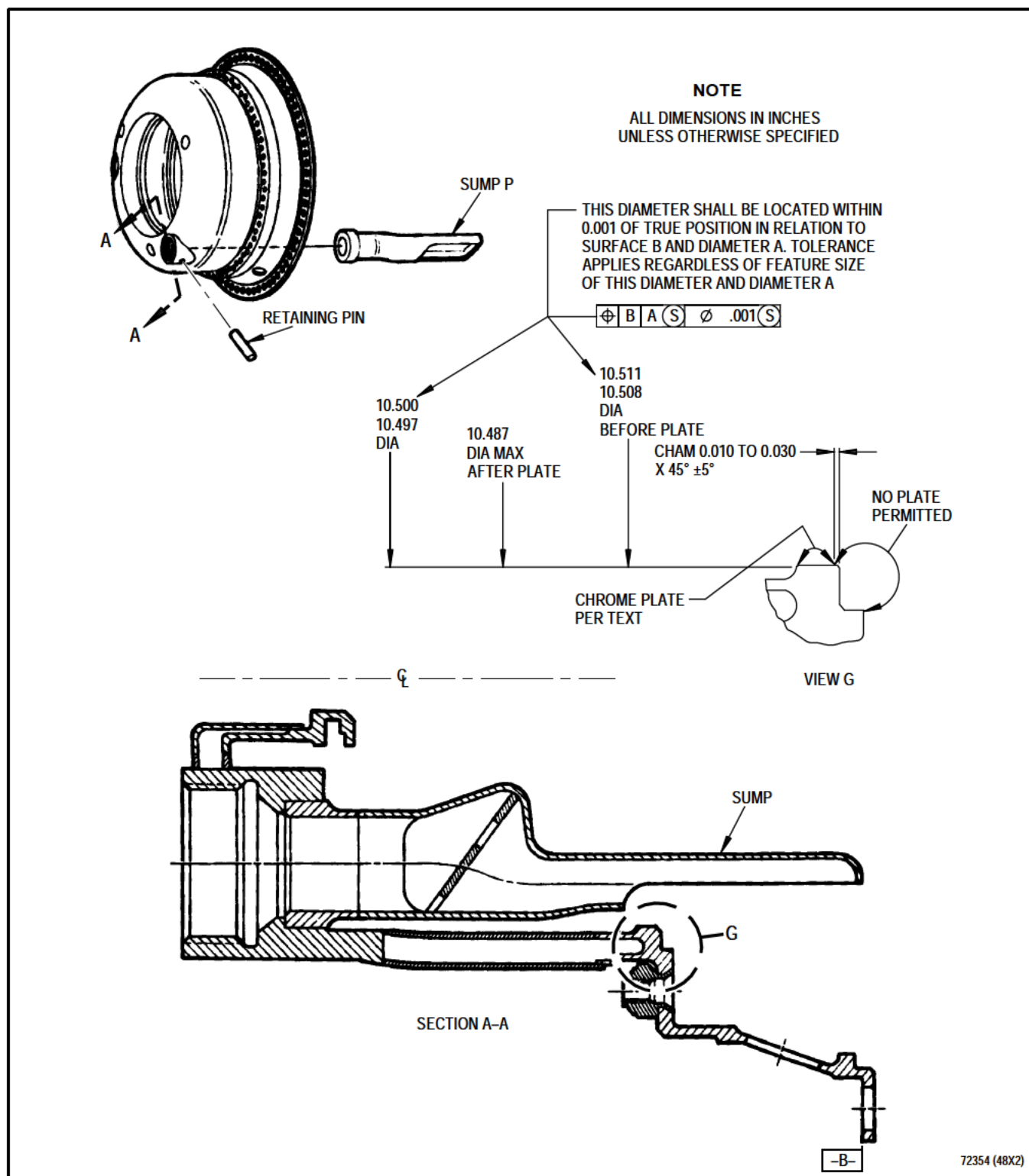
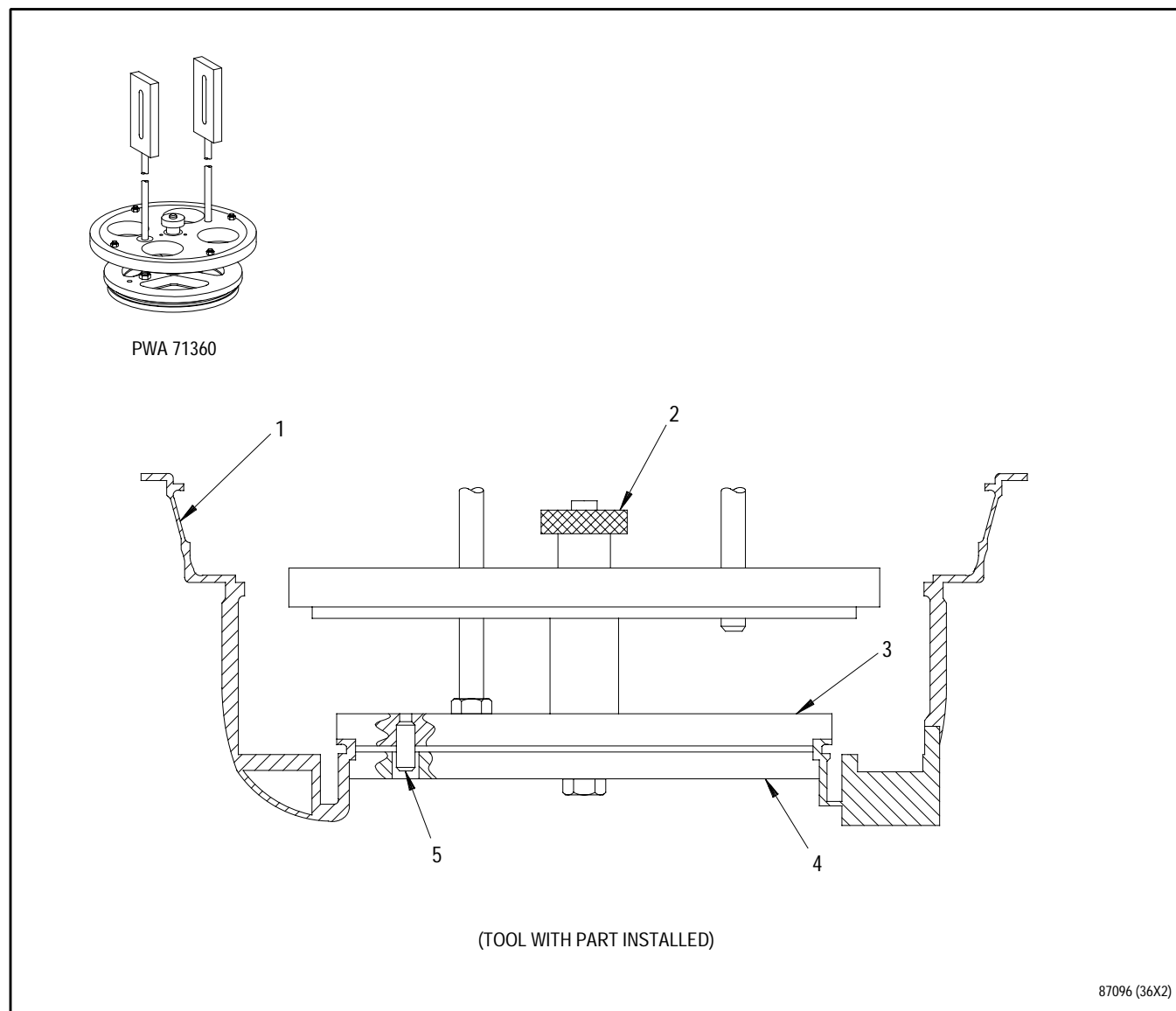


Figure 16. No. 4 Bearing Front Seal Support Assembly - No. 4 bearing Housing
Mating Diameter Chromium Plating



1. No. 4 bearing front seal support assembly
2. Knurled knob
3. Locator ring
4. Clamp ring assembly
5. Dowel pin

Figure 17. No. 4 Bearing Front Seal Support Assembly - Installation into PWA 71360 Fixture

WORK PACKAGE**TECHNICAL PROCEDURES****RING ASSEMBLY - AIR SEALING, NO. 4 BEARING, FRONT (SINGLE LAND) -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 32

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	8	25	15	1
2	25	9	0	16	29
2A - 2B Added	25	10	29	17 - 19	0
3	0	11	0	20	29
4	1	12	29	21	0
5	0	13	0	22	29
6	1	14	29	23 - 24	25
7	0			25 - 30 Added	25

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts by Aqueous Cleaning - - - - -	SPOP 209
Electrochemical Marking - - - - -	SPOP 401
Solution Heat Treat Cycle 102 - - - - -	SPOP 762
Solution Heat Treat Cycle 107 - - - - -	SPOP 767
High Sensitivity Fluorescent Penetrant Inspection - - - -	SPOP 82
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Marking Procedure, General - - - - -	WP 023 00
Marking, Electrochemical (SPOP 401) - - - - -	SWP 023 02
Buffing, Power Denicking of Steel, Nickel, or Cobalt Parts (SPOP 533) - - - - -	SWP 091 02
Welding, Inert Gas Fusion - - - - -	SWP 093 01
Heat Treatment: Solution, Stabilization, or Precipitation Cycles (SPOP 465) - - - - -	SWP 095 01
Plasma and Flame Spray Coating Procedures, General - - - -	WP 096 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BRAZE FOIL	-
BRAZING FILLER METAL, GOLD-NICKEL ALLOY	AMS 4787
STOP-OFF	PMC 1642 OR PMC 2266
WIRE, WELDING	AMS 5832 (INCONEL 718)
WIRE, WELDING	AMS 5837 (INCONEL 625)

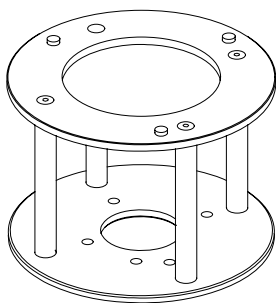
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BUSHING-SLEEVE, FLANGED	4082888	1
BUSHING-SLEEVE, FLANGED	4082889	2

APPLICABLE SUPPORT EQUIPMENT

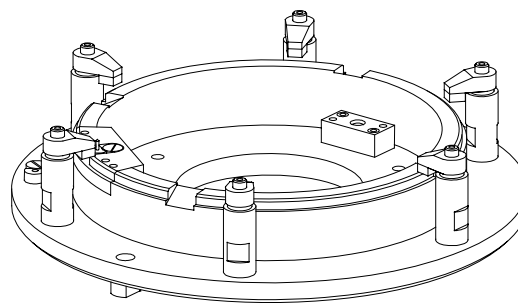
Paragraph	Function - Tool Nomenclature	Tool Number
14	NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY METAL SEAL RING CONTACT SURFACE - PLASMA SPRAY SLEEVE REPAIR	
	FIXTURE, MACHINE, NO. 4 BEARING AIRSEAL FLANGE - - -	PWA 71318
	FIXTURE, BRAZE, NO. 4 BEARING AIR SEAL RING - - - -	PWA 71319
	FIXTURE, PLASMA, NO. 4 BEARING AIR SEAL, RING - - - -	PWA 71320
	ADAPTER, PLASMA SPRAY, 4TH THROUGH 12TH COMPRESSOR AIR SEAL - - - - -	PWA 70911
	FIXTURE, MASK, NO. 4 BEARING AIR SEAL, RING - - - -	PWA 71321
	CUTTER, SPECIAL, CUBIC BORON NITRIDE, 19 TO 21 DEGREE ANGLE - - - - -	PWA 71708

ILLUSTRATED SUPPORT EQUIPMENT



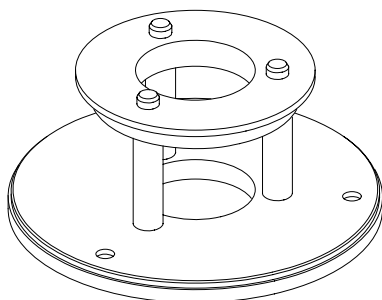
PWA 70911 -C

Figure T1. PWA 70911 ADAPTER



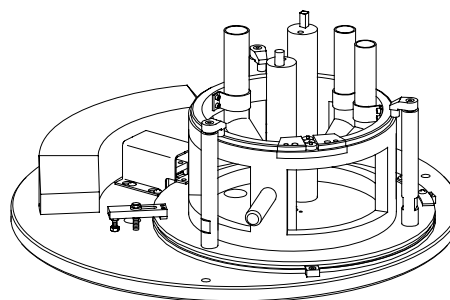
PWA 71318 -C

Figure T2. PWA 71318 FIXTURE



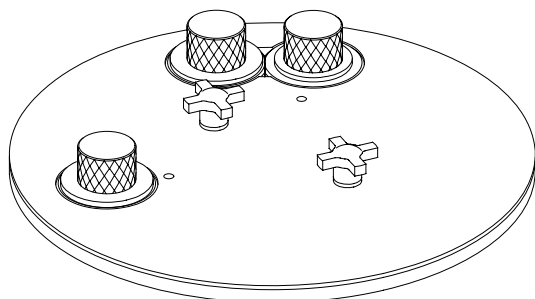
PWA 71319 -C

Figure T3. PWA 71319 FIXTURE



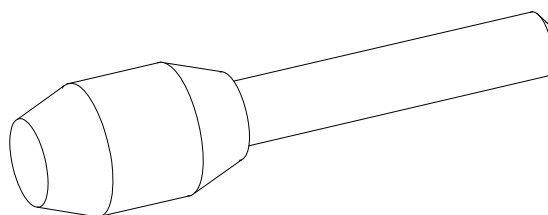
PWA 71320 -C

Figure T4. PWA 71320 FIXTURE



PWA 71321 -C

Figure T5. PWA 71321 FIXTURE



PWA 71708 -C

Figure T6. PWA 71708 CUTTER

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing front air sealing ring assembly.

2. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (SINGLE LAND) - PIN REPLACEMENT.

- a. Drift out pin from inside.
Ensure that no surrounding metal on tang or assembly is bent or damaged while drifting pin.

NOTE

If snap diameter is to be repaired, ensure repair is completed per paragraph 3 before replacing pin.

- b. Chill replacement pin.
- c. Install pin into tang with nonthreaded hole. Position pinhead to outside.

**3. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - SNAP
DIAMETER REPAIR.**

(See Figure 1.)

- a. Remove pin per paragraph 2. Use care when handling assembly for this repair. Heatshield is of thin metal and damages easily.
- b. Machine to dimensions in figure 1.
- c. Fluorescent penetrant inspect for cracks only. Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

No coating is permitted in tapped holes or pinhole.

- d. Coat to dimensions in figure 1 per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
- e. Finish machine to dimensions in figure 1.
- f. Inspect coating. Refer to T.O. 2J-F100-53-1, WP 096 00.
- g. Install new pin per paragraph 2.

Legend for figure 1

NOTE

All dimensions apply when Surface F and Diameter G are flat within 0.001 inch and round within 0.005 inch in free state or constrained. Constraint contact allowed only on Surfaces E, F, or Diameter G.

1. Headless shoulder pin, remove before repair.
2. 0.150 to 0.170 inch, reference.
3. Chamfer 0.010 - 0.030 inch \times 45° \pm 2°.
4. No grit blast or plasma spray.
5. Coat per text. Final coat thickness per PWA 53-37.
6. Plasma coat optional and may be incomplete.
7. 12.325 to 12.339 inch diameter before plasma coat.
8. Diameter G shall be located within 0.004 inch of true position at Maximum Material Condition in relation to Diameter Z at Maximum Material Condition and Surface A. Diameter G shall be perpendicular within 0.005 inch regardless of feature size to Surface A.
9. 0.020 to 0.040 inch
10. 0.020 to 0.040 inch, modified radius.
11. 0.000 to 0.010 inch
12. 0.055 inch minimum prior to plasma spray.
13. Diameter D. 1.269 to 1.271 inch diameter, reference.

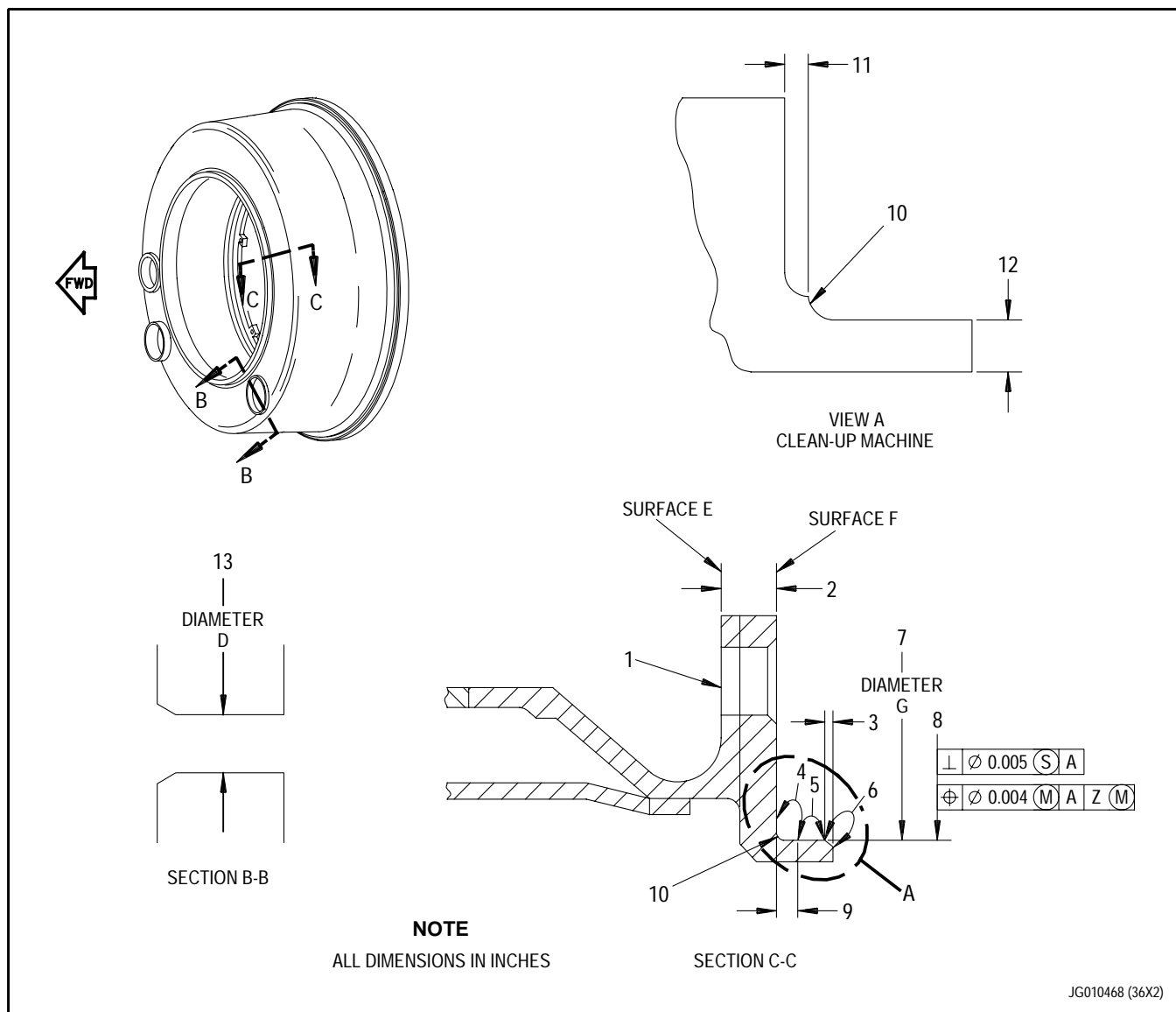


Figure 1. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Snap Diameter Repair

**4. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - METAL
SEAL RING CONTACT SURFACE REPAIR.**

(See Figure 2.)

a. Refinish hole at U as follows:

- (1) Machine to 1.127 to 1.141
inch diameter. Hold to
minimum value.
- (2) Fluorescent penetrant
inspect for cracks only.
Refer to T.O. 2J-F100-9. No
cracks allowed.
- (3) Plasma coat area(3) to
1.107 inch diameter maximum
per PWA 53-1 or PWA 53-2.
Refer to T.O. 2J-F100-53-1,
WP 096 00. Coating thickness
per PWA 53-1 or 53-2.

(4) Finish machine to dimensions
in figure 2.

(5) Inspect coating per
T.O. 2J-F100-53-1,
WP 096 00.

(6) Mark beehive symbol per
T.O. 2J-F100-53-1,
WP 023 00.

Legend for figure 2

NOTE

Unless otherwise specified, all dimensions apply when Surface F is flat within 0.001 inch total and Diameter G maintains a clearance envelope of 12.314 inch diameter in free state or constrained. Constraint contact allowed on Surface E, F, and Diameter G.

1. Coating optional and may be incomplete in this area.
2. 0.700 inch minimum.
3. Plasma coat per text.
4. Break edge 0.003 to 0.010 inch.
5. 20° ±2°
6. 1.119 to 1.121 inch finish diameter at U, and 1.269 to 1.271 inch finish diameter at V and W.
7. 0.090 to 0.110 inch
8. 4.738 inches
9. 4.900 inches
10. 4.680 inches
11. 325 degrees
12. 60 degrees
13. This diameter shall be located within 0.004 inch diameter of true position in relation to Surface F and Diameters G and P. Tolerance applies at Maximum Material Condition of this diameter and Diameters G and P.
14. 0.020 to 0.040 inch modified radius Location V only.

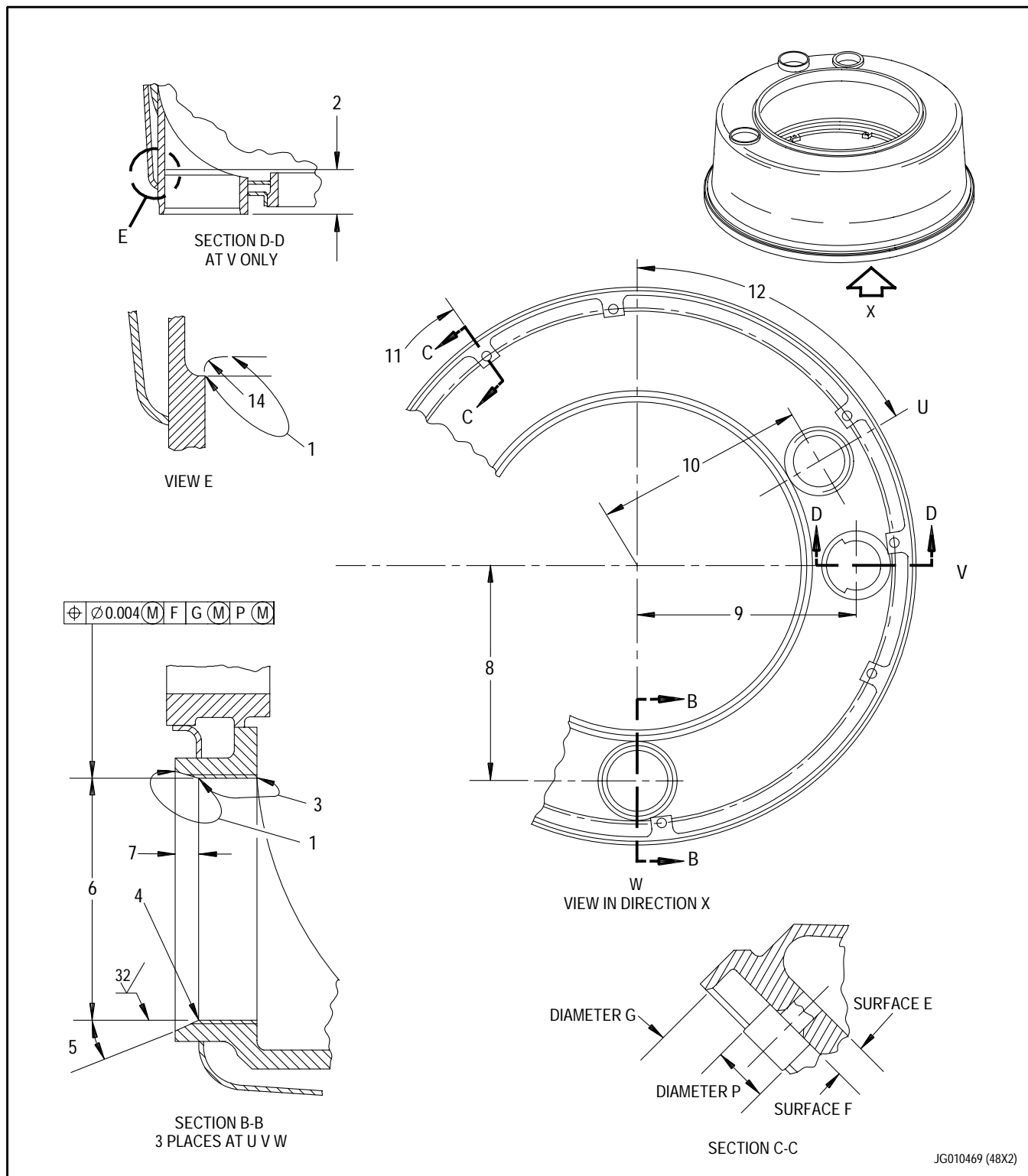


Figure 2. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Metal Seal Ring Contact Surface Repair

- b. Refinish holes at V and W as follows:
- (1) Machine to 1.277 to 1.291 inch diameter. Hold to minimum value.
 - (2) Fluorescent penetrant inspect for cracks only. Refer to T.O. 2J-F100-9. No cracks allowed.
 - (3) Plasma coat area(3) to 1.257 inch diameter maximum per PWA 53-1 or PWA 53-2. Refer to T.O. 2J-F100-53-1, WP 096 00.
 - (4) Finish machine to dimensions in figure 2.
 - (5) Inspect coating per T.O. 2J-F100-53-1, WP 096 00.
 - (6) Mark beehive symbol per T.O. 2J-F100-53-1, WP 023 00.

5. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (SINGLE LAND) - HEATSHIELD CRACK WELD REPAIR.

(See Figure 3.)

- a. Repair air sealing ring heatshield cracks as follows:

- (1) Remove pin(1) per paragraph 2.
- (2) Clean per SPOP 209. Refer to T.O. 2-1-111.
- (3) Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

It is recommended that carbide or cobalt drills be used for stop drilling operations.

- (4) Stop drill(3) all cracks to depth(8) shown using 0.060 to 0.080 inch drill. Locate center of hole(4) 0.060 to 0.080 inch from end of crack.
- (5) Machine cracks within dimensions(7, 8, and 9) along line of crack extending into stop drilled holes at both ends.

Legend for figure 3

1. PN 4075868 pin
2. 0.250 inch
3. 0.060 to 0.080 inch stop drill both ends, all cracks to depth(8) shown or through one thickness only. No damage to inner heatshields permitted.
4. 0.060 to 0.080 inch from end of crack to centerline of stop drilled holes, both ends.
5. Weld per text. Use AMS 5837 welding wire. Stress-relief not required.
6. Weld per text. Use AMS 5837 welding wire. Stress-relief required.
7. 0.040 inch maximum. Machine slot as shown within this dimension along line of crack and extending into stop drilled holes, both ends.
8. 0.010 inch maximum permissible hole and slot depth at bosses only.
9. 0.040 inch maximum. Machine slot through one thickness within this dimension to remove damaged area and extend into stop drilled holes, both ends.

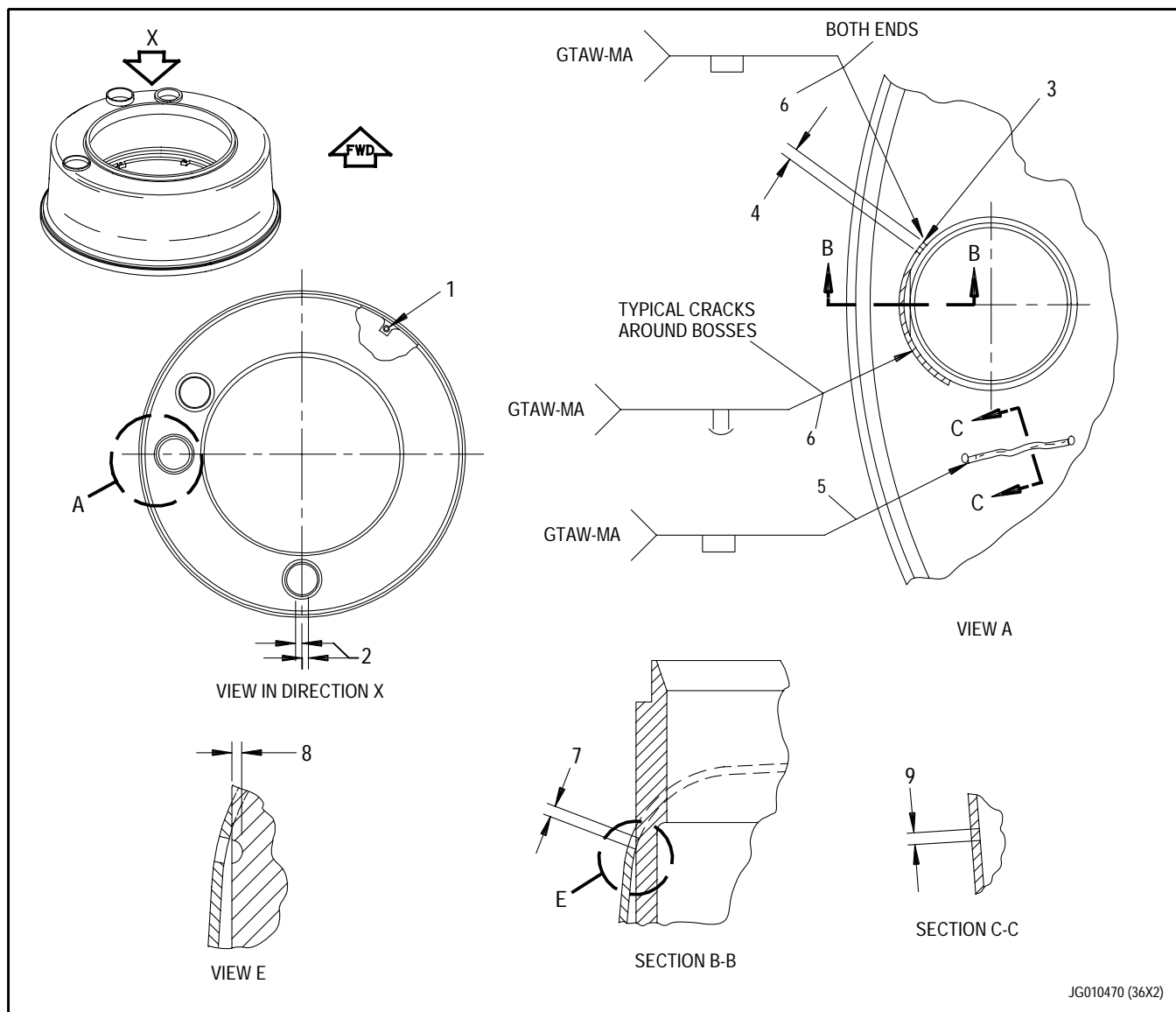


Figure 3. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Heatshield Crack Weld Repair

- (6) Clean per SPOP 209 to remove fluorescent penetrant. Refer to T.O. 2-1-111.

NOTE

After repair, contour of repaired area (View A) shall be within 0.050 inch of existing contour, except in area (2), where contour shall be within 0.020 inch of existing contour.

- (7) Start weld(6) in crack area and complete weld(6) in stop drilled holes. Inert gas fusion weld using AMS 5837 welding wire. Refer to T.O. 2J-F100-53-1, SWP 093 01.
- (8) Inert gas fusion weld(5) crack and holes using AMS 5837 welding wire. Refer to T.O. 2J-F100-53-1, SWP 093 01.
- (9) Fluorescent penetrant inspect weld and heat affected areas. Refer to T.O. 2J-F100-9. No cracks allowed.
- (10) Drain all cleaning material from sealing ring cavities.
- (11) Precipitation heat treat weld(6) areas. Weld(5) areas do not require stress-relief. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.

- (11a) Ensure contour of repaired area (View A) is within 0.050 inch of existing contour, except in area (2), where contour shall be within 0.020 inch of existing contour.

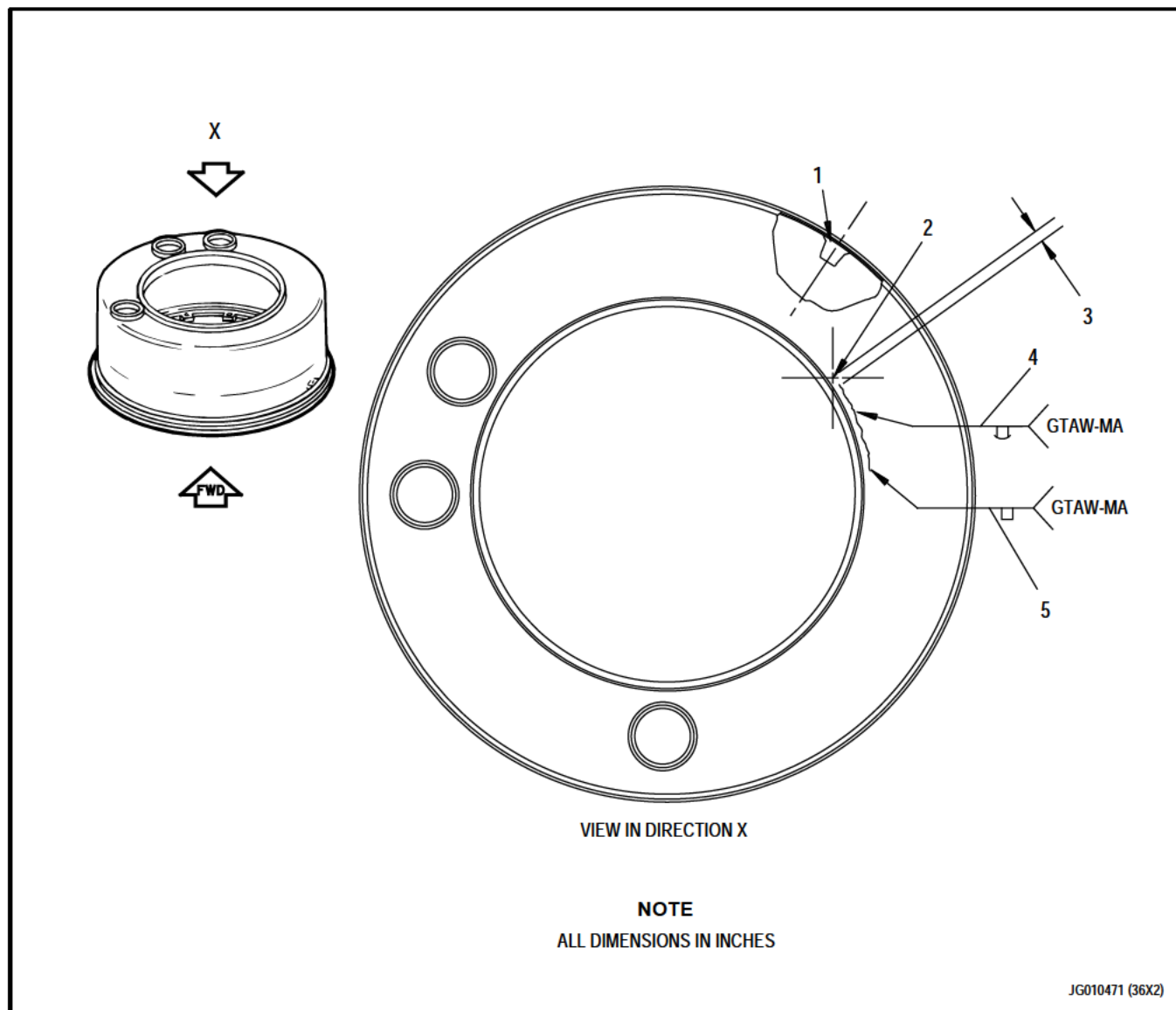
- (12) Fluorescent penetrant inspect weld and heat affected areas. Refer to T.O. 2J-F100-9. No cracks allowed. Do not submerge part in penetrant to prevent entrapment of fluid between walls.

- (13) Replace pin(1) removed in step a., per paragraph 2.

6. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (SINGLE LAND) - HEATSHIELD CRACK WELD REPAIR AROUND ID LAND.

(See Figure 4.)

- a. Remove pin(1, figure 4) per paragraph 2.
- b. Clean air sealing ring assembly per SPOP 209. Refer to T.O. 2-1-111.



1. Pin
2. 0.060 to 0.080 inch stop drill hole, both ends, 0.010 inch deep or through one hole thickness only.
3. 0.060 to 0.080 inch from end of crack to centerline of stop drill hole, both ends.
4. At both ends.
5. Typical crack around ID land.

Figure 4. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) Crack Weld Repair Around ID Land

- c. Fluorescent penetrant inspect.
Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

Carbide or cobalt drill bits are recommended for stop drilling.

- d. Stop drill(2) all cracks. Do not damage inner heatshield when stop drilling. Stop drill as follows:

- (1) Use 0.060 to 0.080 inch drill bit.
- (2) Locate center of hole(3) 0.060 to 0.080 inch from each end of crack.
- (3) Drill holes to 0.010 inch deep or through one wall thickness only.
- (4) Drill both ends of crack.

- e. Clean air sealing ring assembly per SPOP 209 to remove fluorescent penetrant. Refer to T.O. 2-1-111.

- f. Start weld(4) in crack area and complete weld in stop drilled holes. Inert gas fusion weld using AMS 5837 welding wire. Refer to T.O. 2J-F100-53-1, SWP 093 01.

- g. Blend or machine weld bead flush with forward face of ID land.

- h. Fluorescent penetrant inspect weld and heat affected areas. Refer to T.O. 2J-F100-9. No cracks allowed.

- i. Drain all cleaning material from sealing ring cavities.

- j. Precipitation heat treat welded areas. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.

- k. Fluorescent penetrant inspect weld and heat affected areas. Refer to T.O. 2J-F100-9. No cracks allowed. Do not submerge part in penetrant. Fluid trapped between walls can cause part failure due to stress corrosion.

- l. Drain any cleaning material from sealing ring cavities.

- m. Replace pin(1) removed in step a. per paragraph 2.

7. NO. 4 BEARING FRONT AIR SEALING RING ASSEMBLY (SINGLE LAND) - HEATSHIELD DENT WELD REPAIR.

(See Figure 5.)

- a. Drill hole in bottom of dent.
- b. Thread bolt or screw into hole with knocker.
- c. Pull or tap out dent.

d. Remove knocker and bolt or screw.

f. Grind weld flush to within 0.005 inch of parent material.

e. Weld hole per paragraph 5.

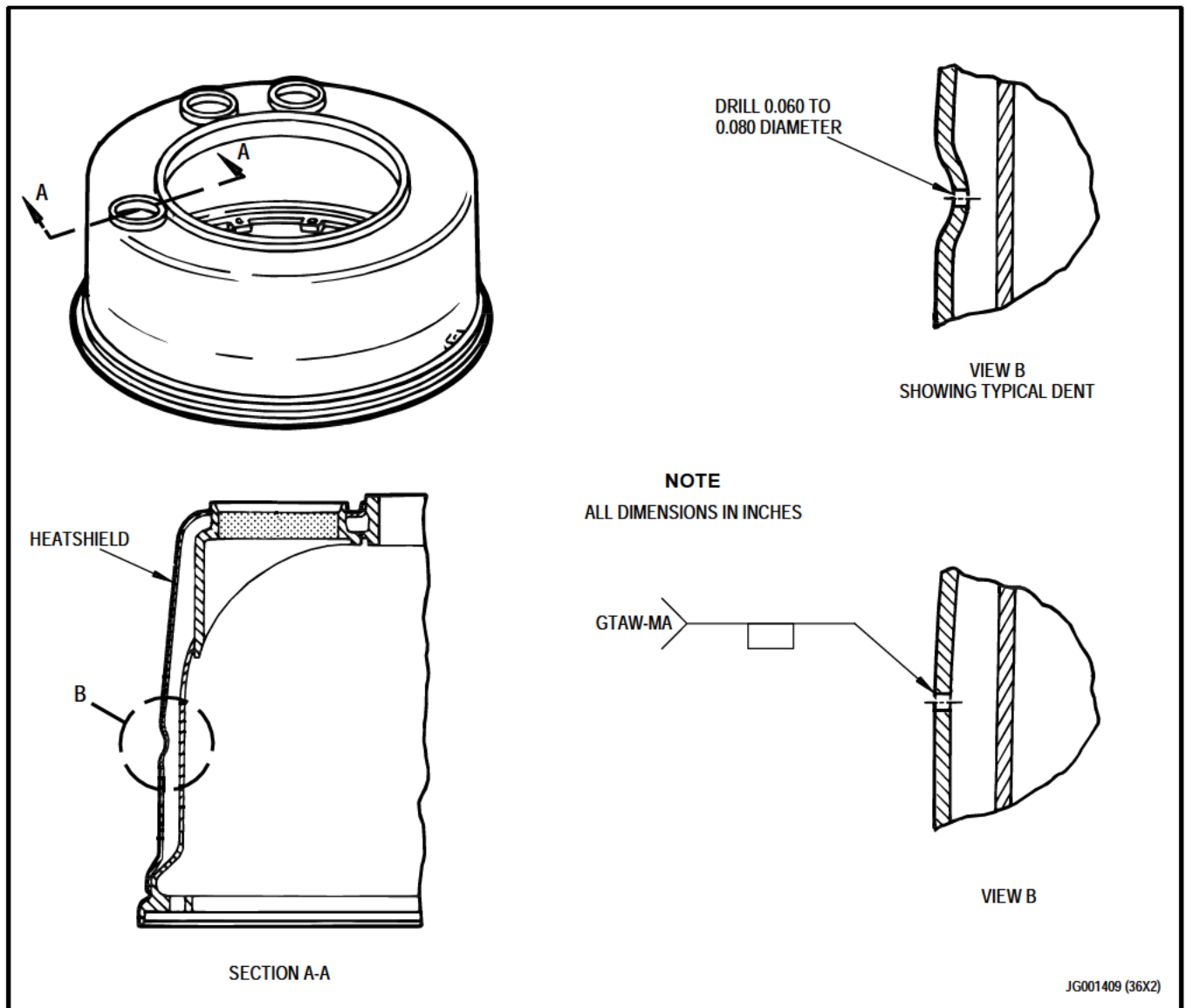


Figure 5. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Heatshield Dent Weld Repair

**8. NO. 4 BEARING FRONT AIR SEALING RING
ASSEMBLY (SINGLE LAND) - PIN HOLE WELD
REPAIR.**

(See Figure 6.)

- a. Remove dowel pin per paragraph 2.
- b. Clean area to be welded per SPOP 209. Refer to T.O. 2-1-111.
- c. Plug weld hole(3) using AMS 5832 filler material. Refer to T.O. 2J-F100-53-1, SWP 093 01. Parent material is AMS 5662 nickel alloy.
- d. Precipitation heat treat welded areas. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.
- e. Machine hole(3) to dimensions shown in figure 6.
- f. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9 and T.O. 2-1-111 SFPS M.
- g. Install new pin per paragraph 2.

Legend for figure 6

- 1. 0.400 to 0.420 inch, 9 places
- 2. 0.172 to 0.203 inch, modified radius
- 3. 11.190 to 11.200 inches, reference
- 4. Chamfer 0.010 to 0.030 inch \times 45° \pm 5°
- 5. 0.110 inch minimum wall thickness
- 6. 0.1235 to 0.1245 inch. Diameter S to be perpendicular to Surface A within 0.002 inch diameter Regardless of Feature Size.
- 7. 12.315 to 12.319 inches, reference
- 8. 0.407 to 0.409 inch
- 9. 0.090 to 0.120 inch, reference
- 10. 0.050 to 0.070 inch, reference

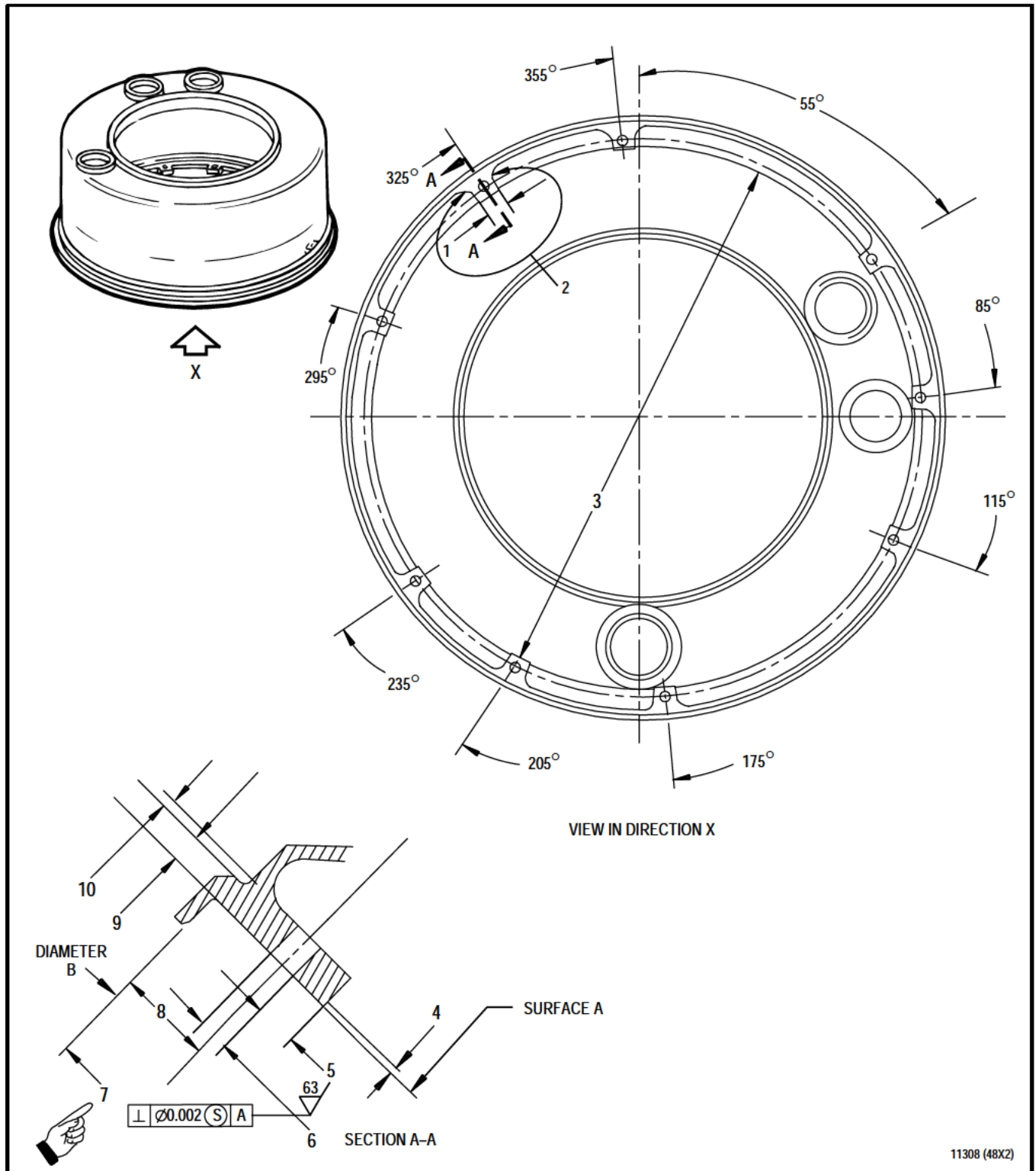


Figure 6. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Pin Hole Weld Repair

**9. NO. 4 BEARING FRONT AIR SEALING RING
ASSEMBLY (SINGLE LAND) - THREADED HOLE
REPAIR.**

(See Figure 7.)

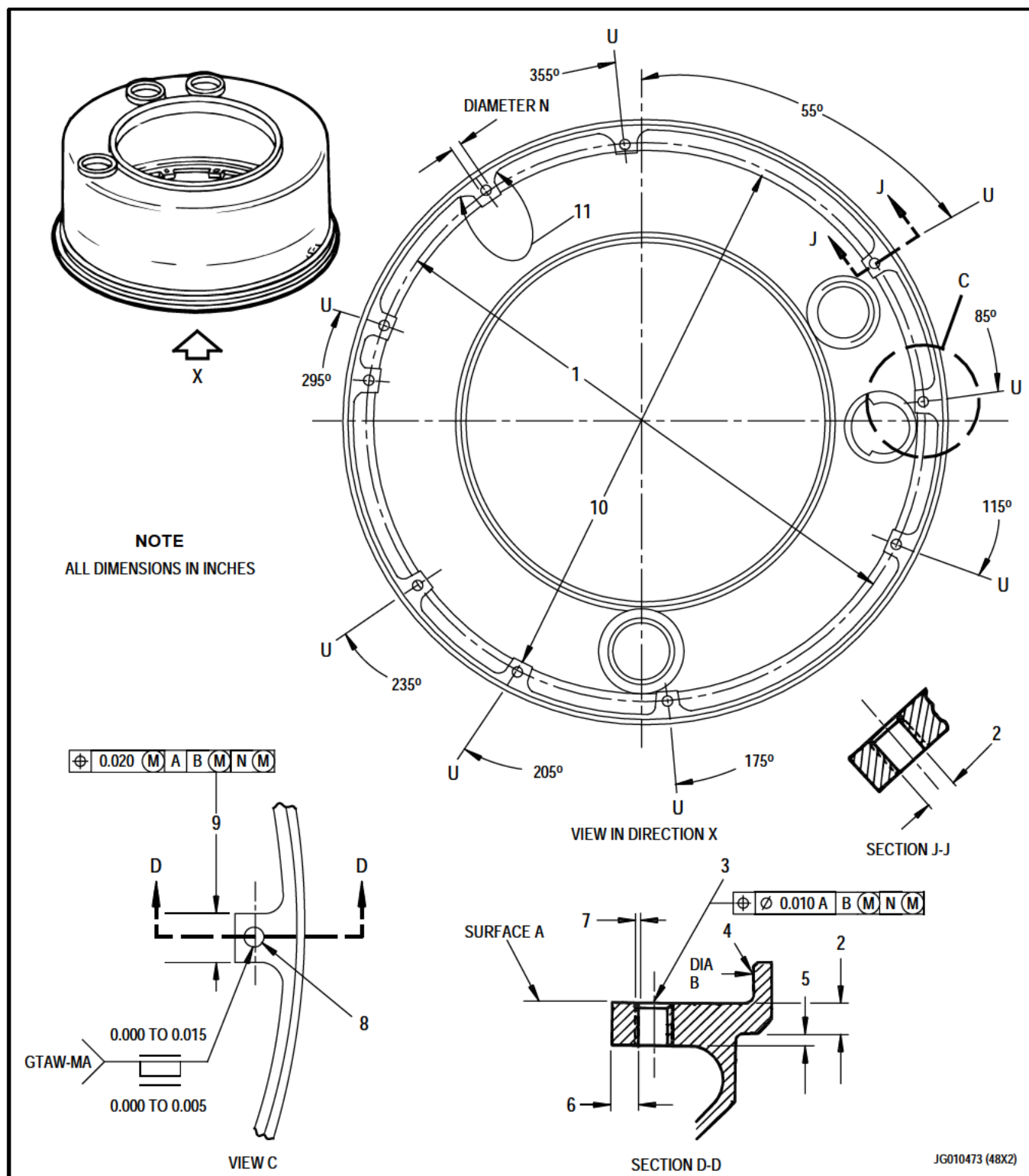
NOTE

If Diameter B was repaired by coating previously, strip coating per paragraph 3. Recoat and finish machine after all welding and heat treatment.

- a. Clean area per SPOP 209. Refer to T.O. 2-1-111.
- b. Remove threads to diameter(8) in figure 7.
- c. Plug weld hole(3) using AMS 5832 filler material. Refer to T.O. 2J-F100-53-1, SWP 093 01. Parent material is AMS 5662 nickel alloy.
- d. Precipitation heat treat welded area. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.
- e. Machine hole(3) to dimensions shown in figure 7.
- f. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9 and T.O. 2-1-111 SFPS M.

Legend for figure 7

1. 11.500 inches diameter
2. 0.090 to 0.120 inch, reference
3. 0.190 - 32 UNFJ - 3B, eight places located at U. Chamfer 90° ±5° inclusive to 0.190 to 0.220 inch diameter located as shown, to be located within 0.010 inch diameter of true position with Surface A and Diameters B, N at Maximum Material Condition.
4. 12.315 to 12.319 inches, reference
5. 0.050 to 0.070 inch, reference
6. 0.095 inch minimum
7. 0.006 inch minimum
8. 0.203 inch diameter maximum before welding
9. 0.400 to 0.420 inch, to be located within 0.020 inch of true position with Surface A and Diameters B, N at Maximum Material Condition.
10. 11.190 to 11.200 inches, reference
11. 0.172 to 0.203 inch, modified radius



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Figure 7. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Threaded Hole Repair

**10. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - AIR SEAL
LAND SURFACE REPAIR.**

(See Figure 8.)

NOTE

Parent material is AMS 5666
nickel alloy.

- a. Machine diameter(1) to dimension shown.
- b. Fluorescent penetrant inspect for cracks. Refer to T.O. 2J-F100-9. No cracks permitted.
- c. Apply PWA 53-37 coating to enclosed area (3), diameter(2). Refer to T.O. 2J-F100-53-1, WP 096 00.
- d. Machine diameter(5) to dimension shown.

e. Visually inspect coating. Refer to T.O. 2-1-111.

f. Permanently mark with beehive symbol. Refer to T.O. 2-1-111 and T.O. 2J-F100-53-1, SWP 023 02.

**11. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - SURFACE
DAMAGE BUFFING REPAIR.**

NOTE

This repair is applicable for surface damage up to 0.010 inch deep maximum, for any length.

- a. Remove surface damage. Refer to T.O. 2J-F100-53-1, SWP 091 02 (SPOP 533). 0.250 inch minimum distance between repair areas.

Legend for figure 8

- 1. 7.343 to 7.365 inch diameter. Hold to minimum value.
- 2. 7.315 inch diameter maximum.
- 3. Plasma coat per text.
- 4. Coat optional and may be incomplete.
- 5. 7.329 to 7.333 inch diameter circular runout with Surface A and Diameter B to be within 0.002 inch.
- 6. Break edges 0.005 to 0.015 inch.
- 7. 0.075 inch minimum (at edge only).

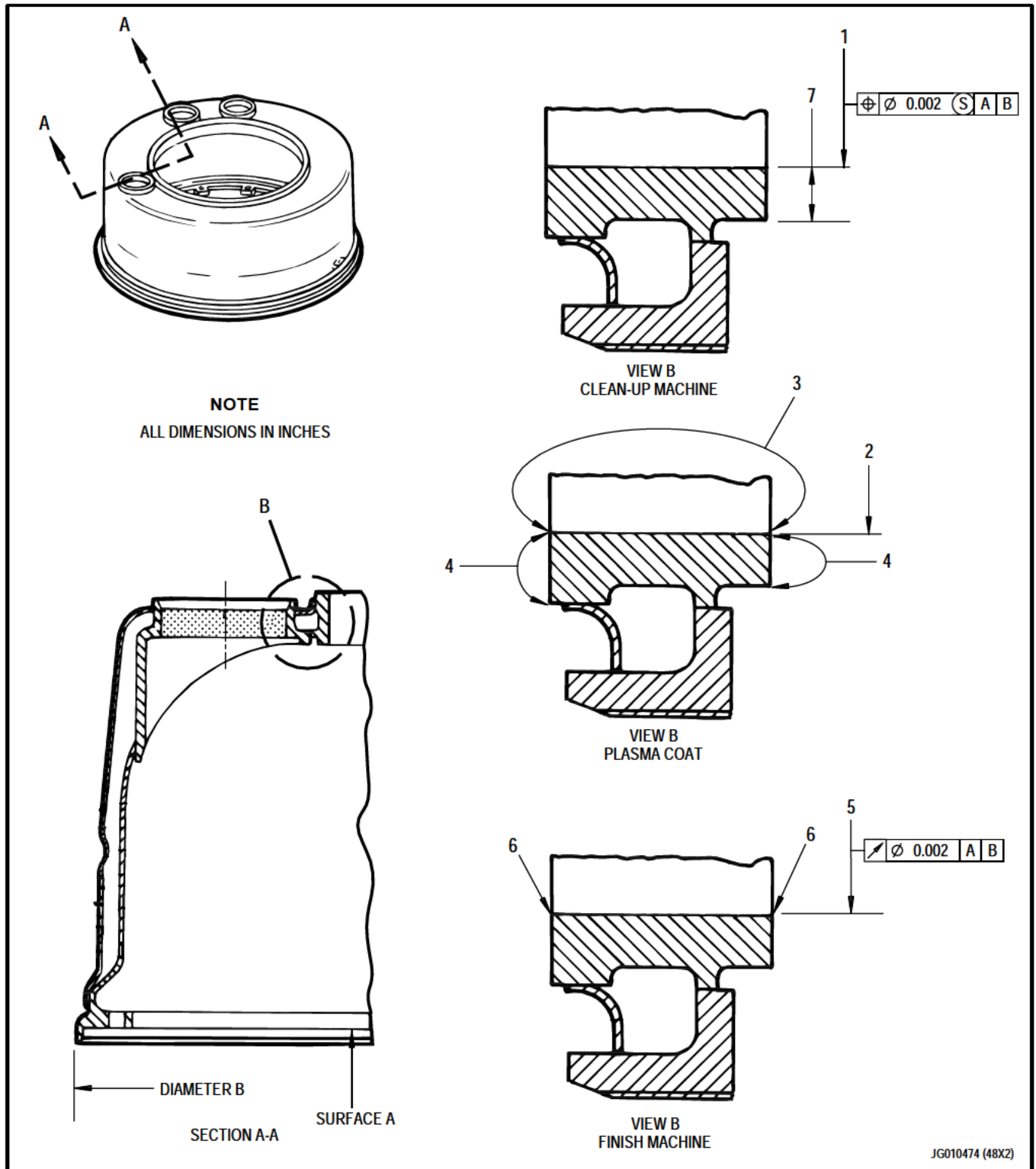


Figure 8. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Air Seal Land Surface Repair

**12. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - PATCH
REPAIR.**

(See Figure 9.)

NOTE

- No more than four repairs total for surface damage or cracks allowed. Distance between repairs shall be 1.000 inch or three times maximum size of patch, whichever is larger.
- Edge of patch shall be at least 0.500 inch from any weld joint.
 - a. Fluorescent penetrant inspect to determine extent of damage. Refer to T.O. 2J-F100-9.
 - b. Cut out damage area as shown in figure 9.
 - c. Fabricate contoured patch from AMS 5599 material 0.023 to 0.027 inch thick.
 - d. Tack weld patch in position and inert gas fusion weld using AMS 5837 filler metal. Refer to T.O. 2J-F100-53-1, SWP 093 01. Parent material is AMS 5599.
 - e. If weld or heating is used in area(1), precipitation heat treat area. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.

NOTE

Contour of repaired area shall be within ± 0.030 inch of original part contour.

- f. Fluorescent penetrant inspect. Refer to T.O. 2J-F100-9 and T.O. 2-1-111, SFPS 38.

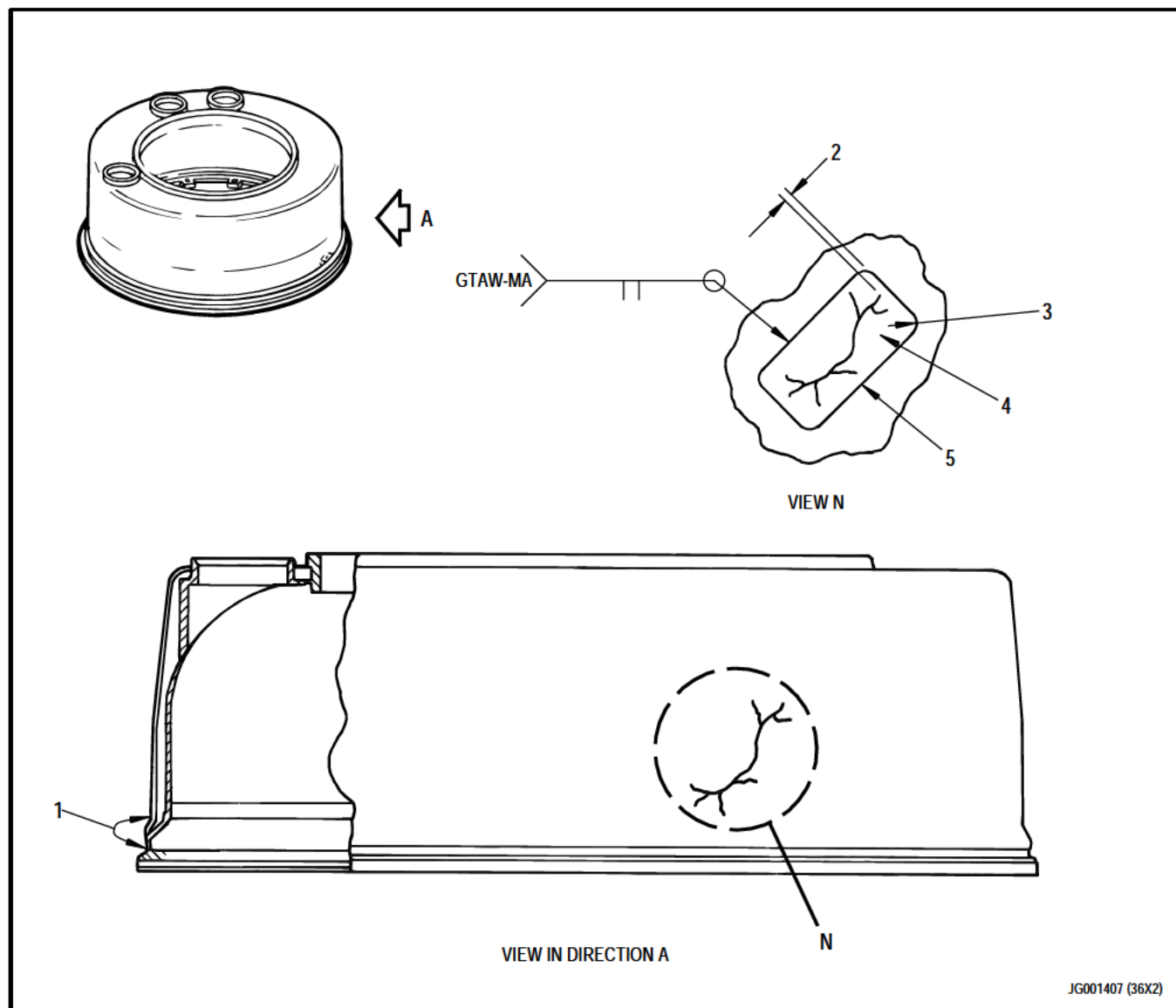


Figure 9. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Patch Repair

**13. NO. 4 BEARING FRONT AIR SEALING
RING ASSEMBLY (SINGLE LAND) - SUPPORT
REPAIR.**

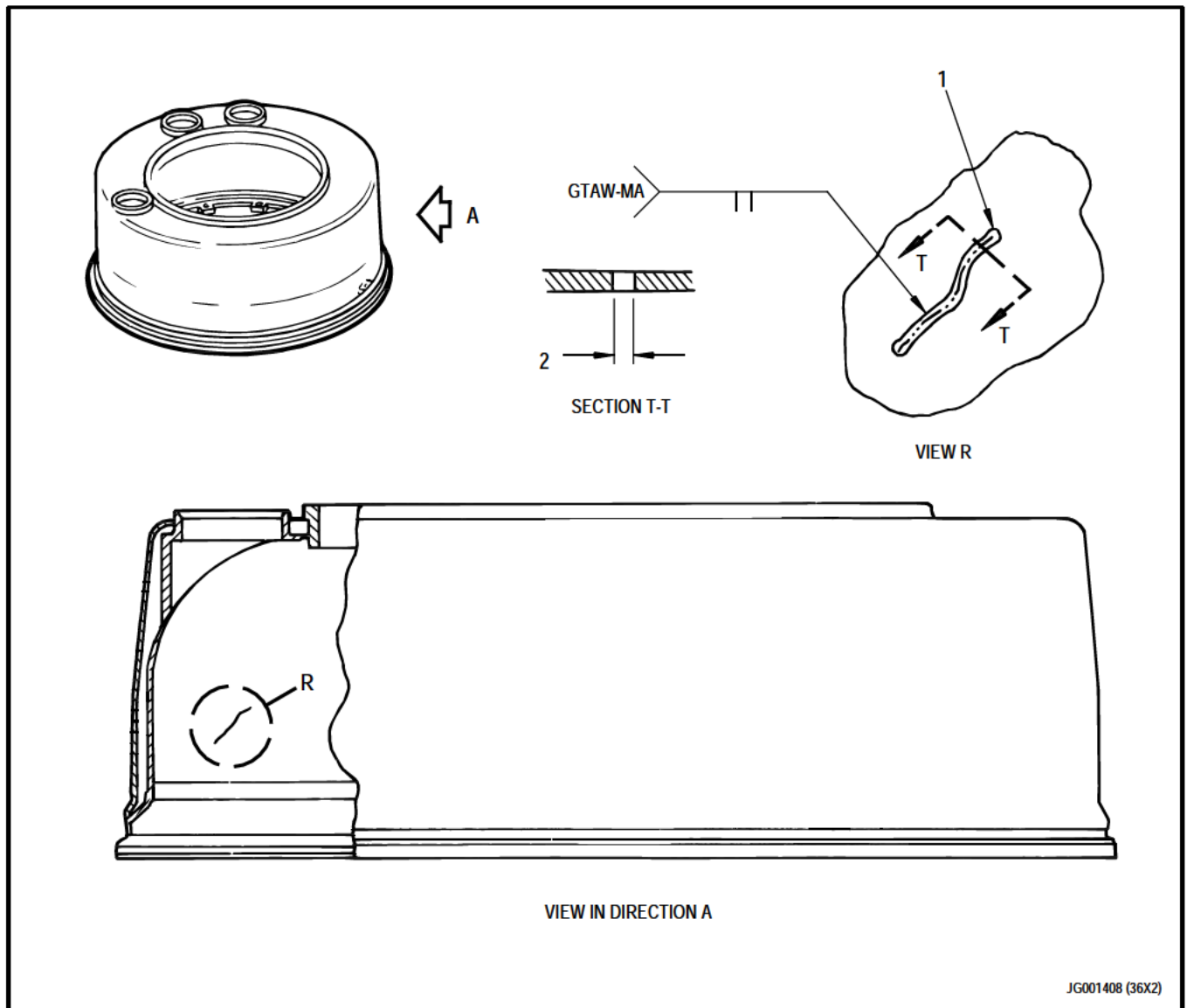
(See Figure 10.)

- a. Stop drill slot damaged area(1) as shown in figure 10. Unless otherwise specified, stop drill and slotting through one thickness only. Do not damage adjacent wall.
- b. Weld slot using AMS 5832 filler material. Refer to T.O. 2J-F100-53-1, SWP 093 01. Parent material is AMS 5596 nickel alloy.
- c. Precipitation heat treat welded area. Refer to T.O. 2J-F100-53-1, SWP 095 01. Use cycle 12A except local heating may be used. If oven heating is used, part must be checked for presence of plasma spray per paragraph 3. If plasma spray (PWA 53-5) is present, it must be stripped and recoated after heat treat.

NOTE

Contour of repaired area shall be within ± 0.030 inch of original part contour.

- d. Fluorescent penetrant inspect for cracks. Refer to T.O. 2J-F100-9. No cracks permitted.



1. 0.060 to 0.080 inch diameter, both ends of repair.
2. 0.060 inch maximum. Machine slot within this dimension to remove damage area. Slot to extend to drilled holes.

Figure 10. No. 4 Bearing Front Air Sealing Ring Assembly (Single Land) - Support Repair

**14. NO. 4 BEARING FRONT AIR SEALING RING
ASSEMBLY METAL SEAL RING CONTACT
SURFACE - PLASMA SPRAY SLEEVE REPAIR**

(See Figures 11 through 13.)



Failure to remove all coatings prior to repair may cause failure of repair.

- a. Ensure all coatings are removed prior to repair and reapplied after repair is complete.
- b. Install No. 4 front air sealing ring assembly into PWA 71318 fixture as follows:
 - (1) Ensure PWA 71318 fixture is secured to grinding machine.
 - (2) Wipe clean work surface and fixture.
 - (3) Loosen six detail-43 hook clamps and rotate outward.

NOTE

Fixture can be altered to allow installation of No. 4 front air sealing ring assembly with or without anti-rotation pin installed.

- (4) Determine if anti-rotation pin has or has not been removed from No. 4 front air sealing ring assembly. Install detail-46 bushing if anti-rotation pin has not been removed. Install detail-8 diamond locating pin if anti-rotation pin has been removed.

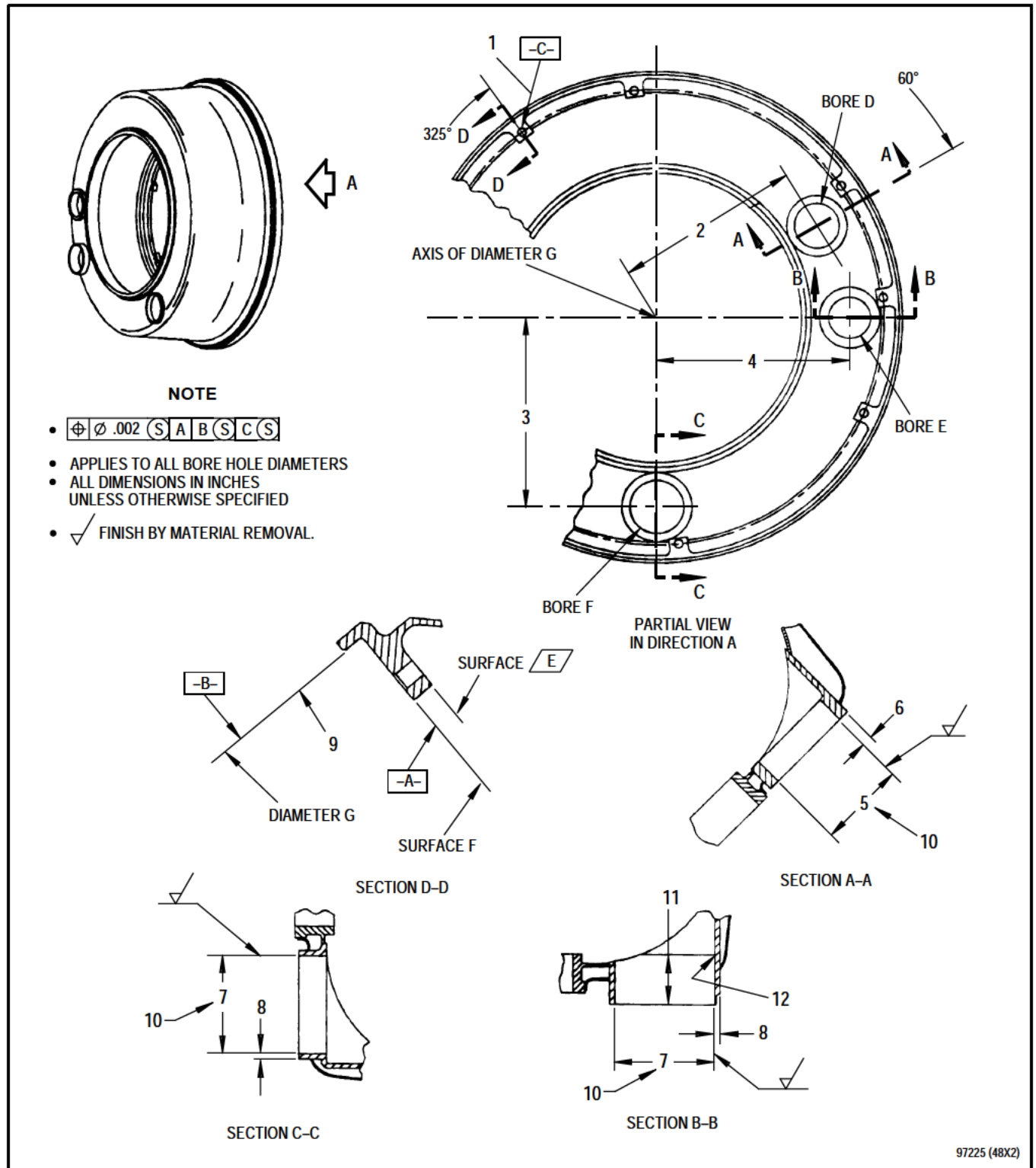
- (5) Position large diameter of No. 4 front air sealing ring assembly onto fixture locating ring. Align anti-rotation pin or hole with appropriate bushing or diamond locating pin.

- (6) Ensure No. 4 front air sealing ring assembly is fully seated. Swing six hook clamps inward and secure.

NOTE

When one bore hole requires repair, all three bore holes shall be repaired.

- c. Machine bore holes to dimensions in figure 11. All three bore holes will be repaired.
- d. Remove No. 4 front air sealing ring assembly from PWA 71318 fixture.
- e. Clean bore holes per SPOP 209. Refer to T.O. 2-1-111.
- f. Fluorescent penetrant inspect machined surface per SPOP 82. Inspect per SFPS-M except no cracks allowed. Refer to T.O. 2J-F100-9 and T.O. 2-1-111.
- g. Prepare sleeves and ring assembly for brazing per PWA 19. Refer to T.O. 2-1-111. Nickel flash only surfaces to be brazed.
- h. Apply PMC 1642 or PMC 2266 stop-off on sleeve flange to prevent brazing flange to parent material. See figure 12. Refer to T.O. 2-1-111.
- i. Insert correct sleeves into bore holes. See figure 12.
- j. Maintain gap of 0.0005 to 0.002 inch, 360 degrees, between sleeve and parent material wall. Use braze foil, if desired, to ensure gap requirement is met.



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Legend for figure 11

NOTE

All dimensions apply when Surface F is flat within 0.001 inch and Diameter G maintains a clearance envelope of diameter 12.314 inches in free state or constrained. Constraint contact allowed only on Surfaces E, F, and Diameter G. In free state Surface F is flat within 0.005 inch and Diameter G is 12.225 to 12.409 inches.

1. 0.1235 to 0.1245 inch diameter hole, reference
2. 4.680 inch
3. 4.738 inch
4. 4.900 inch
5. 1.187 to 1.188 inch diameter, clean up machine, Bore D.
6. 0.145 inch, minimum wall thickness of boss
7. 1.337 to 1.338 inch diameter, clean up machine, Bore E and F.
8. 0.070 inch, minimum wall thickness of boss
9. 12.315 to 12.319 inches, average diameter, reference
10. The diameter shall be located within 0.002 inch diameter of true position in relation to Surface -A-, Diameter -B- and Diameter -C-, regardless of feature size.
11. 0.720 to 0.740 inch depth, diameter (7) for this distance
12. 0.020 inch, modified radius, minimum, if present

Legend for figure 12

- | | |
|-----------------------------------|---------------|
| 1. 0.1235 to 0.1245 inch diameter | 2. PN 4082889 |
| hole, reference | 3. PN 4082888 |

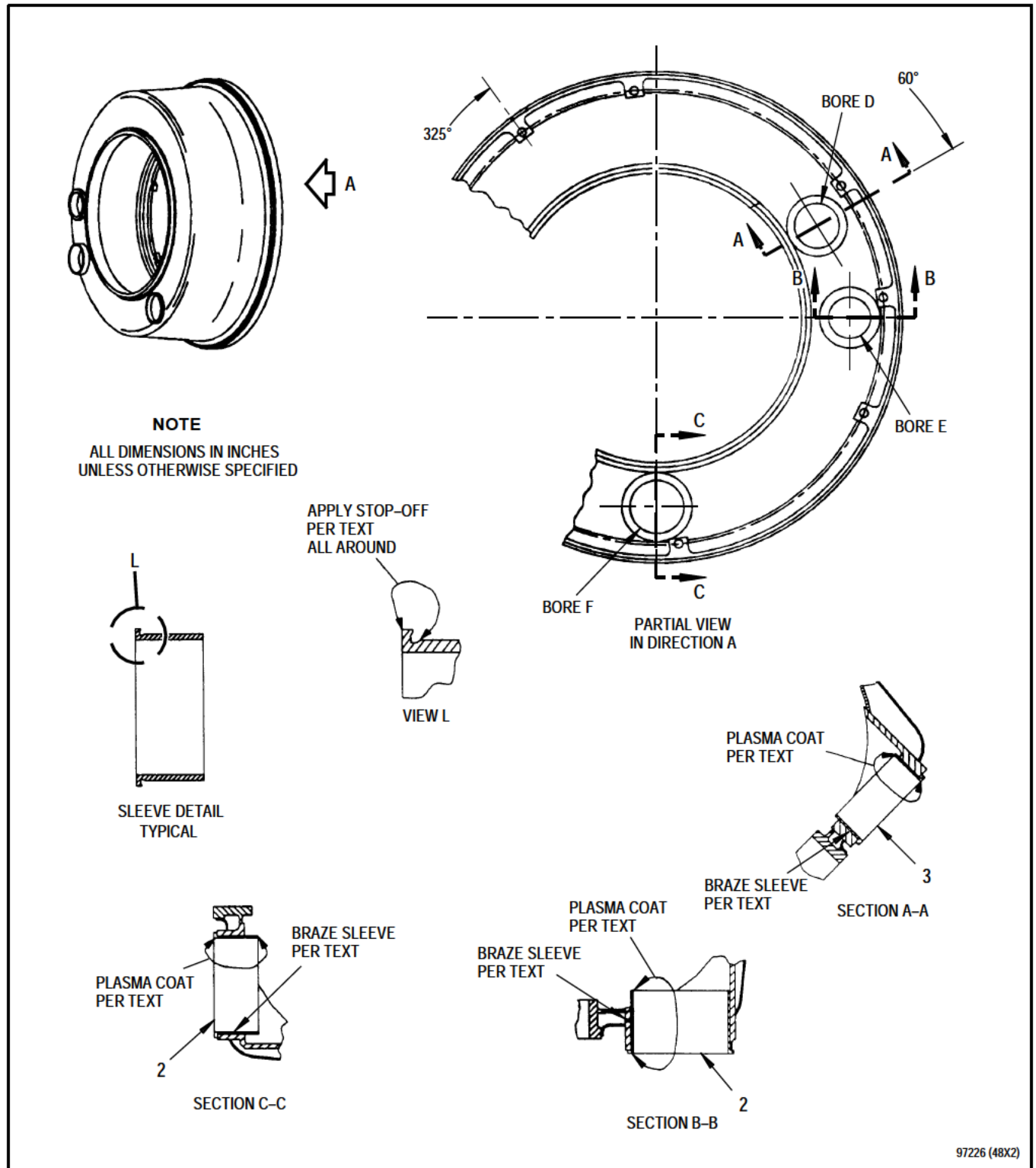


Figure 12. No. 4 Bearing Front Air Sealing Flange Metal Seal Ring Contact Surface - Sleeve Repair (Sleeve Installation and Plasma Spray)

k. Braze sleeves per PWA 19 using AMS 4787 brazing filler metal as follows (refer to T.O. 2-1-111):

- (1) Place No. 4 bearing front air sealing ring assembly, smaller diameter up, onto PWA 71319 fixture. Lower air sealing ring until rear face of seal land, located on top inner diameter of air sealing ring, rests on top of fixture top plate. Fixture must be used during braze heating to maintain critical dimensional relationships of air sealing ring.



Failure to ensure No. 4 bearing front air sealing ring assembly is held securely in fixture prior to heating may result in damage to part.

- (2) Braze sleeves per SPOP 762, except heat 1800° to 1850°F (982° to 1010°C) for 10 to 20 minutes. Cool at a rate of 40°F per minute or equivalent.
- (3) Precipitation heat treat per SPOP 767.
- (4) Hardness of air seals shall be a minimum of HRC 34 after heat treatment.

l. Remove air sealing ring assembly from PWA 71319 fixture.

m. Visually inspect braze to ensure full penetration. Ensure 100% coverage on side where filler metal was introduced.

n. Radiographic inspect braze. Refer to T.O. 2-1-111. Brazed surface area coverage shall be 80%.

o. Prepare machined surfaces per PWA 53. Refer to T.O. 2-1-111.

p. Place PWA 71320 fixture onto PWA 70911 adapter. Ensure three holes in fixture base align with locator pins of adapter.

q. Install No. 4 bearing front air sealing ring assembly onto PWA 71320 fixture as follows:

- (1) Loosen stop screw and slide location bar outward. Retract strap clamps and trap blocks by loosening screws.
- (2) Ensure sub-base is free to rotate using handles on outer diameter of locating ring assembly.

NOTE

Fixture can be altered to allow installation of No. 4 front air sealing ring assembly with or without anti-rotation pin installed.

(3) Determine if anti-rotation pin has or has not been removed from No. 4 front air sealing ring assembly. Install detail-53 bushing if anti-rotation pin has not been removed. Install detail-8 diamond locating pin if anti-rotation pin has been removed.

(4) Position large diameter of No. 4 front air sealing ring assembly onto fixture locating ring. Align anti-rotation pin or hole with appropriate bushing or diamond locating pin, also locate bushing sleeves with tube assemblies of fixture.

(5) Ensure No. 4 front air sealing ring assembly is fully seated.

(6) Swing hook clamps over rear flange of air sealing ring and secure with hex screws.

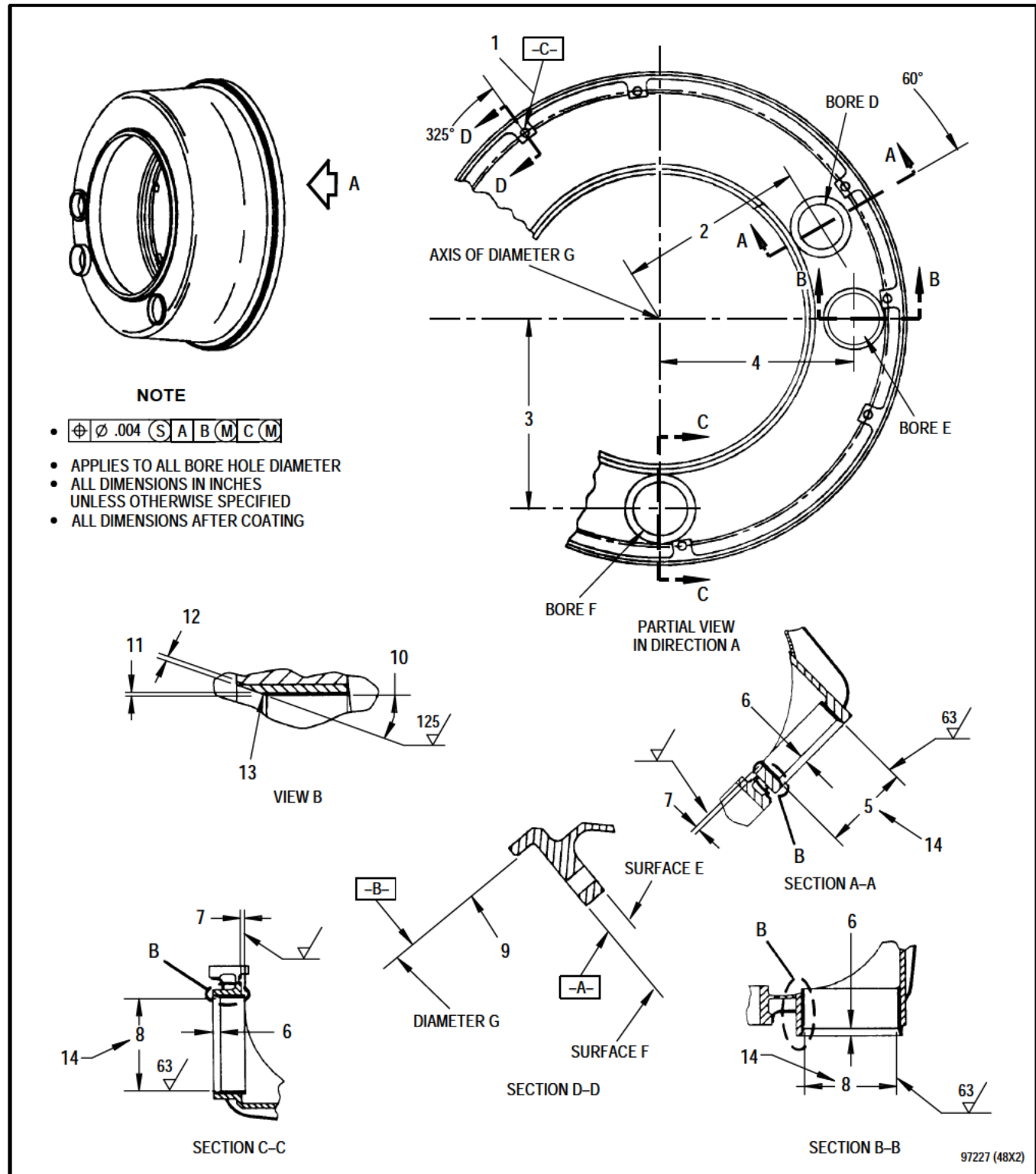
- (7) Install PWA 71321 mask onto PWA 71320 fixture aligning holes in mask with fixture pins. Place three plugs in air sealing ring sleeve holes.
- (8) Rotate sub-base using handles until desired sleeve is in center of PWA 71320 fixture. Insert locating bar into slot on outside of sub-base and tighten screw to lock position. Slide clamp straps and trap blocks into position and lock by tightening screws.
- (9) Remove PWA 71321 mask plug to expose desired bushing sleeve to be grit blasted or plasma coated. Replace plug and re-index remaining bushing sleeves to repeat process.
- r. Final plasma coating shall be 0.003 to 0.010 inch thick. Coat sleeve ID per PWA 53-5 or PWA 256-2. Refer to T.O. 2-1-111.
- s. Finish machine bore holes to dimensions in figure 13.
- t. Chamfer bore holes and machine sleeve using PWA 71708 cutter. See dimensions in figure 13.
- u. Surface finish for plasma sprayed areas shall be 63AA or better.
- v. Clean ring per SPOP 209, refer to T.O. 2-1-111.
- w. Visually inspect machined area. No grooves, steps, scratches or discontinuities allowed.
- x. Use shallow electrolytic etch or vibration method to permanently mark part with beehive symbol in area adjacent to part number. Refer to T.O. 2-1-111, SPOP 401.

Legend for figure 13

NOTE

All dimensions apply when Surface F is flat within 0.001 inch and Diameter G maintains a clearance envelope of diameter 12.314 inches in free state or constrained. Constraint contact allowed only on Surfaces E, F, and Diameter G. In free state Surface F is flat within 0.005 inch and Diameter G is 12.225 to 12.409 inches.

1. 0.1235 to 0.1245 inch diameter hole
2. 4.680 inches
3. 4.738 inches
4. 4.900 inches
5. 1.119 to 1.121 inch diameter, finish machine final plasma coat, Bore D.
6. 0.090 to 0.110 inch
7. 0.000 to 0.020 inch
8. 1.269 to 1.271 inch diameter, finish machine final plasma coat, Bores E and F.
9. 12.315 to 12.319 inches, average diameter, reference
10. Chamfer 18° to 22°
11. 0.003 inch, minimum coating
12. 0.010 inch, maximum mismatch
13. Break edge 0.003 to 0.010 inch
14. Diameter shall be located within 0.004 inch diameter of true position in relation to Surface -A-, Diameter -B- and Diameter -C-. Tolerance applies when Diameter -B- and -C- are at Maximum Material Condition.



WORK PACKAGE

TECHNICAL PROCEDURES

FLANGE - NO. 4 BEARING AIR SEALING RING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 20

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 20		25			

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts by Aqueous Cleaning - - - - -	SPOP 209
Electrochemical Marking - - - - -	SPOP 401
Standard Fluorescent Penetrant Inspection - - - - -	SPOP 62
Standard Fluorescent Penetrant Inspection (Local Application) - - - - -	SPOP 70
Solution Heat Treat Cycle 102 - - - - -	SPOP 762
Solution Heat Treat Cycle 107 - - - - -	SPOP 767

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BRAZE FOIL	-
BRAZING FILLER METAL, GOLD-NICKEL ALLOY	AMS 4787
CLOTH, ABRASIVE, CROCUS	A-A-1206
STOP-OFF	PMC 1642 OR PMC 2266
WIRE, WELDING	AMS 5832 (INCONEL 718)
WIRE, WELDING	AMS 5837 (INCONEL 625)

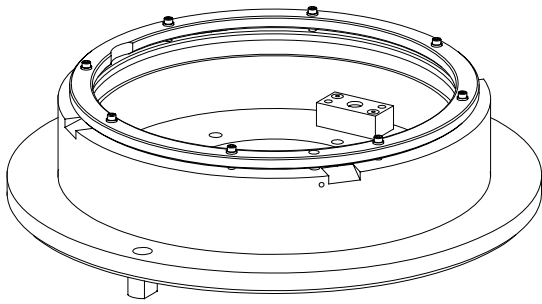
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BUSHING-SLEEVE, FLANGED	4080719	1
BUSHING-SLEEVE, FLANGED	4080978	2

APPLICABLE SUPPORT EQUIPMENT

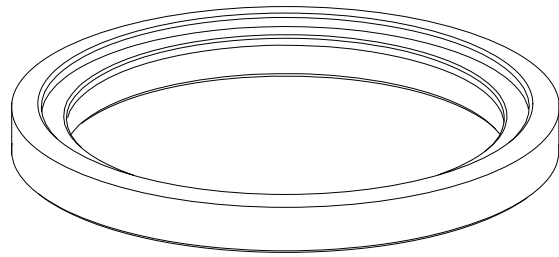
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 4 BEARING FRONT AIR SEALING RING FLANGE, METAL SEAL RING CONTACT SURFACE - PLASMA SPRAY REPAIR	
	FIXTURE, MACHINE, NO. 4 BEARING AIRSEAL FLANGE - - -	PWA 71314
	FIXTURE, BRAZE, NO. 4 BEARING AIRSEAL FLANGE - - - -	PWA 71315
	FIXTURE, PLASMA, NO. 4 BEARING AIR SEAL, FLANGE - - -	PWA 71316
	FIXTURE, MASK, NO. 4 BEARING AIR SEAL, FLANGE - - - -	PWA 71317
	CUTTER, SPECIAL, CUBIC BORON NITRIDE, 19 TO 21 DEGREE ANGLE - - - - -	PWA 71708
3	NO. 4 BEARING FRONT AIR SEALING RING FLANGE, METAL SEAL RING CONTACT SURFACE - SLEEVE REPAIR	
	FIXTURE, MACHINE, NO. 4 BEARING AIRSEAL FLANGE - - -	PWA 71314
	FIXTURE, BRAZE, NO. 4 BEARING AIRSEAL FLANGE - - - -	PWA 71315
	FIXTURE, PLASMA, NO. 4 BEARING AIR SEAL, FLANGE - - -	PWA 71316
	FIXTURE, MASK, NO. 4 BEARING AIR SEAL, FLANGE - - - -	PWA 71317
	CUTTER, SPECIAL, CUBIC BORON NITRIDE, 19 TO 21 DEGREE ANGLE - - - - -	PWA 71708

ILLUSTRATED SUPPORT EQUIPMENT



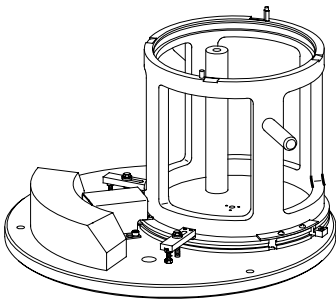
PWA 71314 -C

Figure T1. PWA 71314 FIXTURE



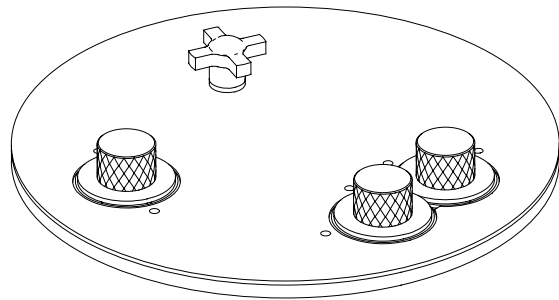
PWA 71315 -C

Figure T2. PWA 71315 FIXTURE



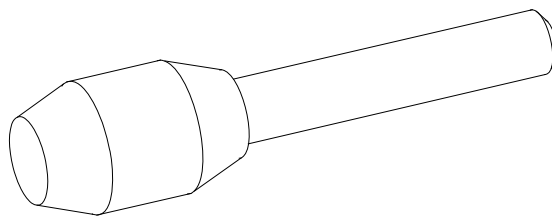
PWA 71316 -C

Figure T3. PWA 71316 FIXTURE



PWA 71317 -C

Figure T4. PWA 71317 FIXTURE



PWA 71708 -C

Figure T5. PWA 71708 CUTTER

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing front air sealing ring flange.

2. NO. 4 BEARING FRONT AIR SEALING RING FLANGE, METAL SEAL RING CONTACT SURFACE - PLASMA SPRAY REPAIR.

(See Figure 1.)



Failure to remove all coatings prior to repair may cause failure of repair.

- a. Ensure all coatings are removed prior to repair and reapplied after repair is complete.
- b. Install No. 4 front air sealing ring flange into PWA 71314 fixture as follows:
 - (1) Ensure PWA 71314 fixture is secured to grinding machine. Establish zero position of fixture using hole in detail-12 block.
 - (2) Wipe clean work surface and fixture.
 - (3) Loosen eight detail-35 screws and remove ring clamp.
 - (4) Lift No. 4 bearing airseal flange with large bolt circle facing up. Rotate flange until largest bushing sleeve is closest to operator. Identify two larger holes on large bolt circle at approximately 5 and 10 o'clock.
 - (5) Position No. 4 bearing airseal flange onto fixture, large bolt circle up, indexing large hole at 10 o'clock with detail-26 pin. Ensure that airseal flange is fully seated.
 - (6) Install clamp ring aligning 0.314 inch hole with detail-26 pin. Secure clamp ring with eight detail-35 screws.

NOTE

When one bore hole requires repair, all three bore holes shall be repaired.

- c. Machine bore holes to dimensions(4, 7, and 10) in figure 1. All three bore holes will be repaired.
- d. Remove No. 4 front air sealing ring flange from PWA 71314 fixture.
- e. Clean flange and bore holes per SPOP 209. Refer to T.O. 2-1-111.
- f. Inspect surface for galled surface clean-up. If clean-up can not be accomplished within limits of dimensions(4, 7, and 10), discontinue repair and refer to paragraph 3.

g. Fluorescent penetrant inspect per SPOP 70. Refer to T.O. 2-1-111. Inspect machined surface to following definitions and limits:

(1) Inspection definitions are as follows:

- Discrete discontinuity: Well defined individual recess, cavity, or inclusion.
- Linear discontinuity: Discontinuity with ratio of length to width greater than three. This includes cracks or any discontinuity containing a crack.
- Cluster: Two or more discrete discontinuities separated by less than three times length of largest adjacent discontinuity.

(2) Limits are as follows:

- (a) Any number of discontinuities acceptable if less than 0.015 inch long or

0.010 inch deep with minimum separation of 0.125 inch.

(b) Maximum of six discrete non-linear discontinuities, 0.032 inch long per metal seal ring contact surface. No linear discontinuities allowed.

(c) One non-linear cluster, 0.125 inch long, consisting of one non-linear discontinuity, 0.032 inch long, and all other non-linear discontinuities less than 0.015 inch long, as permitted above, per metal seal ring contact surface.

(d) No linear clusters or linear discontinuities within clusters permitted.

(e) No cracks allowed.

h. Prepare machined surfaces per PWA 53. Refer to T.O. 2-1-111.

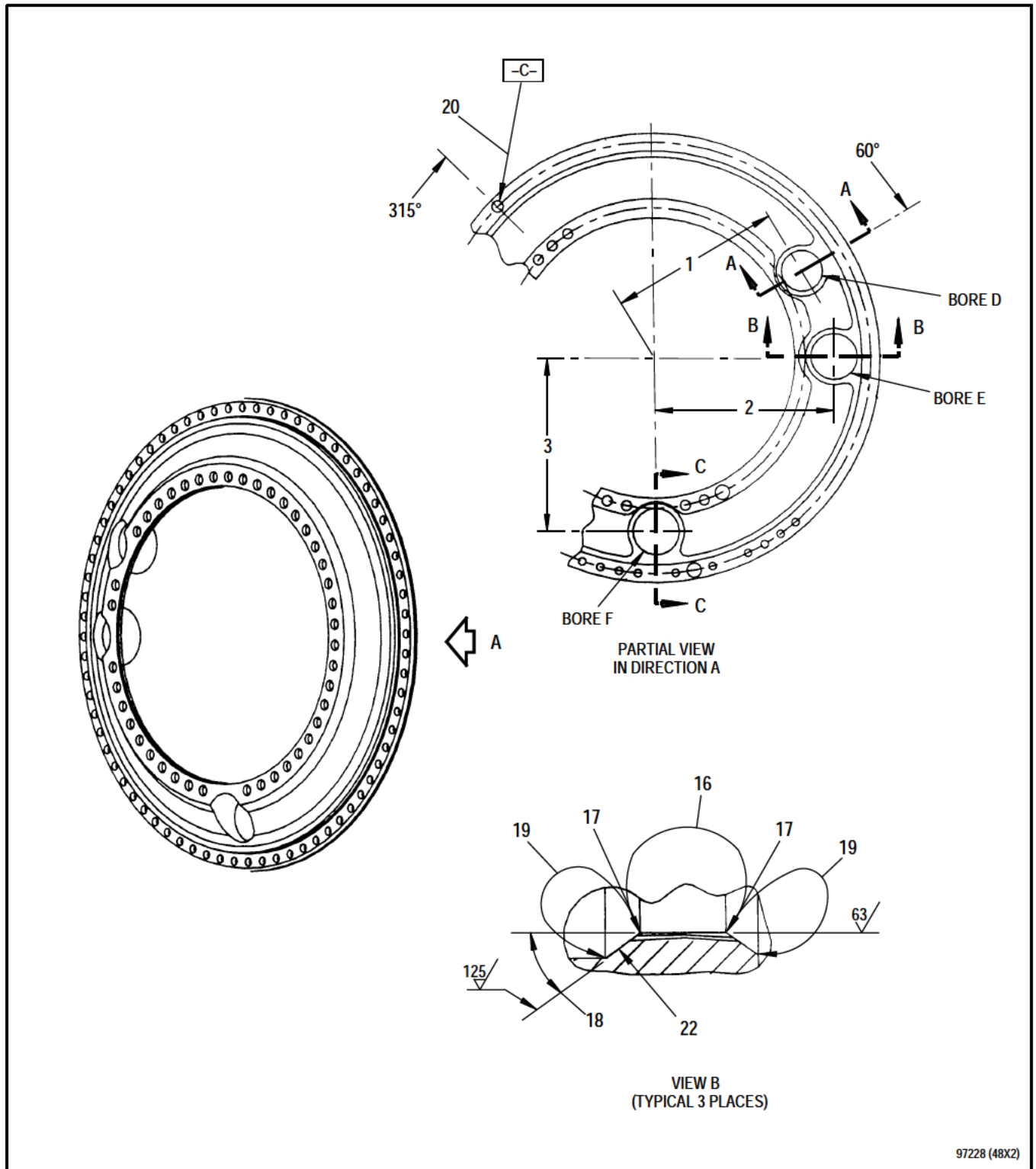
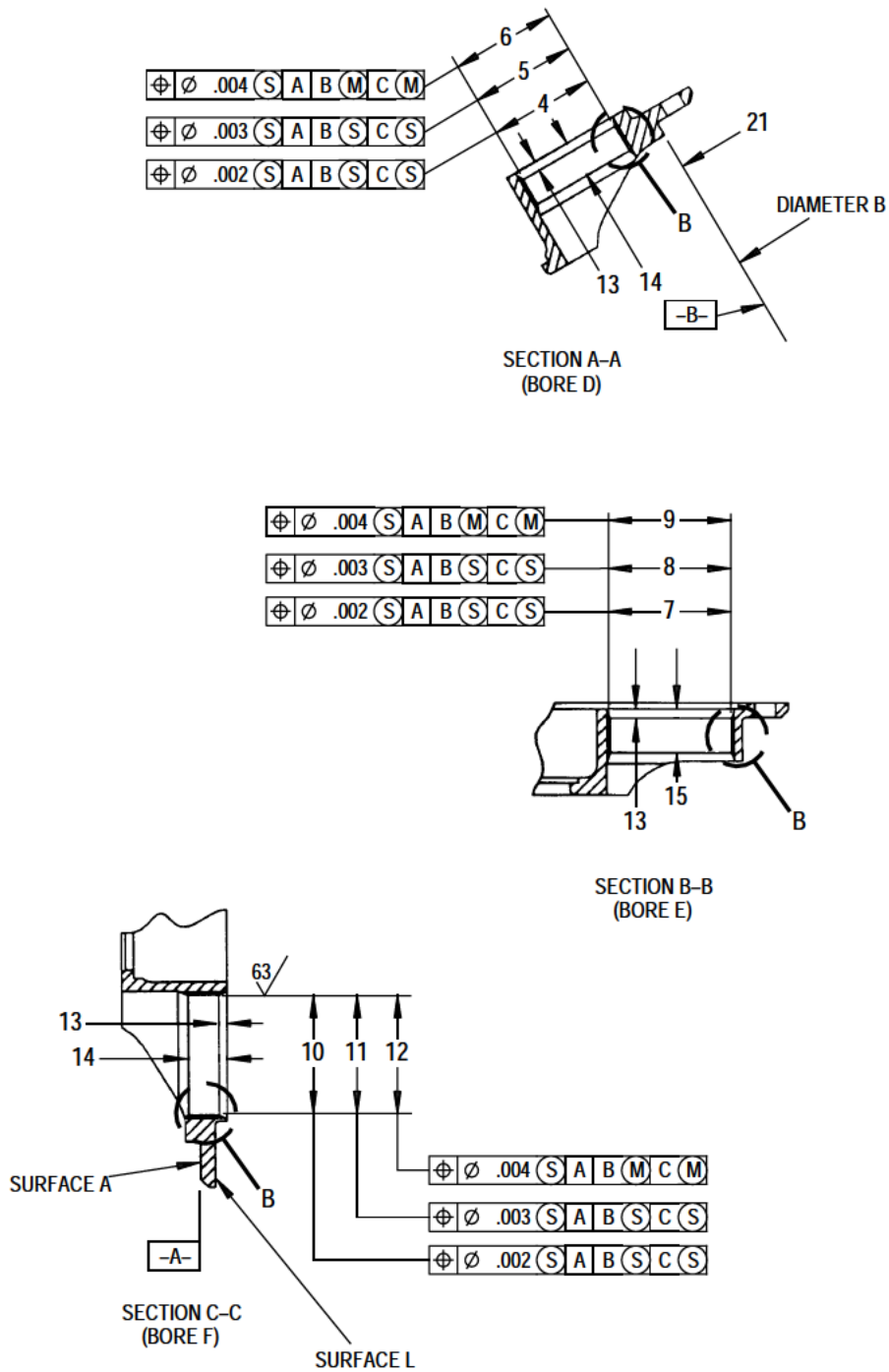


Figure 1. No. 4 Bearing Front Air Sealing Flange Metal Seal Ring Contact Surface - Plasma Spray Repair
(Sheet 1 of 2)



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Figure 1. No. 4 Bearing Front Air Sealing Flange Metal Seal Ring Contact Surface - Plasma Spray Repair
(Sheet 2 of 2)

Legend for figure 1**NOTE**

All dimensions apply when Surface A is flat within 0.002 inch total and Diameter B maintains a clearance envelope of diameter 11.304 inches in free state or constrained. Constraint contact allowed only on Surfaces A and L; and Diameter B. In free state, Surface A is flat within 0.010 inch and Diameter B is 11.271 to 11.293 inches.

1. 4.680 inches
2. 4.890 inches
3. 4.730 inches
4. 1.148 to 1.171 inch diameter, clean up machine, Bore D
5. 1.133 to 1.135 inch diameter, finish machine plasma base coat, Bore D
6. 1.119 to 1.121 inch diameter, finish machine plasma finish coat, Bore D
7. 1.298 to 1.321 inch diameter, clean up machine, Bore E
8. 1.283 to 1.285 inch diameter, finish machine plasma base coat, Bore E
9. 1.269 to 1.271 inch diameter, finish machine plasma finish coat, Bore E
10. 1.298 to 1.321 inch diameter, clean up machine, Bore F
11. 1.283 to 1.285 inch diameter, finish machine plasma base coat, Bore F
12. 1.269 to 1.271 inch diameter, finish machine plasma finish coat, Bore F
13. 0.090 to 0.110 inch
14. 0.370 to 0.430 inch
15. 0.435 to 0.495 inch
16. Plasma coat per text
17. Break edge 0.003 to 0.010 inch
18. Chamfer 19° to 21° (both ends)
19. Plasma coating optional and may be incomplete in this area
20. 0.3195 to 0.3205 inch diameter hole, reference
21. 11.284 inches, average diameter at Maximum Material Condition
22. 0.005 inch mismatch

i. Install No. 4 bearing front air sealing ring flange onto PWA 71315 fixture as follows:

- (1) Loosen stop screw and slide location bar outward. Retract strap clamps and trap blocks by loosening screws.
- (2) Ensure sub-base is free to rotate using handles on outer diameter of locating ring assembly.
- (3) Lift No. 4 bearing airseal flange with large bolt circle facing up. Rotate flange until largest bushing sleeve is closest to operator. Identify two larger holes on large bolt circle at approximately 5 and 10 O'clock.
- (4) Position No. 4 bearing airseal flange onto fixture, large bolt circle up, indexing large hole at 10 O'clock with fixture detail-12 pin. Ensure that airseal flange is fully seated.
- (5) Rotate sub-base using handles until desired sleeve is in center of PWA 71316 fixture. Insert locating bar into slot on outside of sub-base and tighten screw to lock position. Slide clamps over sub-base and secure by tightening hex screws locking clamps to posts.
- (6) Slide trap blocks into position and lock by tightening screws.

(7) Install PWA 71317 mask onto air sealing flange aligning holes to bushing sleeves and to threaded post of fixture.

- (8) Secure PWA 71317 and air sealing flange to PWA 71316 fixture using PWA 71317 detail-2 knob. Place three plugs in air sealing flange sleeve holes



Failure to use masking plugs during blasting or coating may result in damage.

- (9) Remove PWA 71317 mask plug to expose desired bushing sleeve to be grit blasted or plasma coated. Replace plug and re-index remaining bushing sleeves to repeat process.

j. Apply plasma base coat per PWA 53-47 to area(16). Refer to T.O. 2-1-111.

k. Remove air sealing flange from PWA 71316 fixture, reinstall onto PWA 71314 fixture per step b.

l. Machine plasma base coat to dimensions(5, 8, and 11). Minimum coat thickness after machining shall be 0.004 inch.

m. Remove air sealing flange from PWA 71314 fixture.

n. Prepare machined surfaces per PWA 53. Refer to T.O. 2-1-111.

o. Install on PWA 71316 fixture per step i.

- p. Plasma coat over coated areas(16) per PWA 53-5 or PWA 256-2. Refer to T.O. 2-1-111. If using PWA 53-5, coating must be applied within eight hours of surface preparation.
- q. Remove air sealing flange from PWA 71316 fixture and install on PWA 71314 fixture per step b.
- r. Finish machine plasma coat to dimensions(6, 9, and 12). Coating thickness after machining shall be 0.005 to 0.008 inch.
- s. Chamfer both sides of each bore using PWA 71708 cutter. See dimensions(13, 14, 15, and 18). Break edge to dimension(17).
- t. Surface finish for plasma sprayed areas shall be 63AA or better.
- u. Clean air sealing ring per SPOP 209, refer to T.O. 2-1-111.
- v. Visually inspect machined area. No grooves, steps, scratches or discontinuities allowed.
- w. Use shallow electrolytic etch or vibration method to permanently mark part with beehive symbol in area adjacent to part number. Refer to T.O. 2-1-111, SPOP 401.

3. NO. 4 BEARING FRONT AIR SEALING RING FLANGE, METAL SEAL RING CONTACT SURFACE - SLEEVE REPAIR.

(See Figures 2 through 4.)

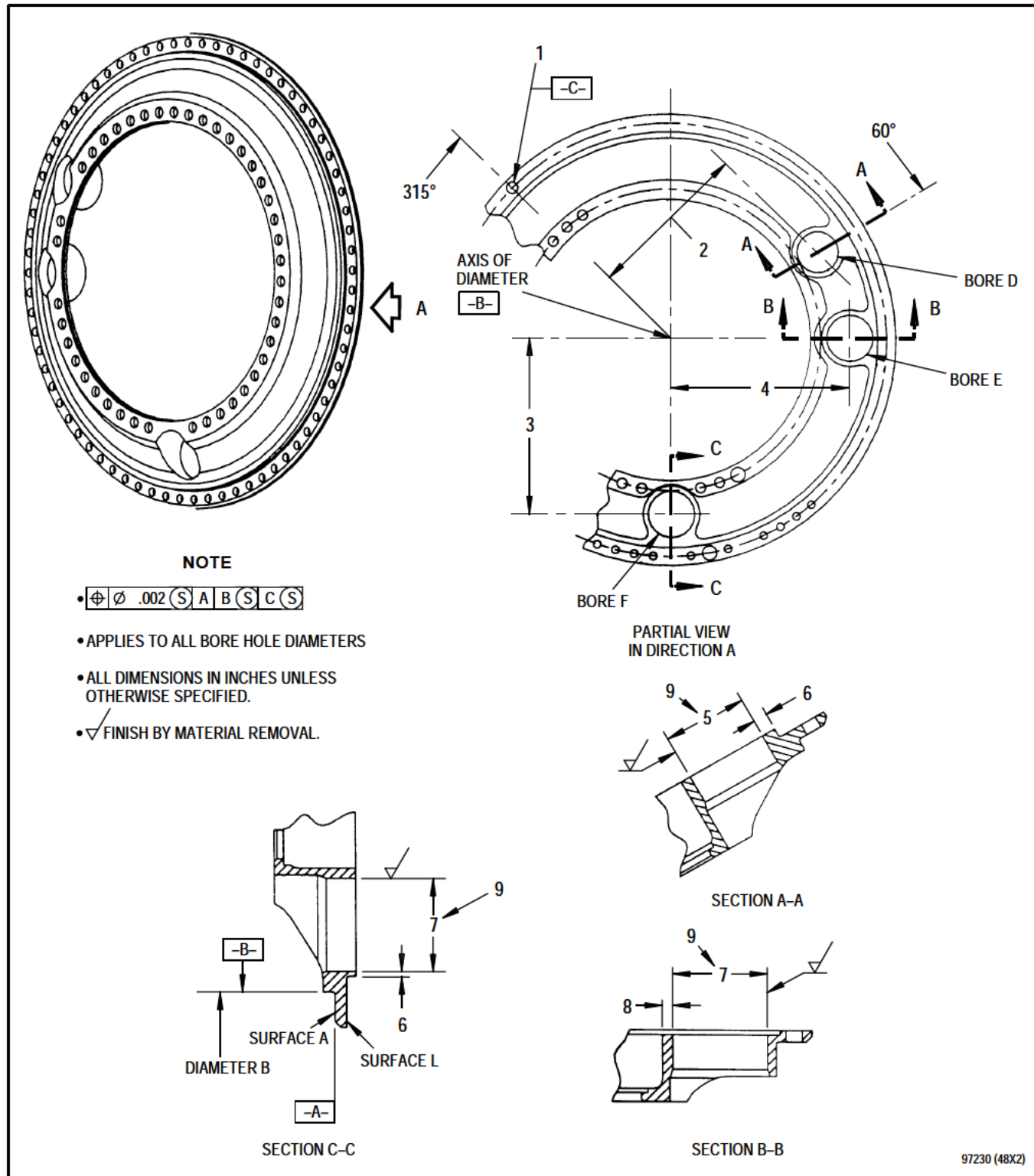


Failure to remove all coatings prior to repair may cause failure of repair.

- a. Ensure all coatings are removed prior to repair and reapplied after repair is complete.
- b. Install No. 4 front air sealing ring flange into PWA 71314 fixture as follows:
 - (1) Ensure PWA 71314 fixture is secured to grinding machine. Establish zero position of fixture using hole in detail-12 block.
 - (2) Wipe clean work surface and fixture.
 - (3) Loosen eight detail-35 screws and remove ring clamp.
 - (4) Lift No. 4 bearing airseal flange with large bolt circle facing up. Rotate flange until largest bushing sleeve is closest to operator. Identify two larger holes on large bolt circle at approximately 5 and 10 o'clock.

- (5) Position No. 4 bearing airseal flange onto fixture, large bolt circle up, indexing large hole at 10 o'clock with detail-26 pin. Ensure that airseal flange is fully seated.
- (6) Install clamp ring aligning 0.314 inch hole with detail-26 pin. Secure clamp ring with eight detail-35 screws.
- c. Machine bore holes to dimensions in figure 2. All three bore holes will be repaired.
- d. Remove No. 4 front air sealing ring flange from PWA 71314 fixture.
- e. Clean bore holes per SPOP 209. Refer to T.O. 2-1-111.
- f. Fluorescent penetrant inspect per SPOP 62. Refer to T.O. 2-1-111.
- g. Inspect machined surface to following definitions, limits, and SPFS-M. Refer to T.O. 2-1-111.
 - (1) Inspection definitions are as follows:
 - Discrete discontinuity: Well defined individual recess, cavity, or inclusion.
 - Linear discontinuity: Discontinuity with ratio of length to width greater than three. This includes cracks or any discontinuity containing a crack.
 - Cluster: Two or more discrete discontinuities separated by less than three times length of largest adjacent discontinuity.
 - (2) Limits are as follows:
 - (a) Any number of discontinuities acceptable if less than 0.015 inch long or 0.010 inch deep with minimum separation of 0.125 inch.
 - (b) Maximum of six discrete non-linear discontinuities, 0.032 inch long per metal seal ring contact surface. No linear discontinuities allowed.
 - (c) One non-linear cluster, 0.125 inch long, consisting of one non-linear discontinuity, 0.032 inch long, and all other non-linear discontinuities less than 0.015 inch long, as permitted above, per metal seal ring contact surface.
 - (d) No linear clusters or linear discontinuities within clusters permitted.
 - (e) No cracks allowed.
- h. Prepare sleeves and air sealing flange for brazing per PWA 19. Refer to T.O. 2-1-111. Nickel flash only surfaces to be brazed.
- i. Apply PMC 1642 or PMC 2266 stop-off on sleeve flange to prevent brazing flange to parent material. See figure 3. Refer to T.O. 2-1-111.
- j. Insert correct sleeves into bore holes. See figure 3.

- k. Maintain gap of 0.0005 to 0.002 inch, 360 degrees, between sleeve and parent material wall. Use braze foil, if desired, to ensure gap requirement is met.
- l. Braze per PWA 19 using AMS 4787 brazing filler metal as follows (refer to T.O. 2-1-111):
 - (1) Place No. 4 bearing front air sealing flange into PWA 71315 fixture with large bolt circle up. Fixture must be used during braze heating to maintain critical dimensional relationships of air sealing flange.
 - (2) Braze sleeves per SPOP 762, except, heat 1800° to 1850°F (982° to 1010°C) for 10 to 20 minutes. Cool at a rate of 40°F per minute or equivalent.
 - (3) Precipitation heat treat per SPOP 767.
 - (4) Hardness of air seals shall be a minimum of HRC 34 after heat treatment.
- m. Remove air sealing flange from PWA 71315 fixture.
- n. Visually inspect braze to ensure full penetration. Ensure 100% coverage on side filler metal was introduced.
- o. Radiographic inspect braze. Refer to T.O. 2-1-111. Brazed surface area coverage shall be 80%.
- p. Prepare machined surfaces per PWA 53. Refer to T.O. 2-1-111.



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Legend for figure 2**NOTE**

All diameters apply when Surface A is flat within 0.002 inch total and Diameter B maintains a clearance envelope of diameter 11.284 inches in free state or constrained. Constraint contact allowed only on Surfaces A and L; and Diameter B.

1. 0.3195 to 0.3205 inch diameter hole, reference
2. 4.680 inches
3. 4.730 inches
4. 4.890 inches
5. 1.187 to 1.188 inch diameter, clean up machine, Bore D
6. 0.063 inch, minimum wall thickness of boss
7. 1.337 to 1.338 inch diameter, clean up machine, Bore E and F
8. 0.053 inch, minimum wall thickness of boss
9. Diameter shall be located within 0.002 inch diameter of true position in relation to Surface -A-, Diameters -B- and -C- regardless of feature size.

Legend for figure 3

1. 0.3195 to 0.3205 inch diameter hole, reference
2. PN 4080719
3. PN 4080978

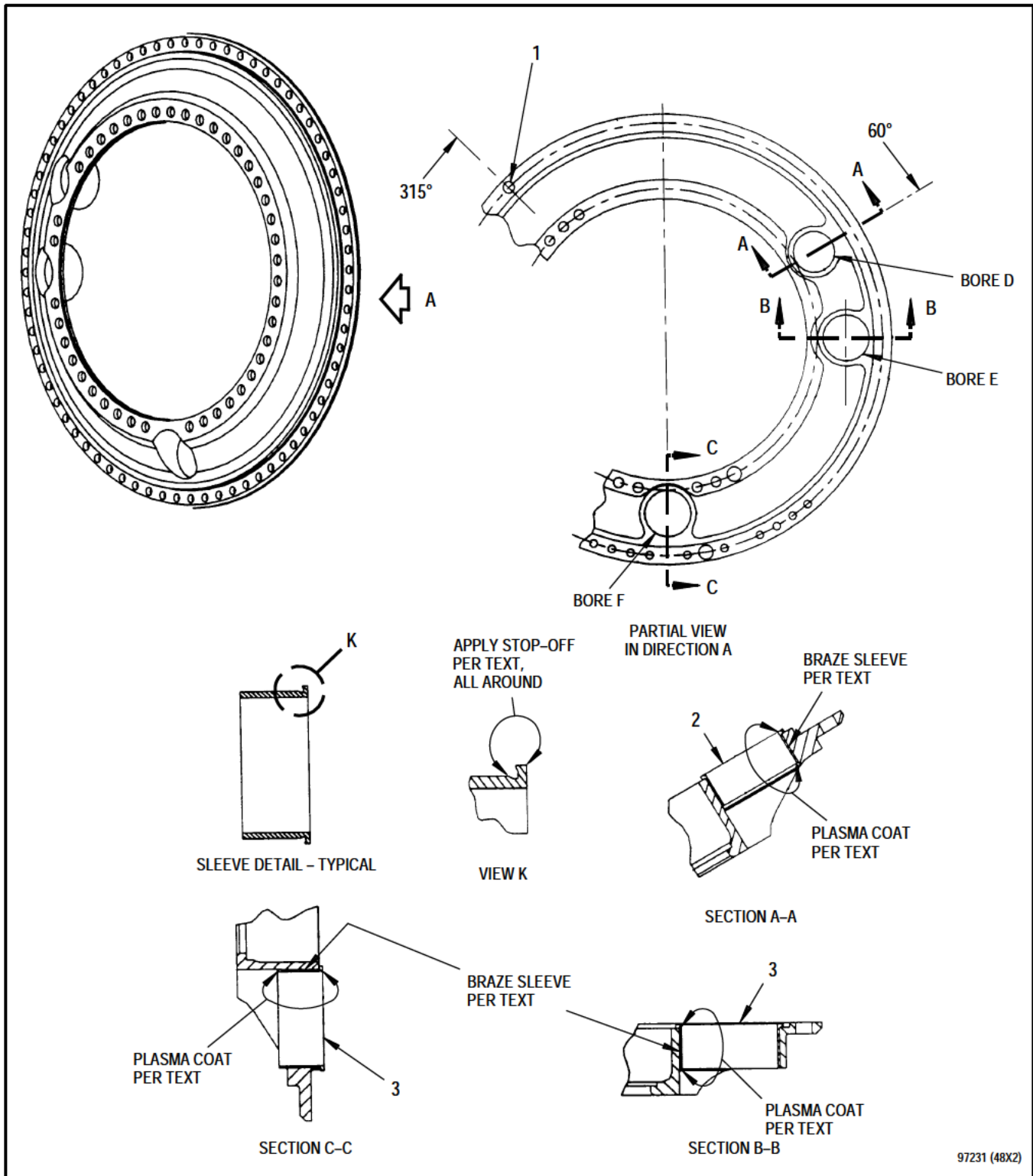


Figure 3. No. 4 Bearing Front Air Sealing Flange Metal Seal Ring Contact Surface - Sleeve Repair (Sleeve Installation and Plasma Spray)

q. Install No. 4 bearing front air sealing ring flange onto PWA 71316 fixture as follows:

- (1) Loosen stop screw and slide location bar outward. Retract strap clamps and trap blocks by loosening screws.
- (2) Ensure sub-base is free to rotate using handles on outer diameter of locating ring assembly.
- (3) Lift No. 4 bearing airseal flange with large bolt circle facing up. Rotate flange until largest bushing sleeve is closest to operator. Identify two larger holes on large bolt circle at approximately 5 and 10 o'clock.
- (4) Position No. 4 bearing airseal flange onto fixture, large bolt circle up, indexing large hole at 10 o'clock with fixture detail-12 pin. Ensure that airseal flange is fully seated.
- (5) Rotate sub-base using handles until desired sleeve is in center of PWA 71316 fixture. Insert locating bar into slot on outside of sub-base and tighten screw to lock position. Slide clamps over sub-base and secure by tightening hex screws locking clamps to posts.
- (6) Slide trap blocks into position and lock by tightening screws.
- (7) Install PWA 71317 mask onto air sealing flange aligning holes to bushing sleeves and to threaded post of fixture.

- (8) Secure PWA 71317 mask and air sealing flange to PWA 71316 fixture using PWA 71317 detail-2 knob. Place three plugs in air sealing flange sleeve holes



Failure to use masking plugs during blasting or coating may result in damage.

- (9) Remove PWA 71317 mask plug exposing desired bushing sleeve to be grit blasted or plasma coated. Replace plug and re-index remaining bushing sleeves, repeating process.
- r. Final plasma coating shall be 0.003 to 0.010 inch thick. Coat sleeve ID per PWA 53-5 or PWA 256-2. Refer to T.O. 2-1-111.
- s. Finish machine bore holes to dimensions in figure 4.
- t. Chamfer bore holes and machine sleeve using PWA 71708 cutter. See dimensions in figure 4.
- u. Surface finish for plasma sprayed areas shall be 63AA or better.
- v. Clean ring per SPOP 209, refer to T.O. 2-1-111.
- w. Visually inspect machined area. No grooves, steps, scratches or discontinuities allowed.
- x. Inspect plasma coating per PWA 53. Refer to T.O. 2-1-111.
- y. Use shallow electrolytic etch or vibration method to permanently mark part with beehive symbol in area adjacent to part number. Refer to T.O. 2-1-111, SPOP 401.



Legend for figure 4**NOTE**

All diameters apply when Surface A is flat within 0.002 inch total and Diameter B maintains a clearance envelope of diameter 11.284 inches in free state or constrained. Constraint contact allowed only on Surfaces A and L; and Diameter B. In free state Surface A is flat within 0.010 inch and Diameter B is 11.271 to 11.293 inches.

1. 0.3195 to 0.3205 inch diameter hole, reference
2. 4.680 inches
3. 4.730 inches
4. 4.890 inches
5. 1.119 to 1.121 inch diameter, finish machine final plasma coat, Bore D
6. 0.090 to 0.110 inch
7. 0.370 to 0.430 inch
8. 1.269 to 1.271 inch diameter, finish machine final plasma coat, Bores E and F
9. 0.435 to 0.495 inch
10. 11.280 to 11.284 inches, average diameter, reference
11. Chamfer 19° to 21°, both ends. No interrupted surfaces
12. 0.003 inch, minimum coating
13. 0.010 inch, maximum mismatch
14. Break edge 0.003 to 0.010 inch
15. Plasma coat
16. Plasma coating optional and may be incomplete in this area
17. Diameter shall be located within 0.004 inch diameter of true position in relation to Surface -A-, Diameters -B- and -C-. Tolerance applies when Diameters -B- and -C- are at Maximum Material Condition.

**4. NO. 4 BEARING FRONT AIR SEALING
FLANGE - BLEND REPAIR.**

- a. Blend repair No. 4 bearing front air sealing flange using the following criteria:
 - (1) Remove raised material on flanges A and B only.
 - (2) Remove defect using a fine stone, crocus cloth or file. Blend finish shall be as smooth or smoother than adjacent manufactured surfaces.
- b. Fluorescent penetrant inspect blended areas per SPOP 62. Refer to T.O. 2-1-111. No cracks allowed.

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, DIFFUSER****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 36

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2B	29	9 - 10 Deleted	29	16 - 18 Added	21
3	29	11	29	19 - 22	27
4 - 7	25	12	25	23 - 24	29
8	29	13 - 15	27	25 - 36 Added	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Case Assembly, Diffuser - Inspection - - - - -	WP 370 00
Tubing, Diffuser Case - Inspection - - - - -	WP 372 00
Tubing, Diffuser Case - Repair - - - - -	WP 472 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ALCOHOL, ISOPROPYL	TT-I-735 (PMC 9094)
BRAZING ALLOY, SILVER	AMS 4765 (PWA 707)
CLOTH, ABRASIVE	400 GRIT, SILICON CARBIDE
CLOTH, LINT-FREE	-
COMPOUND, ANTIGALLING	ESNALUBE 382 (PWA 36545)
DRY ICE	SOLID CO2
LUBRICANT	MIL-L-7808
SHOT, CAST STEEL	SAE 110, C45 ROCKWELL HARDNESS
STONE, RUBBERIZED ABRASIVE	CRATEX FLEXIBLE ABRASIVE, 90 GRIT OR FINER OR EQUIVALENT
TAPE, GLASS CLOTH	NO. 361, FSCM 26006 (PMC 4273)

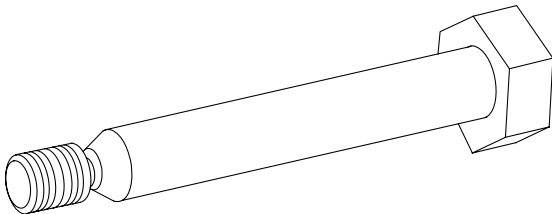
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BOLT, SHOULDER	4076478	AR
BOLT	MS9696-05	AR
BOLT	MS9696-07	AR
BRACKET, LOOP CLAMP	4070350	AR
BRACKET-LOOP CLAMP, ASSY OF	4069634-01	AR
BRACKET-LOOP CLAMP	4069169	AR
BRACKET-LOOP CLAMP	4070087	AR
BUSHING-STEPPED	2120200	AR
CHANNEL-LOOP CLAMP	2104327	AR
CLAMP-LOOP	2108637	AR
NUT OPTION	4066226	AR
NUT OPTION	4069778	AR
NUT OPTION	4079798	AR
PIN, STRAIGHT, HEADLESS	MS9389-80	AR
PIN-SHOULDER, HEADLESS	4036723	AR
PIN-SHOULDER, HEADLESS	4045421	AR
PIN-SHOULDER, HEADLESS	4069865	AR
RETAINER-DIFFUSER	4071404	AR

APPLICABLE SUPPORT EQUIPMENT

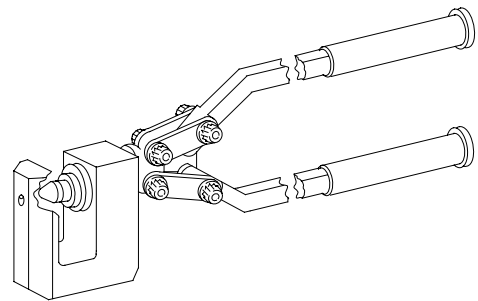
Paragraph	Function - Tool Nomenclature	Tool Number
5	DIFFUSER CASE ASSEMBLY - CLINCH NUT REPLACEMENT	
	FLARING TOOL, FRONT TURBINE CASE CLINCH NUTS - - - - -	PWA 24670
6	DIFFUSER CASE ASSEMBLY - SHOULDER BOLT/RETAINER REPLACEMENT	
	FIXTURE, DRILL, DIFFUSER CASE, RETAINER - - - - -	PWA 71477
7	NO. 4 BEARING CONNECTOR/NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - DISASSEMBLY AND ASSEMBLY	
	FIXTURE, BRAZE, NO. 4 SCAVENGE TRANSFER TUBES - - - - -	PWA 71396
	PULLER, NO. 4 BEARING CONNECTOR - - - - -	PWA 55260
	CONTROLLER, COMBUSTION, GAS AND TEMPERATURE - - - - -	PWA 55308
	WRENCH, NO. 4 SCAVENGE TUBE RETAINING NUT - - - - -	PWA 52767
12	DIFFUSER CASE ASSEMBLY - LOOP CLAMP BRACKET AND CHANNEL REPLACEMENT	
	RIVETER, BRACKET LOOP CLAMP ASSY BUSHING - - - - -	PWA 50974

ILLUSTRATED SUPPORT EQUIPMENT



PWA 24670 -C

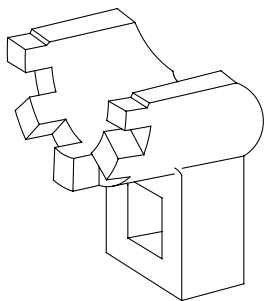
Figure T1. PWA 24670 FLARING TOOL



PWA 50974 -C

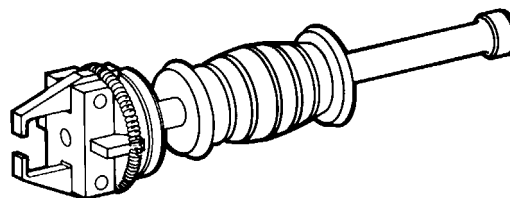
Figure T2. PWA 50974 RIVETER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



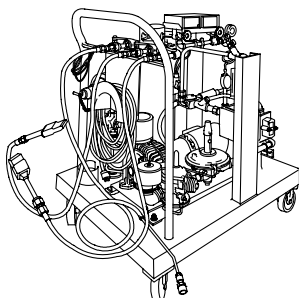
PWA 52767 -C

Figure T3. PWA 52767 WRENCH



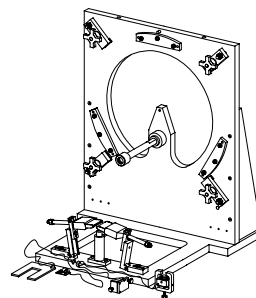
PWA 55260 -C

Figure T4. PWA 55260 PULLER



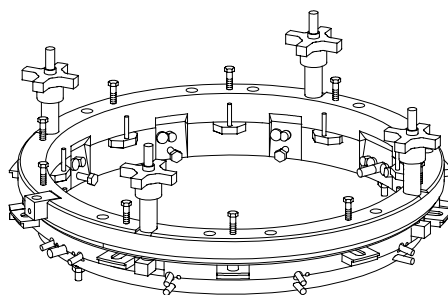
PWA 55308 -C

Figure T5. PWA 55308 CONTROLLER



PWA 71396 -C

Figure T6. PWA 71396 FIXTURE



PWA 71477 -C

Figure T7. PWA 71477 FIXTURE

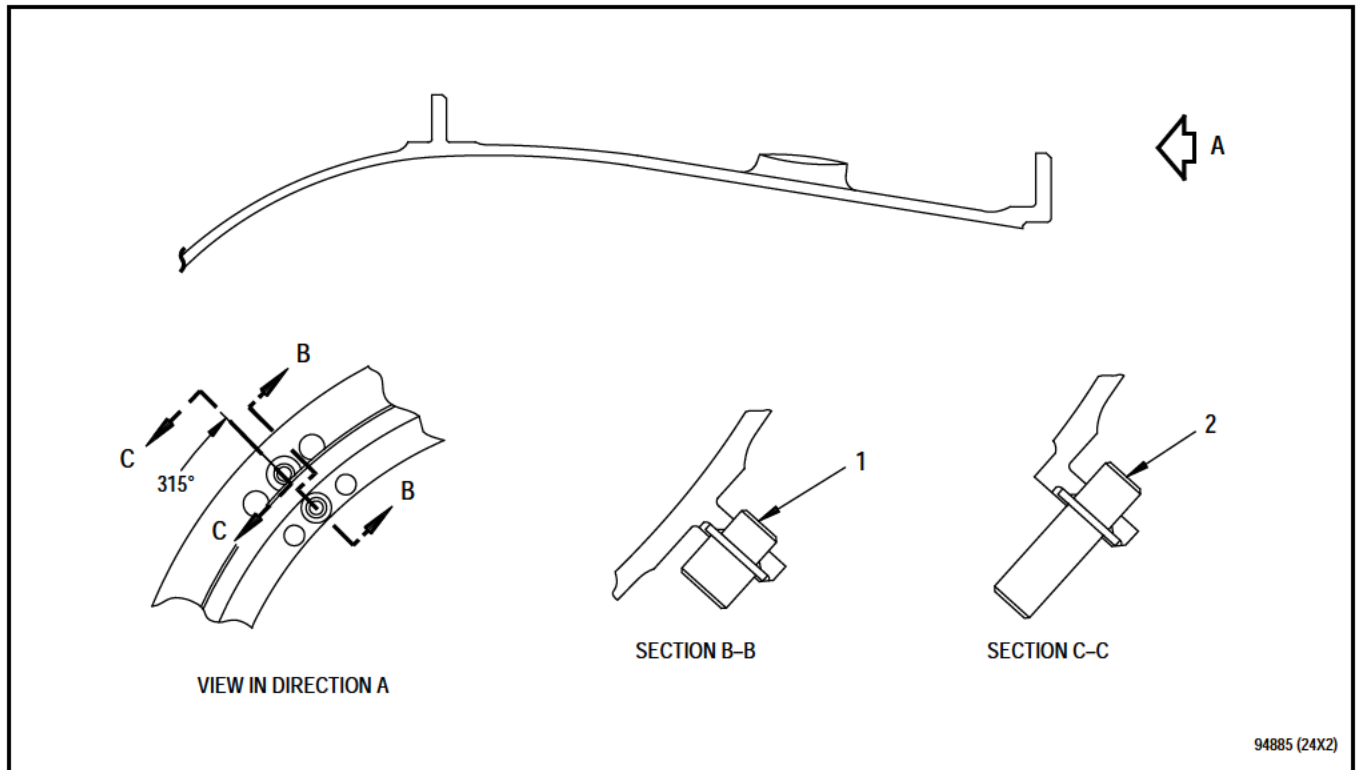
1. INTRODUCTION.

- a. This work package provides instructions for repair of long skirt and short skirt diffuser case assemblies.

**2. DIFFUSER CASE ASSEMBLY - HEADLESS
SHOULDER PIN REPLACEMENT.**

(See Figure 1.)

- a. Remove unserviceable pins(1 and 2) located in inner case flanges as follows:
 - (1) Remove unserviceable pins using standard drift. Use care to prevent distorting flange or damaging parent material.
 - (2) Chill replacement pins 10 to 15 minutes in dry ice.
 - (3) Install replacement pins using standard drift.



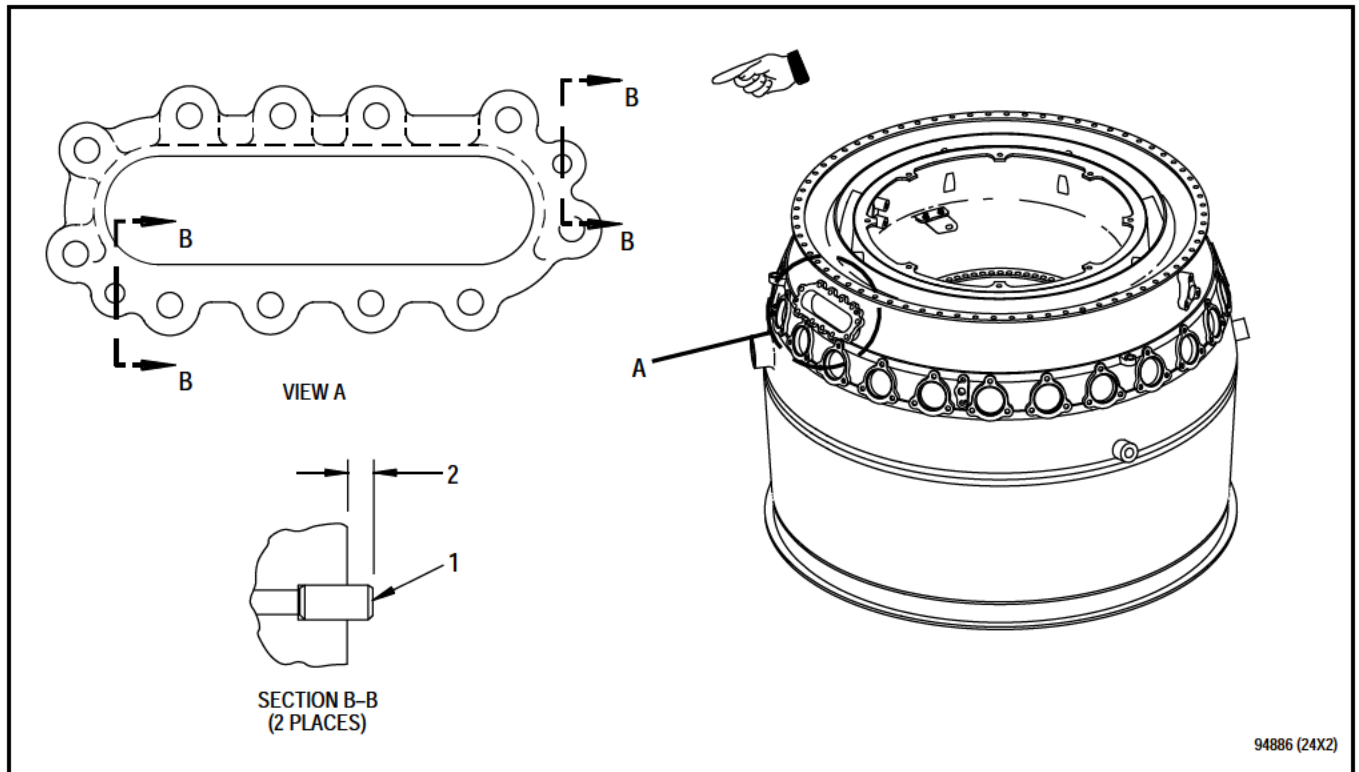
1. Headless shoulder pin (PN 4069865)
Omit from heat treat - hardness requirements waived
2. Headless shoulder pin (PN 4045421)
Omit from heat treat - hardness requirements waived

Figure 1. Diffuser Case Assembly - Headless Shoulder Pin Replacement

**3. DIFFUSER CASE ASSEMBLY - HEADLESS
STRAIGHT PIN REPLACEMENT.**

(See Figure 2.)

- a. Remove unserviceable pin(1).
Use caution to prevent damage to
parent material.
- b. Chill replacement pin 10 to 15
minutes in dry ice.
- c. Install pin per figure 2.



1. Headless straight pin (PN MS9389-80), 2 places
2. 0.120 to 0.140 inch

Figure 2. Diffuser Case Assembly - Headless Straight Pin Replacement

4. Deleted.

Figure 3. Deleted.

5. DIFFUSER CASE ASSEMBLY - CLINCH NUT REPLACEMENT.

(See Figure 4.)

- a. Use appropriate size drill to drill retaining flare of unserviceable nut(1). Collapse or break away remainder of retaining flare to remove nut(1).
- b. Install new nut(1) as follows (see figure 4):
 - (1) Thread PWA 24670 flaring tool into shank end of nut. Do not thread flaring tool into self-locking portion of nut.
 - (2) Hold nut(1) in position using T-handle then turn nut detail against flaring anvil until nut is in place.

6. DIFFUSER CASE ASSEMBLY - SHOULDER BOLT/RETAINER REPLACEMENT.

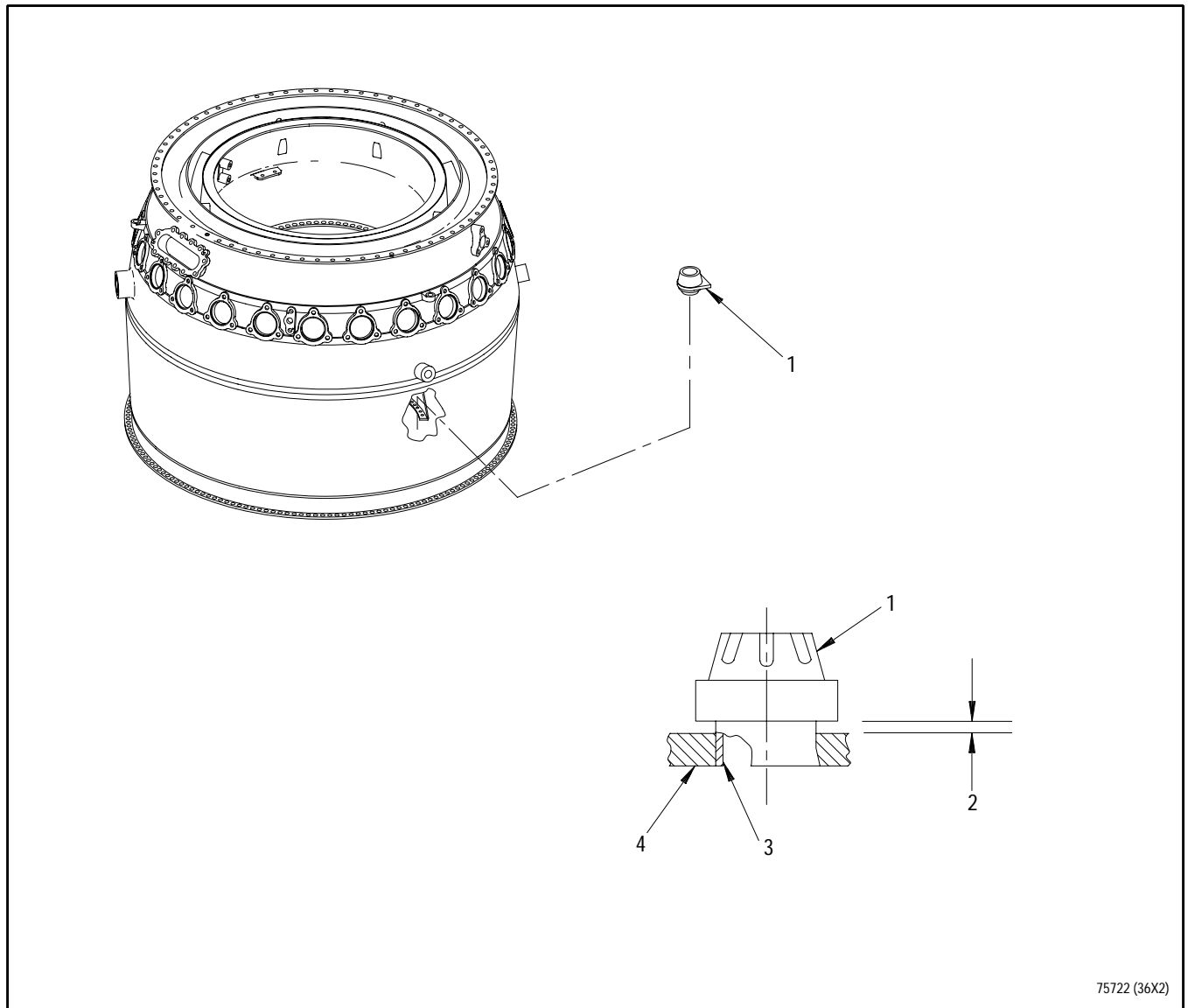
(See Figure 5.)



Failure to use care when grinding rivets may damage diffuser case parent material.

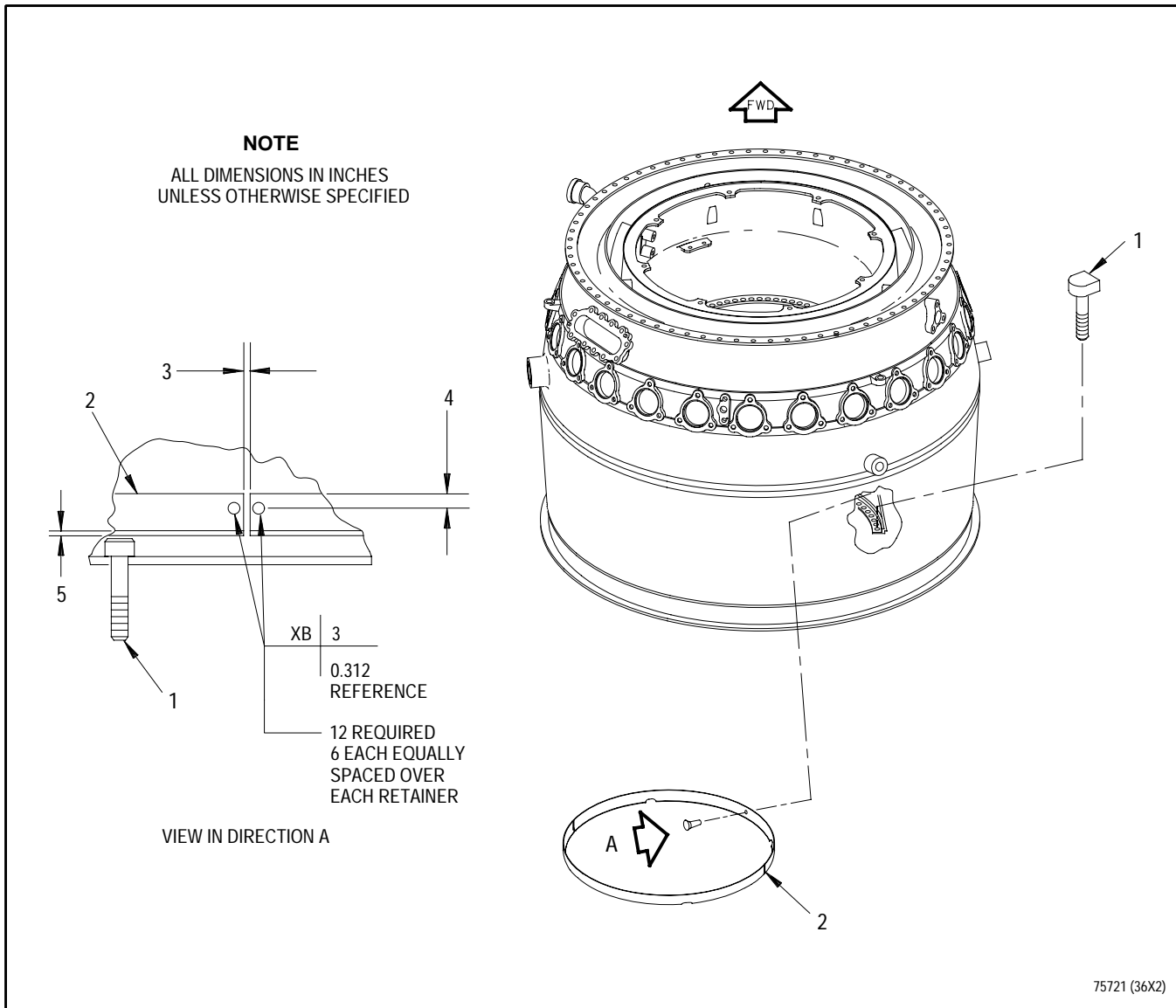
- a. Remove unserviceable retainer(2) by grinding to remove heads of rivets. Remove retainer.
- b. Remove unserviceable bolts(1).
- c. Install serviceable bolts(1) and retainer(2) as shown. If using new retainer, transfer drill 0.096 to 0.100 inch rivet holes into retainer using PWA 71477 drill fixture.
- d. Install and upset rivets. Refer to T.O. 2-1-111. Maximum faying surface gap shall be 0.060 inch.

Pages 9 and 10 deleted.



1. Clinch nut
2. 0.000 to 0.010 inch
3. Flare shank to secure. Shank must be flush with or below reference surface(4) after flaring.
4. Reference surface

Figure 4. Diffuser Case Assembly - Clinch Nut Replacement



1. Shoulder bolts (PN 4076478, 37 required)
2. Diffuser case retainer (PN 4071404, 2 required)
3. 0.250 inch, maximum gap, 2 places
4. 0.250 inch, reference
5. 0.000 to 0.050 inch gap

Figure 5. Diffuser Case Assembly - Shoulder Bolt/Retainer Replacement

7. NO. 4 BEARING CONNECTOR/NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - DISASSEMBLY AND ASSEMBLY.

(See Figures 6 through 9.)

- a. Remove all tubes, housings and seal supports from case assembly.
- b. Remove nuts(5, figure 6), loop clamps(8) and bolts(7).
- c. Remove nuts(11), bolts(9) and bracket assemblies(6 and 10). Hold bracket assemblies for reuse.



Transfer tubes of No. 4 bearing left internal scavenge tube will be damaged if attempt is made to remove connector(2) after removing bolts(1).

NOTE

No. 4 bearing left internal scavenge tube(4) and connector(2) is a brazed assembly.

- d. Remove and retain bolts(1). Do not attempt to remove connector(2) at this time.
- e. Prepare PWA 71396 brazing fixture as follows:
 - (1) Loosen hand knob/clamps(10, figure 7) and retract.
 - (2) Retract spring loaded connector support(15) and lock in down position.
 - (3) Loosen burner nozzles(14) and position out of the way.
 - (4) Retract inlet manifold(8).

- f. Load diffuser case horizontally into PWA 71396 brazing fixture as follows:

- (1) Use sling, straps and hoist to position diffuser case rear flange onto locating segments(11).
- (2) Rotate case to locate flange hole between X marks in fixture locating pin(9).
- (3) Position hand knob/clamps(10) over diffuser case rear flange and hand tighten to hold case against locating segments(11).
- (4) Release spring loaded connector support(15) to contact bearing connector.
- (5) Install heat shield(7) to keep heat away from case assembly.

- g. Install PWA 55260 puller by attaching hooks under scavenge tube connector, and handtightening knurled grip.
- h. Connect hoses No. 2 and 3 of PWA 55308 combustion controller to burner nozzles(14) of PWA 71396 brazing fixture. See figure 8.
- i. Adjust position of burner nozzles(14, figure 7) 1/2 inch from bearing connector.

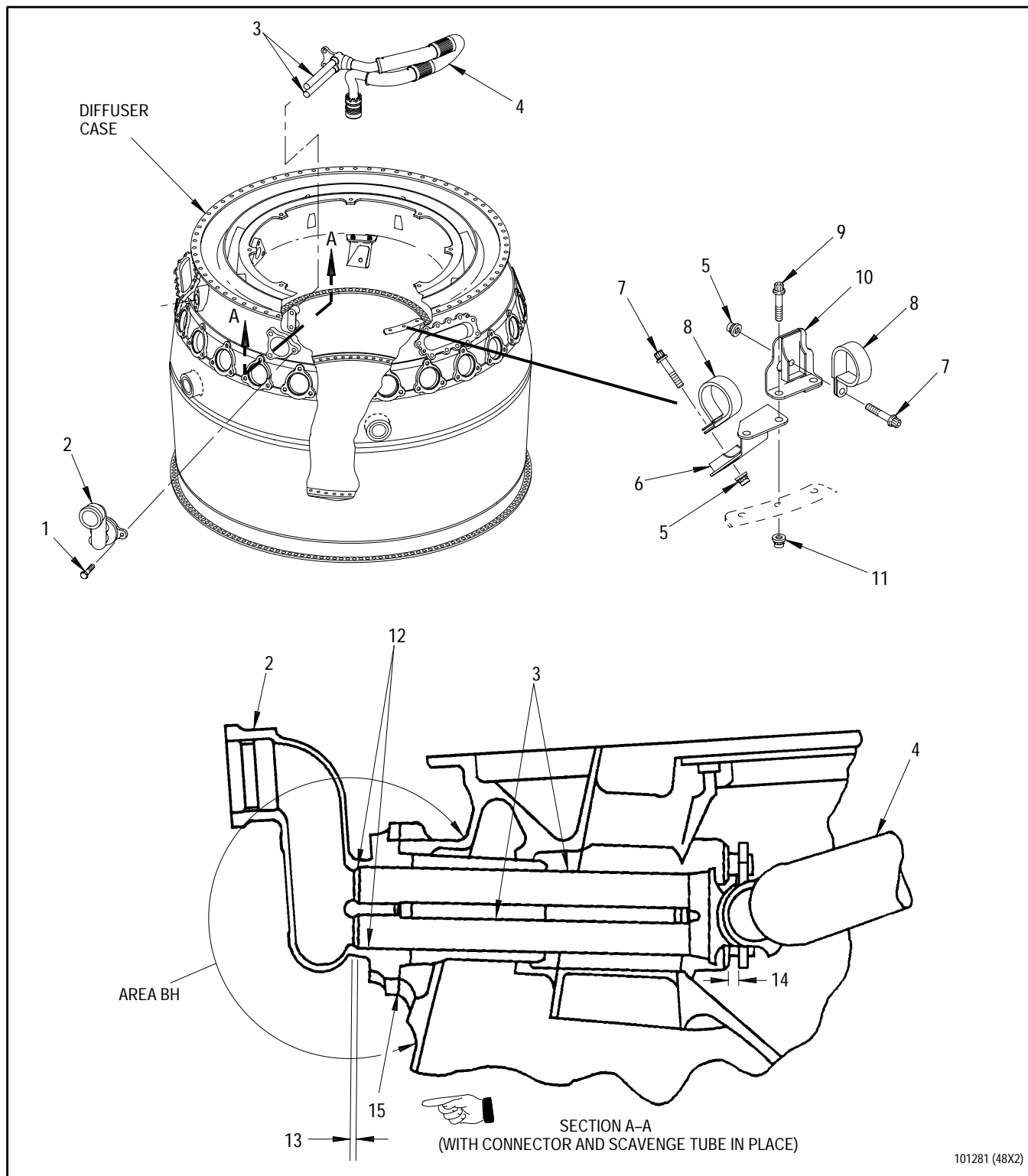


Figure 6. No. 4 Bearing Connector/No. 4 Bearing Left Internal Scavenge Tube Assembly - Disassembly and Assembly

Legend for figure 6

1. Bolt (typical PN ST2151-020), 3 required
2. No. 4 bearing connector (typical PN 4069179)
3. Transfer tubes
4. No. 4 bearing left internal scavenge tube assembly (typical PN 4081460-01)
5. Nut (typical PN 4066266), 2 required
6. Bracket assembly (typical PN 4070793)
7. Bolt (typical PN MS9696-07), 2 required
8. Loop clamp (typical PN 2108637), 2 required
9. Bolt (typical PN MS9696-07), 3 required
10. Bracket assembly (typical PN 4069633)
11. Nut (typical PN 4066266), 3 required
12. Braze per text. Induction or radiant gas heating only. Use of AMS 4772 braze alloy permissible. Use of flux in braze joint not permissible. Temperature of diffuser must not exceed 1200°F (660°C) except in Area BH. Minimum area of joining required is 70%.
13. 0.090 inch maximum
14. 0.070 to 0.110 inch gap
15. No gap, all around

j. Start combustion burner as follows: (See figure 8.)

- (1) Connect controller to electric power, 110VAC, 60 CY.
- (2) Check thermocouple hook-up.
- (3) Set air ratio control at 90%.
- (4) Place maxon valve lever in latch position.

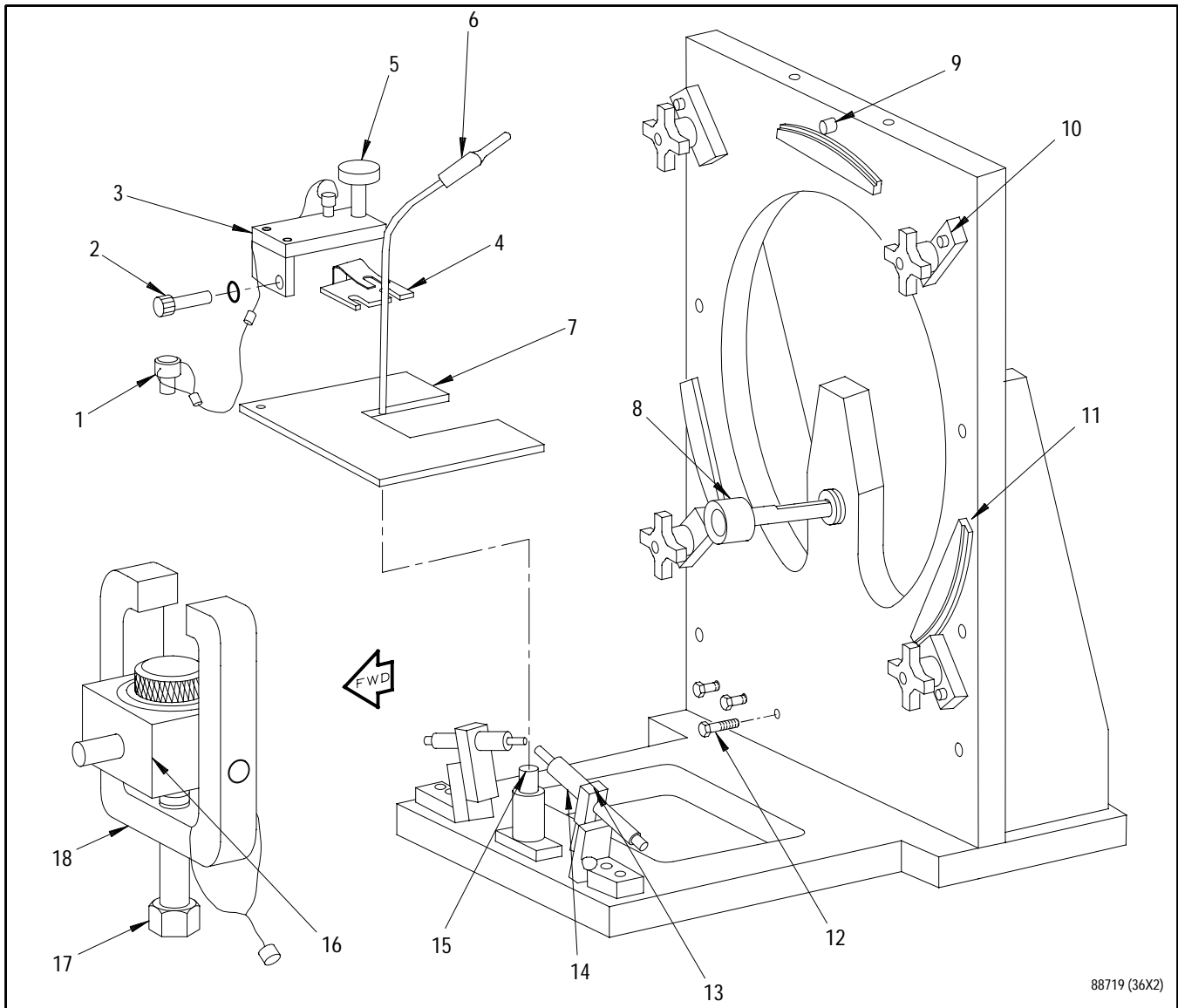
NOTE

Two tanks are provided to avoid running out of propane.

- (5) Open propane tank valve. Use only one tank at a time.
- (6) Open main line valve.
- (7) Position firecheck to SET position.
- (8) Close valves No. 1, 2, and 3.
- (9) Adjust regulator to 10 psig.

(10) Open valve downstream from regulator.

- (11) Turn power switch on.
- (12) Move maxon valve lever to OPEN position. Red flag shall be visible in valve window.
- (13) Open valve No. 1 approximately 15 degrees and light spear flame burner with match, spark, or pilot flame. Adjust valve to get 3 to 4 inch flame.
- (14) Open valve No. 2 approximately 15 degrees and direct spear burner flame to internal furnace area of burner No. 2 on PWA 71396 braze fixture, until burner is lit.
- (15) Open valve No. 3 approximately 15 degrees and direct spear burner flame to internal furnace area of burner No. 3 on PWA 71396 braze fixture, until burner is lit.



88719 (36X2)

- | | |
|------------------------|-------------------------------------|
| 1. Locating pin | 10. Hand knob/clamp assembly |
| 2. Screw | 11. Locating segment |
| 3. Block extension | 12. Bolt |
| 4. Spacer assembly | 13. Burner clamp |
| 5. Swivel head screw | 14. Burner nozzle |
| 6. Argon tube assembly | 15. Spring loaded connector support |
| 7. Heat shield | 16. Argon manifold assembly |
| 8. Inlet manifold | 17. Screw |
| 9. Dowel pin | 18. Clamp |

Figure 7. Diffuser Case Assembly - Installation Into PWA 71396 Brazing Fixture

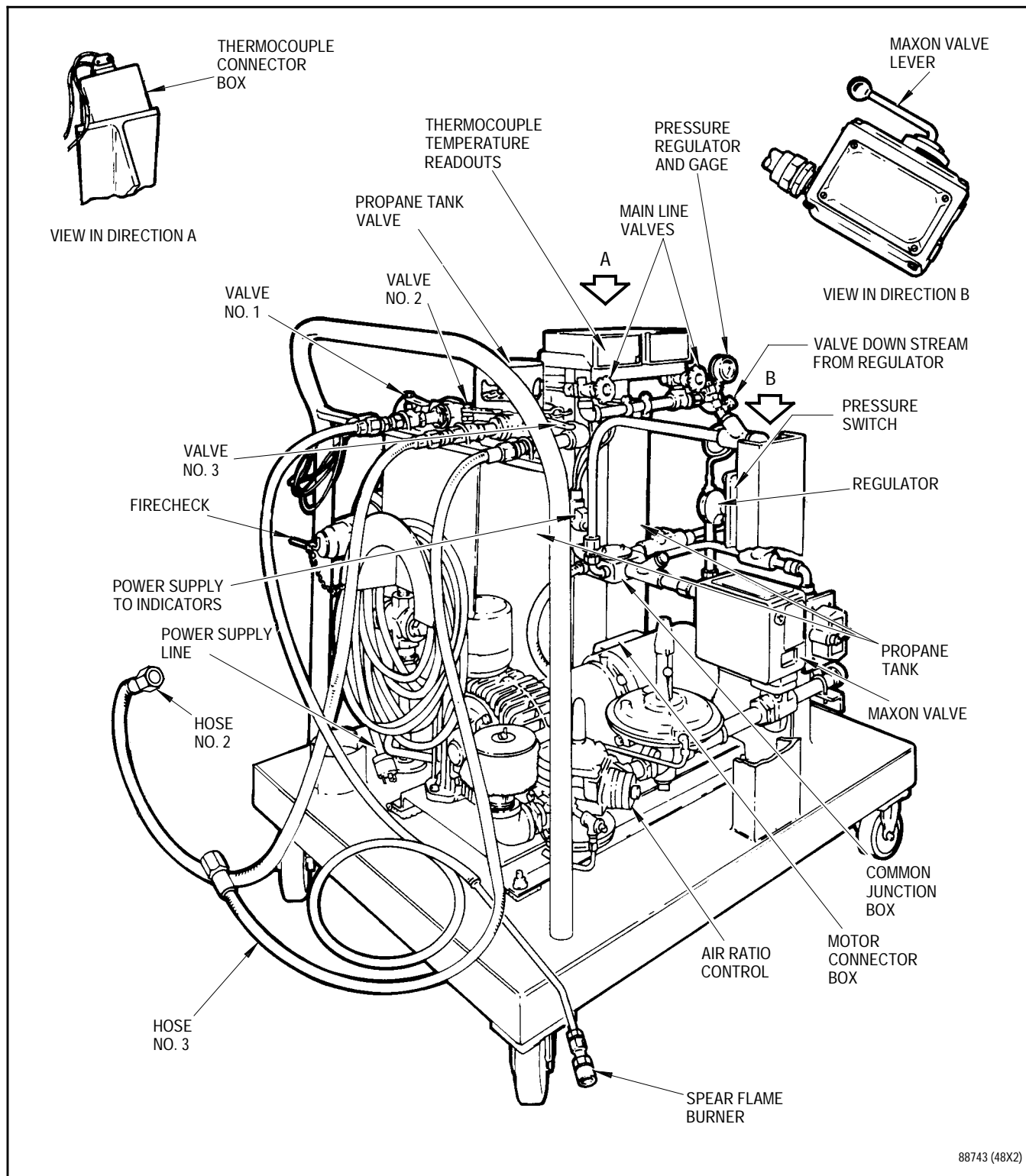
- (16) Due to variation of propane quality, PWA 55308 combustion controller mixture ratio cannot be fixed. The mixture must sometimes be adjusted to proportions other than required in this paragraph to provide sufficient heat. All mixture adjustments shall be made slowly to allow affected mixture to pass through the system to the burner.
- (17) Verify burners No. 2 and 3 on PWA 71396 braze fixture are burning internally. Adjust mixture to 97.5% air. If burners do not continue to burn at this setting, shut down and repeat start procedure, except change ratio in step 3 to 95%. Adjust mixture per step (16).



Exceeding specified temperature outside Area BH may distort case.


- (18) Open valves No. 2 and 3 slowly and simultaneously to Full Open. Do not exceed 1200°F (649°C) outside Area BH.
- (19) Verify burners No. 2 and 3 are still burning internally and repeat lighting procedures as needed.


- (20) Close valve No. 1 when burners No. 2 and 3 are burning properly with their valves full open.
- (21) If temperature required to debraise joint cannot be met with gas valves No. 2 and 3 full open, adjust gas mixture ratio to meet temperature.
- k. Time heating period for 3 1/2 minutes after opening burner nozzles to full open.
- l. Use knocker of PWA 55260 puller to free connector of scavenge tube. If tube does not come free, wait 1 minute; then try again. Refer to WP 372 00 for tube inspection limits and WP 472 00 for repairs.
- m. Shut down combustion controller as follows: (See figure 8.)
- (1) Close valves No. 2 and 3 simultaneously.
 - (2) Allow machine to operate until burners stop burning.
 - (3) Stop motor.
 - (4) Place maxon valve lever in latch position. Red flag should not be visible in valve window.
 - (5) Close valve downstream from regulator.
 - (6) Close tank valve and main line valve.
 - (7) Turn power switch off.



88743 (48X2)

Figure 8. PWA 55308 Combustion Controller

- n. Retract spring loaded connector support(15, figure 7) of PWA 71396 fixture. Remove and retain bearing connector(2, figure 6).
 - o. Remove scavenge tube assembly(4) from diffuser case. See WP 372 00 for uninstalled tube inspection limits and WP 472 00 for tube repair.
 - p. Nickel plate transfer tubes(3) and connector(2) per WP 472 00.
 - q. Prepare connector for brazing as follows (see figure 9):
 - (1) Using 400 grit or finer silicon carbide grit cloth, polish two spots on side of connector for thermocouple installation.
- 

CAUTION
- Failure to ensure thermocouple wires are serviceable may cause incorrect readings and/or equipment damage.
- (2) Using trimmed (remove burnt portion) chromel-alumel thermocouple wire, tack weld wire to polished spots on connector, using FE RW 62A resistance welder or equivalent. See figure 9.
- 

CAUTION
- Allowing bare thermocouple wires to touch may cause incorrect readings and/or equipment damage.
- (3) Use glass cloth tape, No. 361, FSCM 26006 to tape wire leads to connector. Ensure wires do not touch at any point where wire is bare.
- r. Make 4 braze rings from AMS 4765, 0.045 inch diameter wire.
 - s. Wipe transfer tubes of No. 4 bearing left internal scavenge tube, braze rings and connector braze area with isopropyl alcohol to clean. Do not flux.
 - t. Install diffuser case, connector and left internal scavenge tube into PWA 71396 brazing fixture as follows:
 - (1) Use sling, straps and hoist to position diffuser case rear flange onto locating segments(11, figure 7).
 - (2) Rotate case to locate flange hole between X marks in fixture dowel pin(9).
 - (3) Position hand knob/clamps(10) over diffuser case rear flange and hand tighten to hold case against locating segments(11).
 - (4) Ensure inlet manifold(8) is retracted.
 - (5) Install transfer tubes of No. 4 bearing left internal scavenge tube into diffuser case assembly strut. Two pins in case locate holes in scavenge tube flange.
 - (6) Slide inlet manifold(8) into position to connect ferrule/ring assembly of scavenge tube.
 - (7) Thread scavenge tube ring to contact gasket inside inlet manifold(8).



Failure to maintain gap between case and tube flange may cause oil leak and engine fire.

- (8) Insert spacer assembly(4) of PWA 71396 brazing fixture onto flange of scavenge tube to maintain 0.070 to 0.110 inch gap(14, figure 6) between case and tube flange.
- (9) Attach block extension(3, figure 7) to case flange using screw(2).
- (10) Install 2 braze rings onto ends of each transfer tube using tissue soaked with isopropyl alcohol to avoid contamination. Do not flux.
- (11) Position connector over transfer tubes and against mating flange on diffuser case with no gap between connector and diffuser case flange.
- (12) Insert argon tube assembly(6) between transfer tubes(3, figure 6) and secure in place with suitable wire, if needed.
- (13) Use PWA 52767 wrench to torque ring at manifold(8, figure 7) 100 pound-inches.

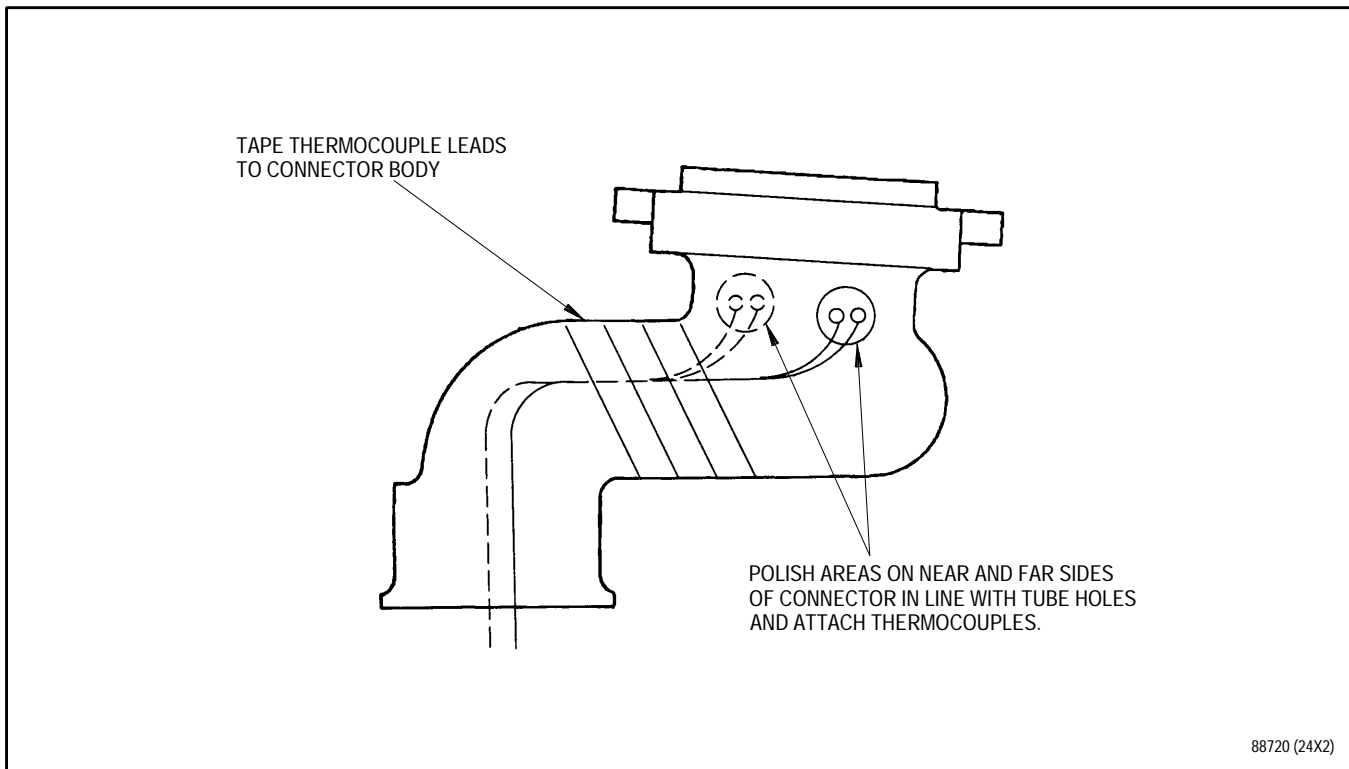




Figure 9. No. 4 Bearing Connector - Preparation for Brazing

- (14) Attach bearing connector as follows:
- (a) Visually align connector flange with diffuser case flange.
 - (b) Insert locating pin(1) into any of 3 holes.
 - (c) Install workbolts(12) in other 2 holes and tighten.
 - (d) Remove locating pin(1), install third workbolt(12) and tighten.
- (15) Release spring loaded connector support(15) to contact bearing connector.
- u. Install bracket assemblies(6 and 10, figure 6) and secure with bolts(9) and nuts(11). Torque 32 to 36 pound-inches.
 - v. Install loop clamps(8) on scavenge tube assembly(4) and secure with bolts(7) and nuts(5). Torque 32 to 36 pound-inches.
 - w. Install heat shield(7, figure 7) to keep heat away from case assembly.
 - x. Install argon manifold assembly(16) on bearing connector and secure in place with clamp (18) and screw(17).
- NOTE**
- Brazing can be accomplished by induction or radiant gas heat.
- y. If using induction heat, go to step ac.
 - z. If using radiant gas, connect hoses No. 2 and 3 of PWA 55308 combustion controller to burner nozzles(14) of PWA 71396 brazing fixture.
- aa. Adjust position of burner nozzles(14) 1/2 inch from bearing connector.
 - ab. Start combustion burner per step j.
 - ac. Braze per AMS 2664. Refer to T.O. 2-1-111. Ensure the following conditions are met:
 - (1) Omit prebraze diffusion treatment.
 - (2) AMS 4772 braze alloy is permissible.
- 

CAUTION
- Flux in braze joint may cause case contamination.
- (3) Flux in braze joint is not permissible.
- 

CAUTION
- Exceeding specified temperature outside Area BH may distort case.
- (4) Do not exceed 1200°F (649°C) outside Area BH.
 - (5) Hold temperatures on bearing connector between 1880° and 1950°F (1027° and 1066°C) for 7 minutes after reaching temperature.
 - (6) Seventy percent minimum area of joining required.
- ad. If used, shut down combustion controller per step m. and allow diffuser case to cool for 1 hour minimum before handling.

- ae. Remove workbolts(12) from connector.
- af. Remove diffuser case from PWA 71396 brazing fixture.

NOTE

Pressure test per step ai. may be done before radiographic inspection.

- ag. Radiographic inspect brazed joint. Refer to T.O. 2-1-111.
- ah. Visually inspect brazed joint per WP 370 00.
- ai. Pressure test brazed joint. Refer to T.O. 2-1-111. Joints and connector shall not leak during test.
- aj. Apply PWA 36545 antigalling compound to bolts(1, figure 6) per SPOP 748. Refer to T.O. 2-1-111.
- ak. Secure connector(2) to diffuser case using bolts(1). Torque 27 to 30 pound-inches.

8. DIFFUSER CASE ASSEMBLY - HEADLESS SHOULDER PIN REPLACEMENT.

(See figure 6 and Figure 10.)

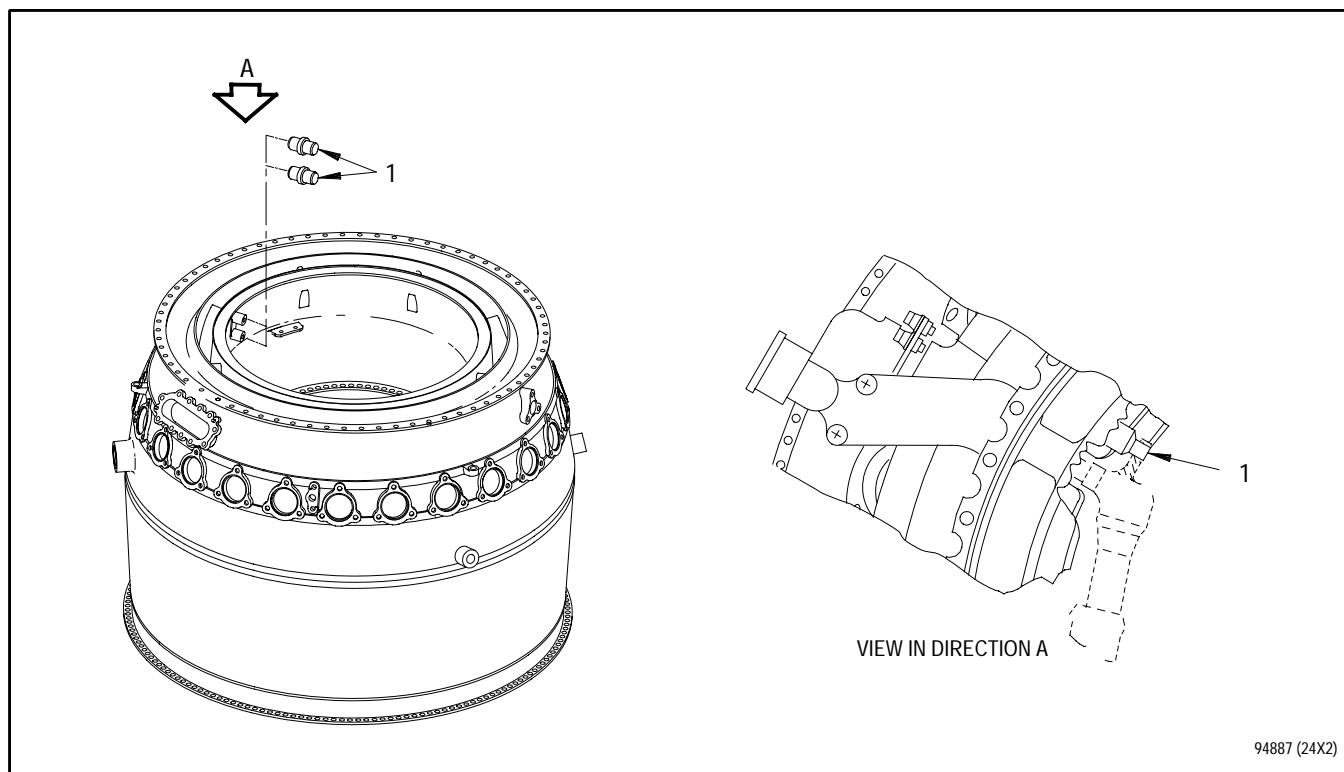
- a. Replace unserviceable pins(1) as follows:

- (1) Remove No. 4 bearing left internal scavenge tube assembly(4, figure 6) per paragraph 7.



Failure to use care when removing pins may damage diffuser case parent material.

- (2) Remove unserviceable pins(1, figure 10). Refer to T.O. 2-1-111, removal of dowels from blind holes.
- (3) Chill replacement pins 10 to 15 minutes in dry ice.
- (4) Install replacement pins using standard drift.
- (5) Apply PWA 36545 antigalling compound to paired holes of No. 4 bearing left internal scavenge tube assembly connector which make contact with pins(1). Refer to T.O. 2-1-111, SPOP 748.
- (6) Install No. 4 bearing left internal scavenge tube assembly per paragraph 7.



1. PN 4036723 headless shoulder pin

Figure 10. Diffuser Case Assembly - Headless Shoulder Pin Replacement

9. DIFFUSER CASE ASSEMBLY - SHOTPEEN REQUIREMENTS.

(See Figure 11.)

- a. Complete all nondestructive testing and visual inspections prior to heat treat and shotpeening.
- b. Clean diffuser case with isopropyl alcohol and a clean, lint-free cloth.
- c. Mask part identification and all areas where peening is not permitted.

NOTE

Shotpeening following blend repair is only required in area blended.

- d. Shotpeen case using SAE 110 maximum cast steel shot of C45 Rockwell hardness per figure 11. See figure legend for specifications. Refer to T.O. 2-1-111, SPOP 501.
- e. Clean all residue from diffuser case per WP 201 00. It is permissible to pressure rinse with cold or room temperature water.

Legend for figure 11

1. FA - Peen per AMS 2430 where shown with intensity of 4 to 6A using SAE 110 maximum cast steel shot of hardness 45 HRC minimum or equivalent. No peening permitted on machined surface of bosses.
2. FX - Minimum intensity waived, but complete coverage required.
3. HA - Transition intensity of peening within this area.
4. GX - Peen per AMS 2430 where shown with intensity of 6 to 9A using SAE 110 maximum cast steel shot of hardness 45 HRC minimum or equivalent. Overspray permitted. No peening permitted on machined surface of bosses.

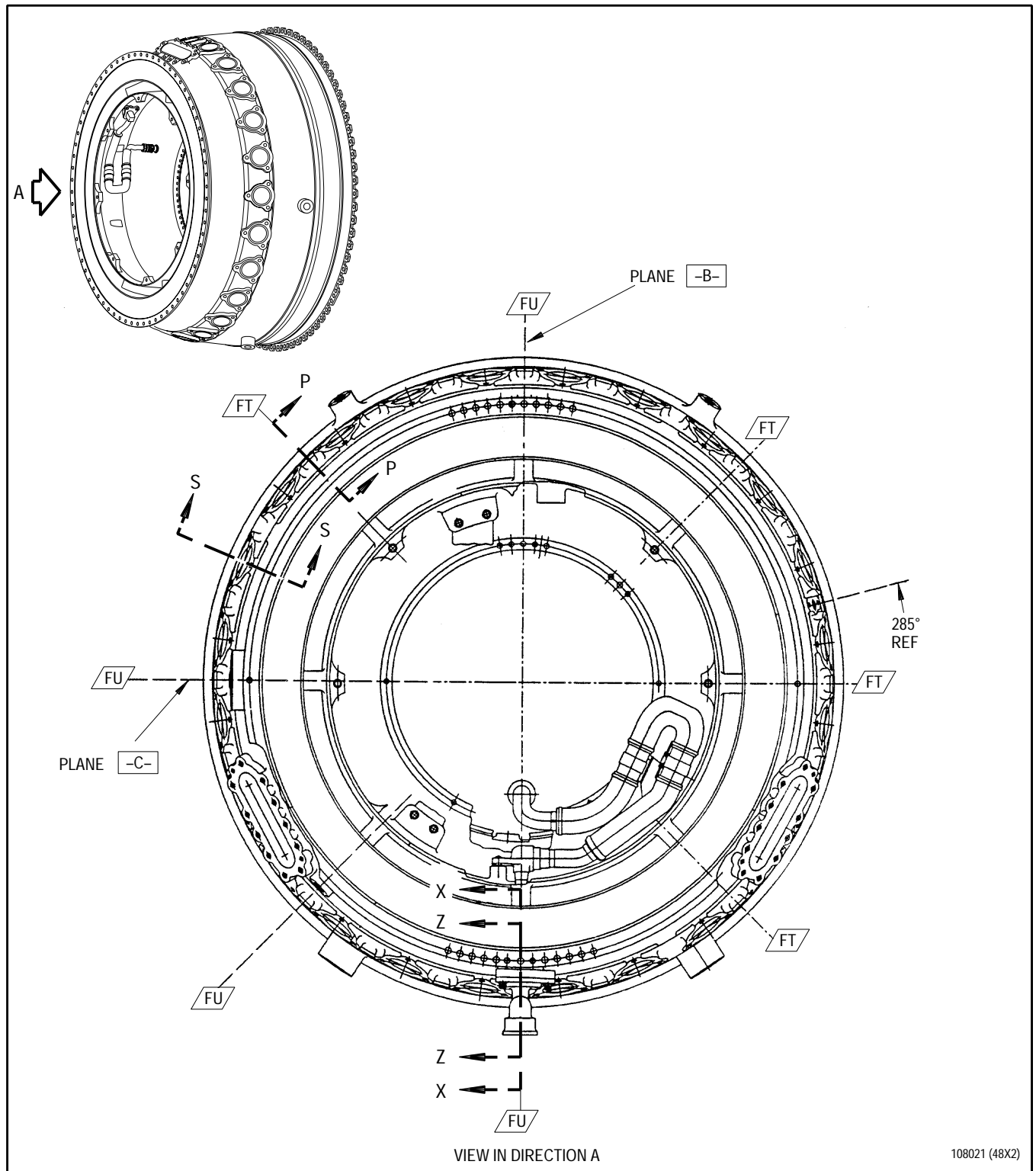


Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 1 of 6)

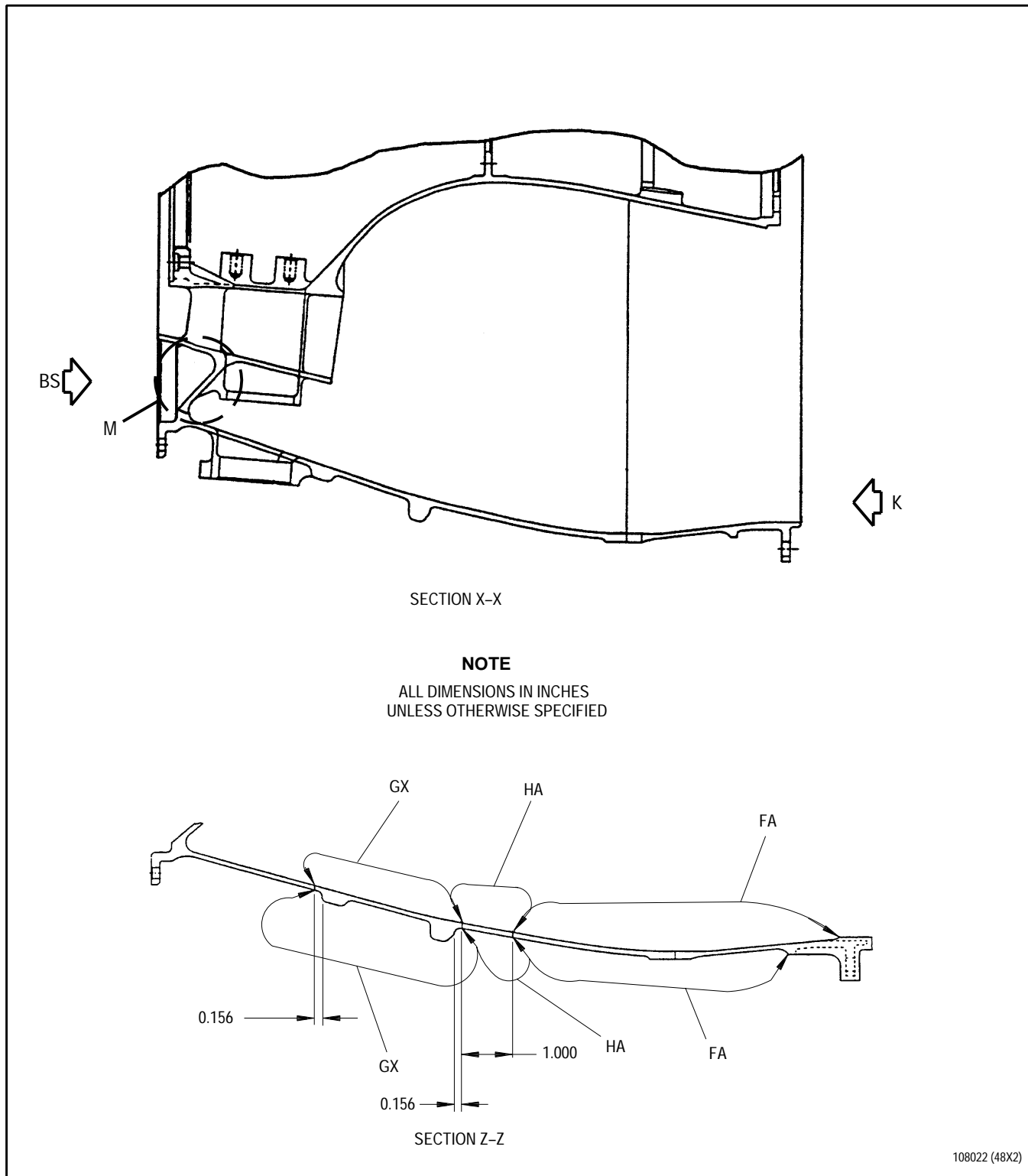


Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 2 of 6)

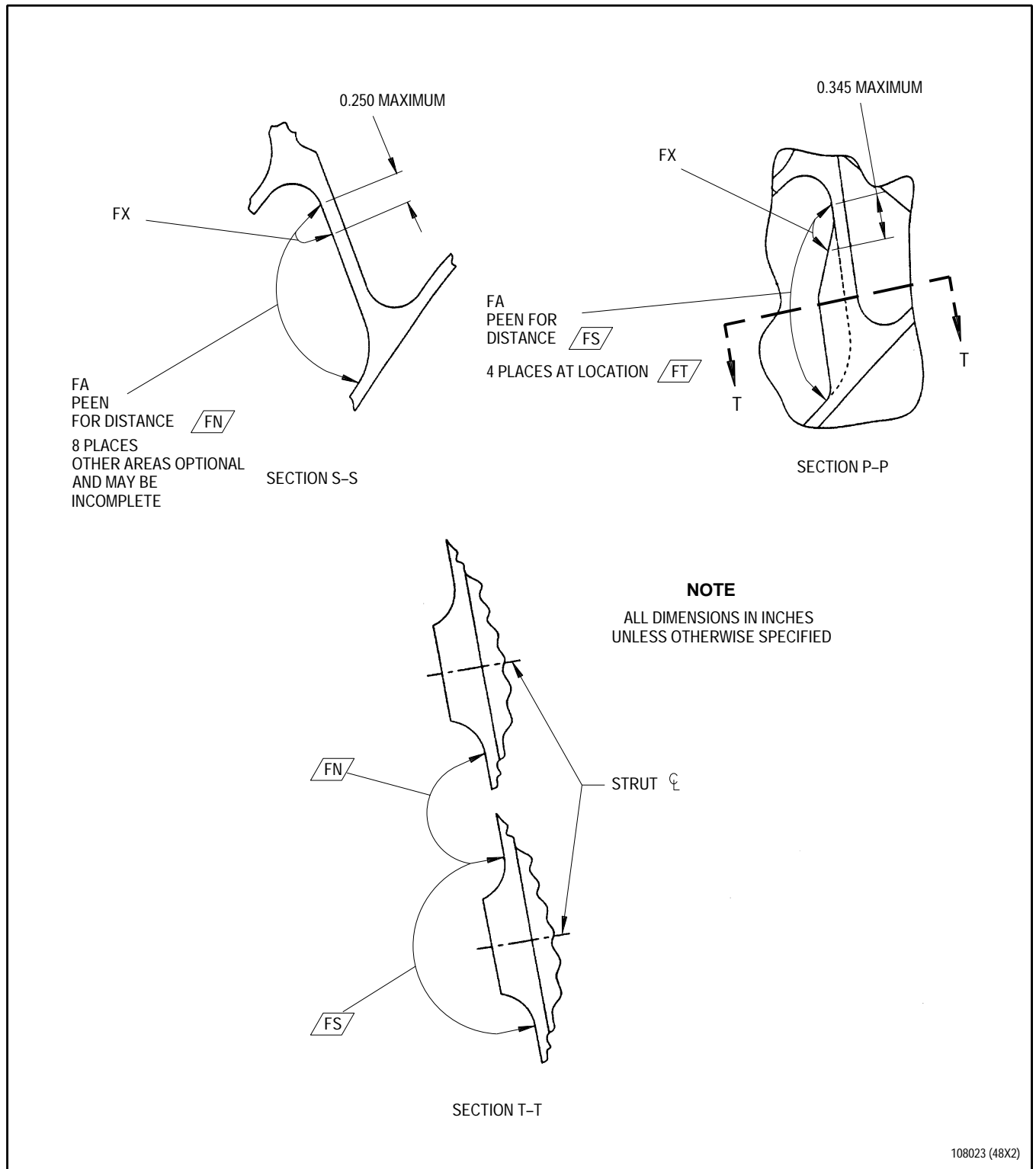
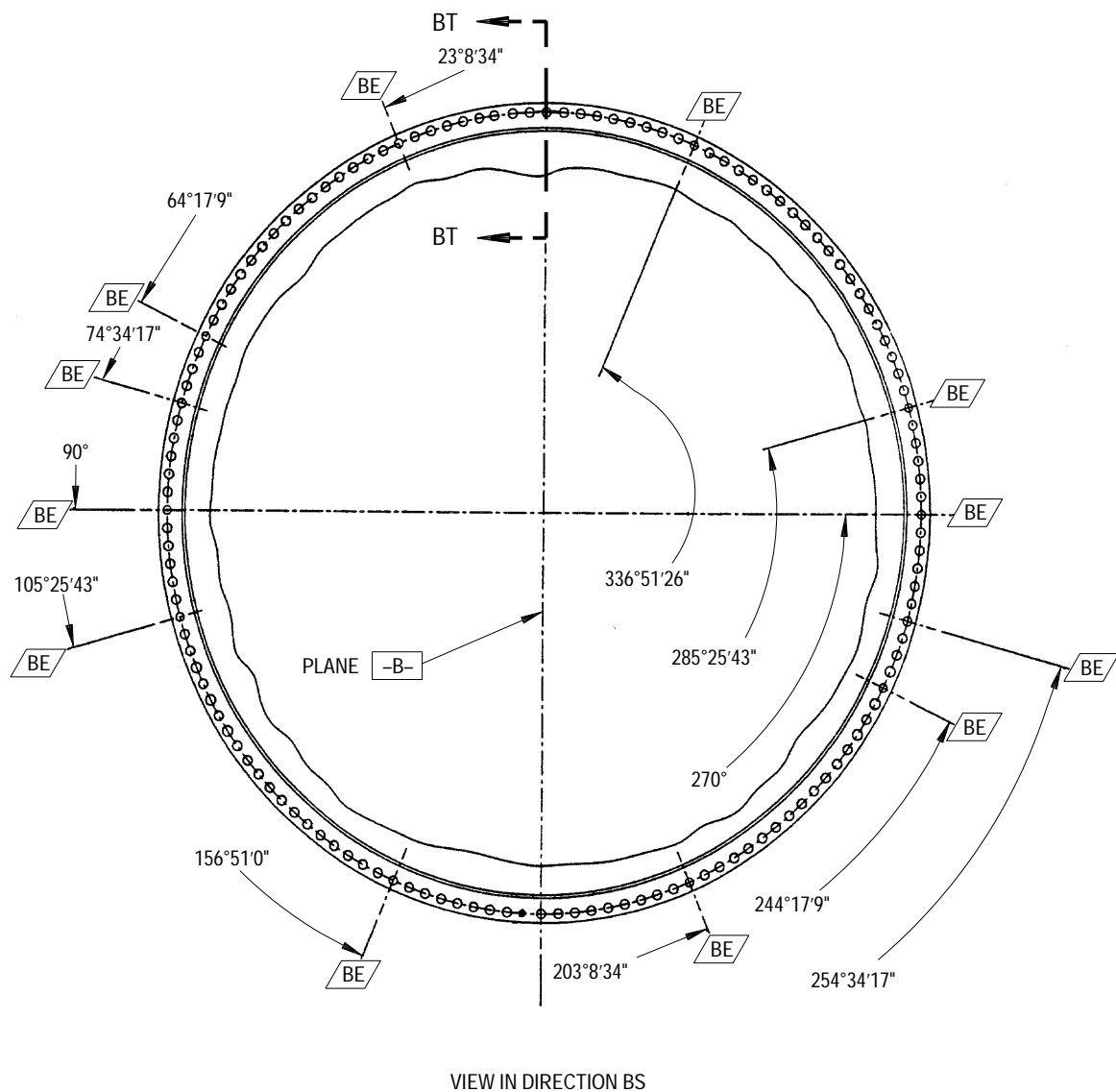


Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 3 of 6)



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Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 4 of 6)

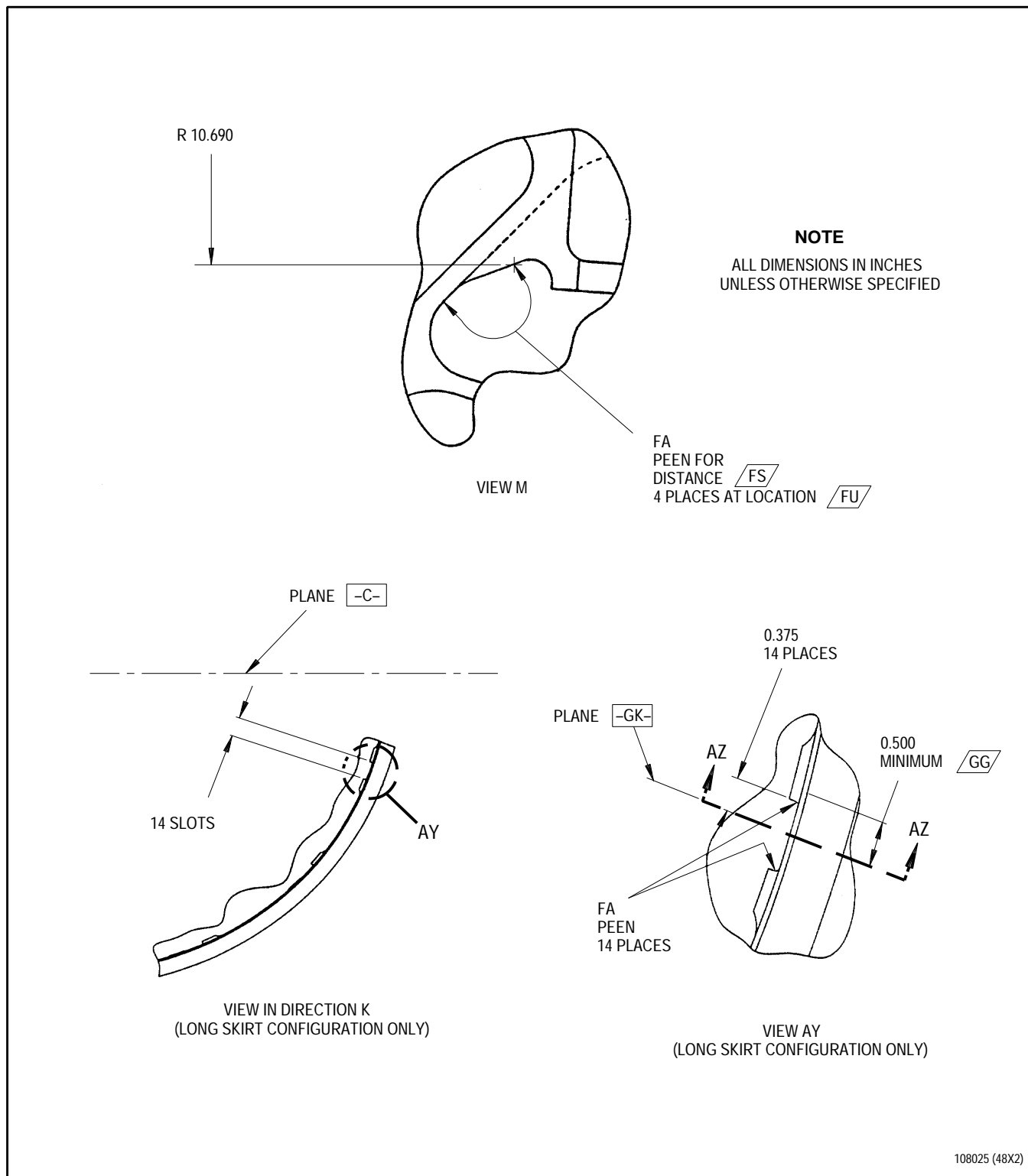


Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 5 of 6)

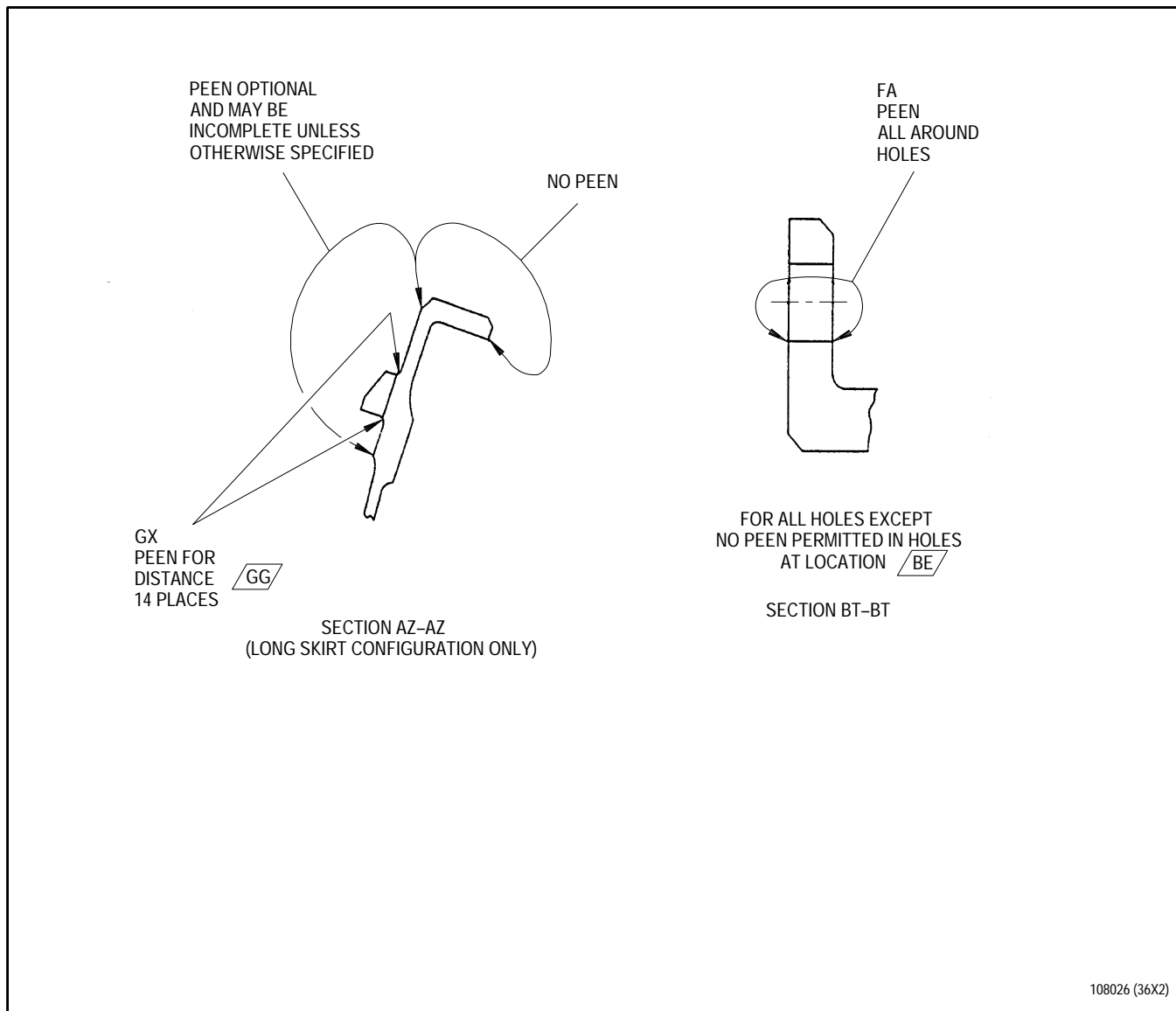


Figure 11. Diffuser Case Assembly - Shotpeen Requirements (Sheet 6 of 6)

10. DIFFUSER CASE ASSEMBLY - BLEND REPAIR.

(See Figure 12.)

- a. Blend per SPOP 533 using the following requirements. Refer to T.O. 2-1-111.
 - (1) Do not repair cracks by blending.
 - (2) Do not blend in areas not specified in WP 370 00 corrective action.
 - (3) Blend with rubberized abrasive stone, such as Cratex flexible abrasive (90 grit or finer), or equivalent.
 - (4) All blending shall maintain a blend L/D ratio, minimum length(L) to maximum depth(D), of 15/1 or greater, unless otherwise specified.
 - (5) Surface finish of blends shall be as smooth or smoother than adjacent, as manufactured, surface.
 - (6) Blends must be smooth and continuous. Do not leave indications in bottom of a blended area or sharp edges or transitions.
 - (7) Depth of blends on opposite surfaces shall not exceed maximum blend depth limit or violate minimum wall thickness.
 - (8) Maximum blend depth is 0.010 inch unless otherwise specified in figure 12.
- b. Fluorescent penetrant inspect blended areas per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- c. Shotpeen blended surfaces per paragraph 9, if required. See legend for figure 12 for requirements.

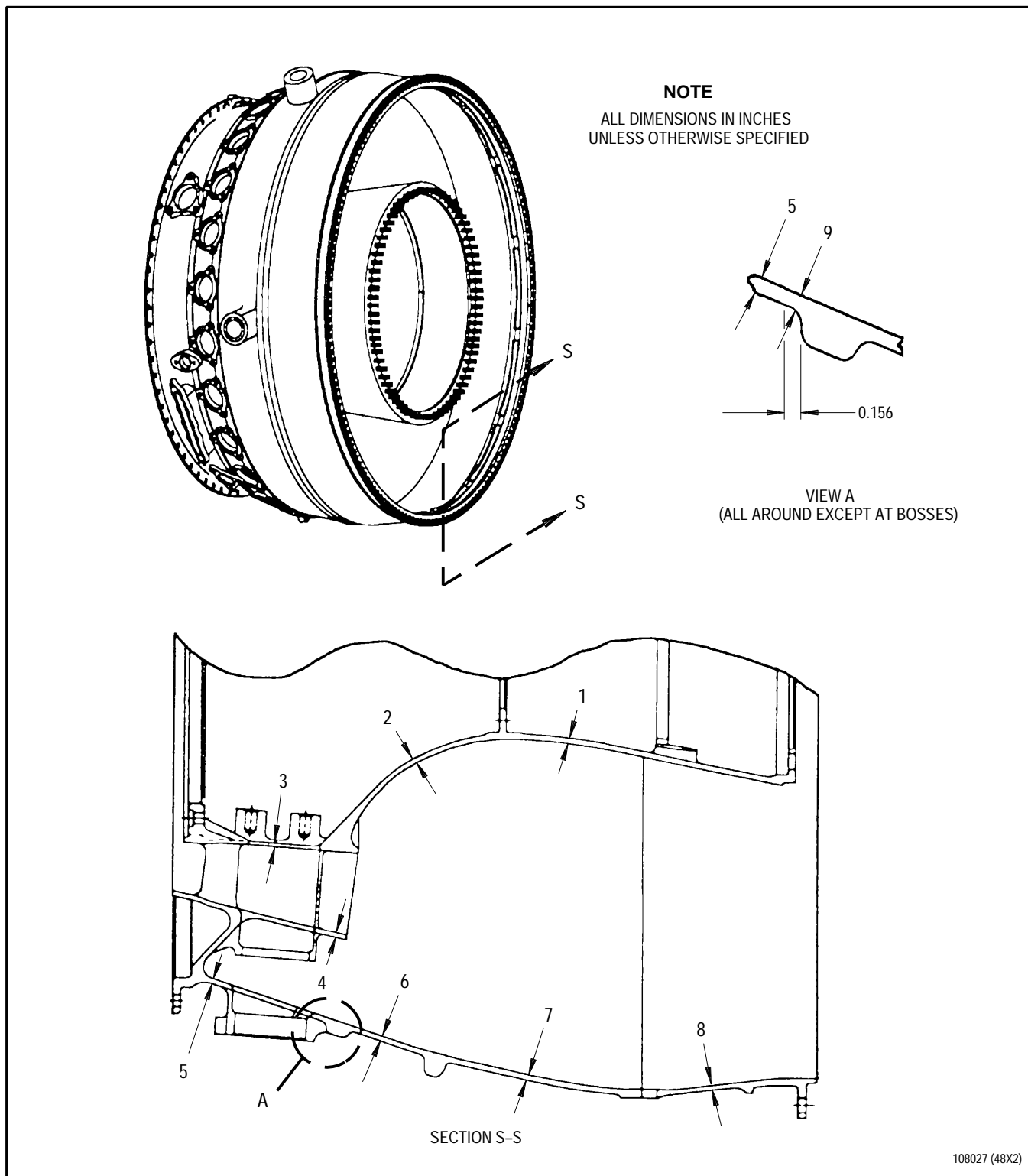


Figure 12. Diffuser Case Assembly - Inside and Outside Diameter Surface Damage Blend Limits

Legend for figure 12

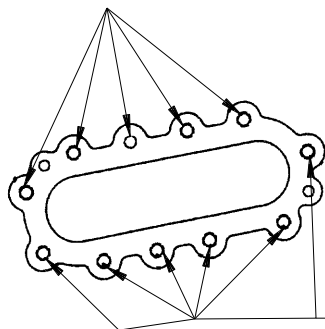
Location	Maximum Blend Depth (Inch)	Minimum Thickness After Blend (Inch)	Shotpeen Requirement
1	0.010	0.090	No
2	0.010	0.080	No
3	0.010	0.040	No
4	0.010	0.070	No
5	Not below minimum thickness	0.100	No
6	Not below minimum thickness	0.095	Peen per AMS 2430, 6 to 9A intensity, SAE 110 maximum cast steel shot
7	0.005	0.105	Peen per AMS 2430, 4 to 6A intensity, SAE 110 maximum cast steel shot
8	Not below minimum thickness	0.090	Peen per AMS 2430, 4 to 6A intensity, SAE 110 maximum cast steel shot
9	Not below minimum thickness	0.100	Peen per AMS 2430, 6 to 9A intensity, SAE 110 maximum cast steel shot

11. DIFFUSER CASE ASSEMBLY - DAMAGED THREAD REPAIR.

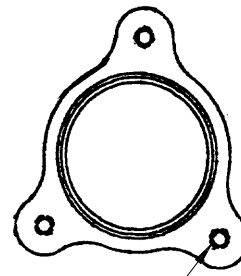
(See Figure 13.)

- a. Chase diffuser case front inner flange lug threads, manifold air bleed boss threads, and fuel nozzle mount pad threads, using 0.250-28 UNJF-3B tap. Chase No. 4 bearing pressure tube boss threads and No. 4 bearing seal air supply tube boss threads using 0.190-32 UNJF-3B tap.
- b. Thread a GO-NO GO gage into newly tapped threads to clean.
- c. Use air at less than 30 psi to blow chips and debris from hole.
- d. Visually inspect hole to ensure no cross-threading or burrs are present.

Ø 0.250-28 UNJF-3B THROUGH, 0.580 MINIMUM FULL THREAD DEPTH



MANIFOLD AIR BLEED BOSS

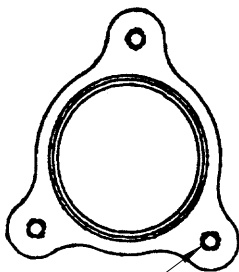


Ø 0.190-32 UNJF-3B, 0.475 MINIMUM
FULL THREAD DEPTH, MINOR Ø
DEPTH THROUGH (3 PLACES)

NO. 4 BEARING SEAL
AIR SUPPLY TUBE BOSS
AND
NO. 4 BEARING PRESSURE
TUBE BOSS

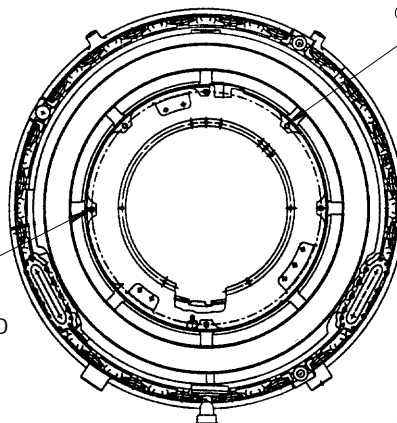
NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



Ø 0.250-28 UNJF-3B THROUGH (3 PLACES)

FUEL NOZZLE MOUNT PAD



Ø 0.250-28 UNJF-3B THROUGH,
7 OF 8 HOLES

Ø 0.250-28 UNJF-3B
0.480 MINIMUM FULL THREAD
DEPTH, MINOR Ø
DEPTH 0.662 MAXIMUM

FRONT INNER FLANGE LUGS

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Figure 13. Diffuser Case Assembly - Damaged Thread Repair

12. DIFFUSER CASE ASSEMBLY - LOOP CLAMP BRACKET AND CHANNEL REPLACEMENT.

(See Figure 14.)

a. Replace unserviceable loop clamp brackets as follows:

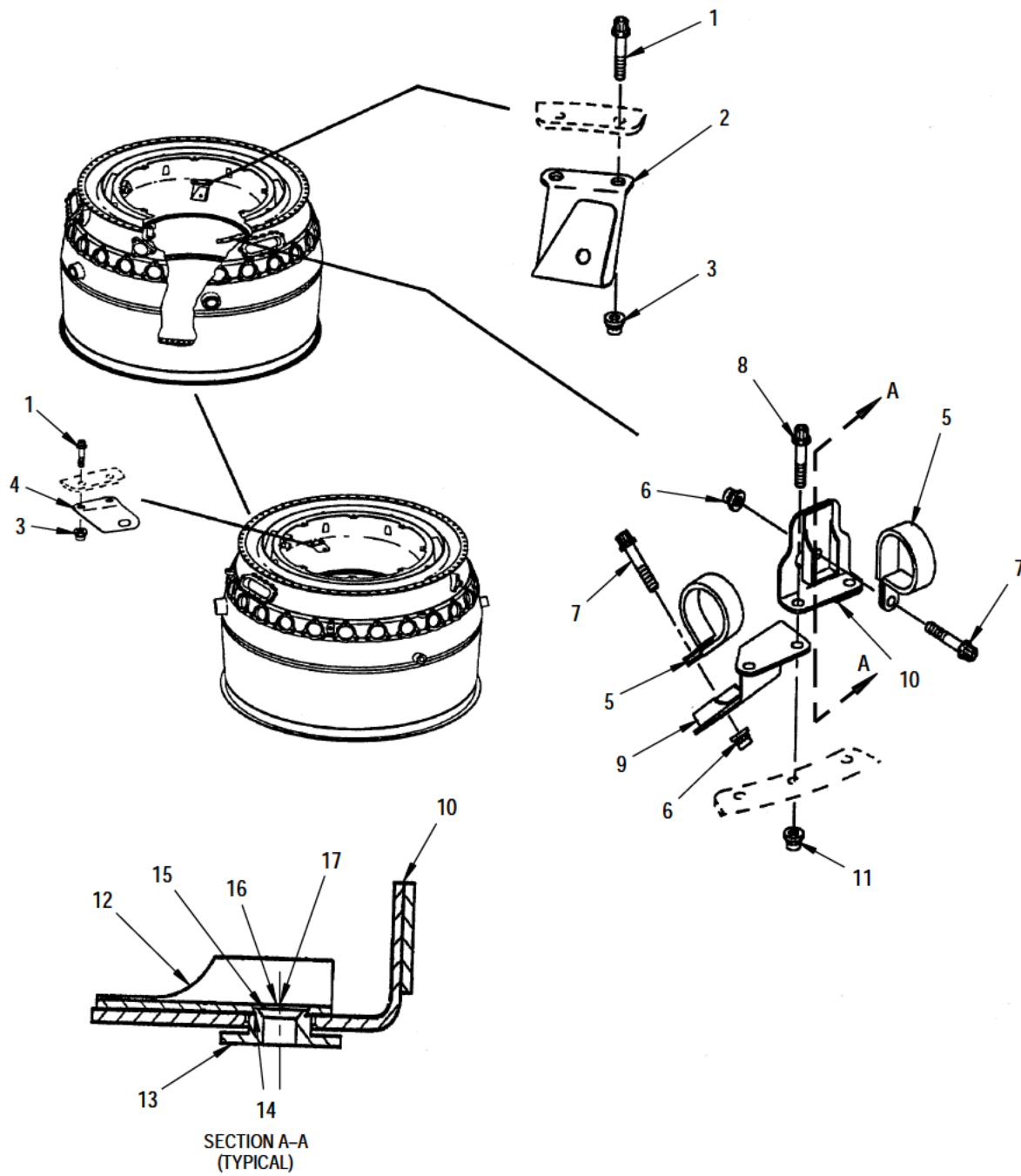
- (1) Remove bolts(1 or 8) and nuts(3 or 11) securing bracket(2, 4, 9, or 10) to diffuser case.
- (2) Apply thin, even coat of MIL-L-7808 lubricant to bolt threads and contact surface of nuts.
- (3) Install bolts and nuts to secure replacement bracket to diffuser case. Torque 32 to 36 pound-inches.

b. Replace unserviceable loop clamp channels as follows:

- (1) Remove channel(12) by drilling out flared end of bushing(13) using 0.250 inch diameter drill.
- (2) Remove bushing and channel.
- (3) Assemble new bushing and channel to bracket(9 or 10). Flare bushing securely as shown using PWA 50974 riveter.

Legend for figure 14

1. PN MS9696-05 bolt, 2 required
2. PN 4069169 loop clamp bracket
3. PN 4066226 nut, 2 required
4. PN 4070087 loop clamp bracket
5. PN 2108637 loop clamp, 2 required
6. PN 4066226 nut, 1 required
7. PN MS9696-07 bolt, 1 required
8. PN MS9696-07 bolt, 3 required
9. PN 4070350 loop clamp bracket
10. PN 4069634-01 loop clamp bracket assembly
11. PN 4066226 nut, 3 required
12. PN 2104327 channel, 2 required
13. PN 2120200 bushing, 1 required
14. No gap permissible
15. This surface shall be flush or below Surface X
16. Surface X
17. Flare securely



108029 (48X2)

Figure 14. Diffuser Case Assembly - Loop Clamp Bracket and Channel Replacement

WORK PACKAGE**TECHNICAL PROCEDURES****SYNCHRONIZING LINKAGE,
REAR COMPRESSOR VARIABLE STATOR VANES -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 20

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	25	8	3	12	22
2A - 2B	22	9 - 10 Added	1	13 - 17 Added	22
3 - 4	0	11	25	18 Blank Added	22
5 - 7 Added	1				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Steel or Titanium Parts, Antigallant and Varnish Removal - - - - -	SWP 031 16
Buffing, Power Denicking of Titanium Parts (SPOP 33) - -	SWP 091 02
Masking Procedures (SPOP 36) - - - - -	SWP 092 12
Compound, Antigalling (PWA 474) Application to Steel or Titanium Parts (SPOP 160) - - - - -	SWP 098 04

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ALCOHOL, ISOPROPYL	TT-I-735
CLOTH, ABRASIVE, CROCUS	P-C-458
DRY ICE	SOLID C02

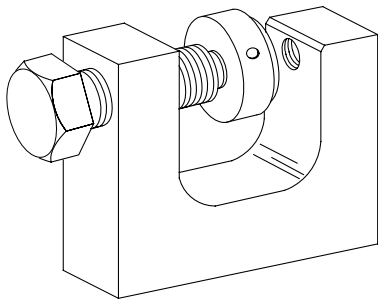
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BEARING, COMPRESSOR STATOR VANE	4075460	AR
INSERT, SCREW THREAD	4075677	4
PIN, HEADLESS SHOULDER	2146277	2
PIN, HEADLESS STRAIGHT	4009810	2
PIN, HEADLESS STRAIGHT	655443	2
PIN	4078408	2

APPLICABLE SUPPORT EQUIPMENT

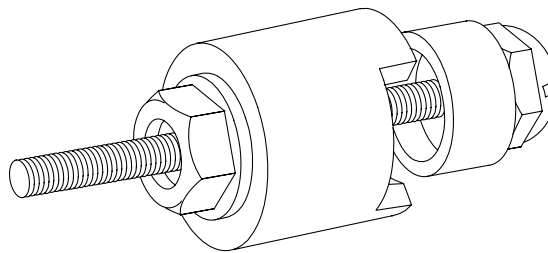
Paragraph	Function - Tool Nomenclature	Tool Number
5	REAR COMPRESSOR STATOR SYNCHRONIZING ARM ASSEMBLY - SELF-ALIGNING BEARING REPLACEMENT	
	PULLER - - - - -	PWA 50922
	PULLER - - - - -	PWA 55517
7	REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY - PIN REPLACEMENT	
	FLARING TOOL, COMPRESSOR STATOR LINKAGE ARM PIN - -	PWA 50921
8	REAR COMPRESSOR INLET, FOURTH, FIFTH, AND SIXTH STAGE STATOR SYNCHRONIZING RING ASSEMBLIES - BEARING REPLACEMENT	
	PUSHER, RING HALF BUSHING - - - - -	PWA 57899
11	REAR COMPRESSOR INLET, FOURTH, AND FIFTH STAGE STATOR SYNCHRONIZING RING ASSEMBLIES - INSERT REPLACEMENT	
	PUSHER, INLET SYNCHRONIZING RING HALF BUSHING - - -	PWA 57900

ILLUSTRATED SUPPORT EQUIPMENT



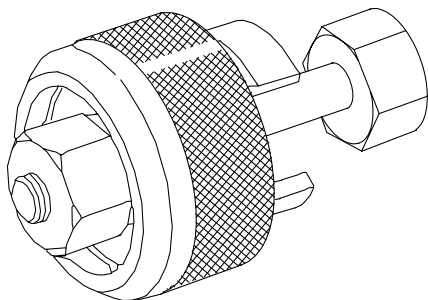
PWA 50921 -C

Figure T1. PWA 50921 FLARING TOOL



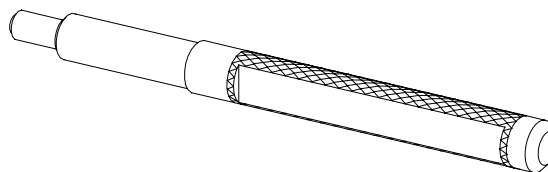
PWA 50922 -C

Figure T2. PWA 50922 PULLER



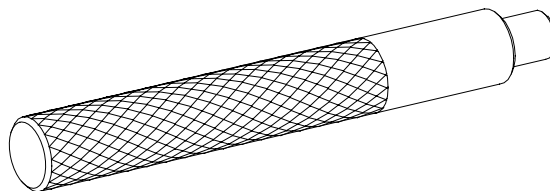
PWA 55517 -C

Figure T3. PWA 55517 PULLER



PWA 57899 -C

Figure T4. PWA 57899 PUSHER



PWA 57900 -C

Figure T5. PWA 57900 PUSHER

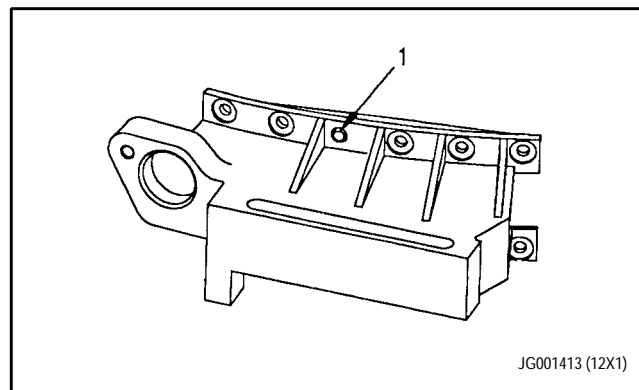
1. INTRODUCTION.

- a. This work package contains instructions for repair of the rear compressor variable stator vanes synchronizing linkage.

2. REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY - PIN REPLACEMENT.

(See Figure 1.)

- a. Chill replacement pin in freezer for 10 minutes minimum.
- b. Remove damaged pin from bracket. Do not remove parent material from bracket.
- c. Install replacement pin.



1. Pin

Figure 1. Rear Compressor Stator Linkage Arm Bracket Assembly - Pin Replacement

**3. FOURTH, FIFTH, AND SIXTH STAGE REAR
COMPRESSOR STATOR SYNCHRONIZING RING
ASSEMBLY - OD SURFACE BLEND REPAIR.**

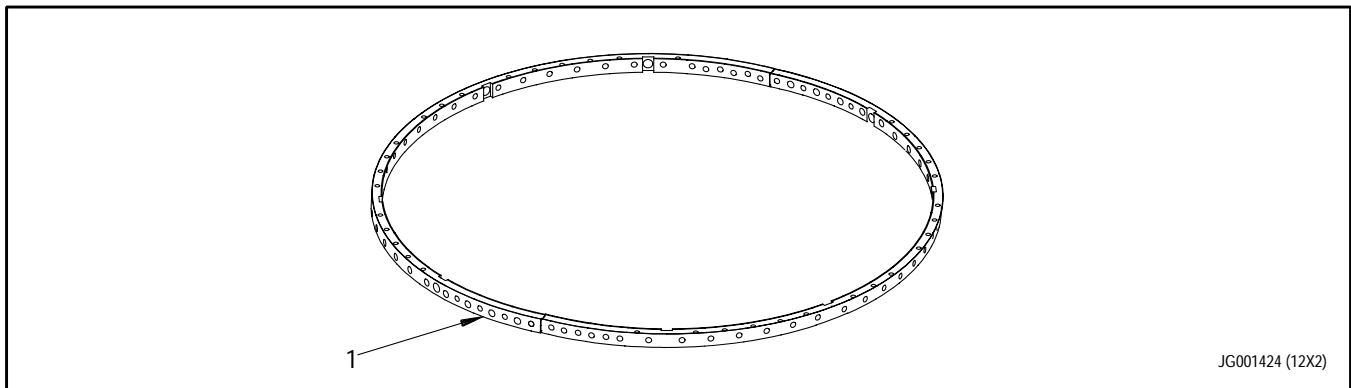
(See Figure 2.)

- a. Blending requirements are as follows:
- (1) All local blending shall extend to a distance of at least 15 times the depth of the damage.
 - (2) Surface finish of blends shall be as smooth or smoother than original finish.

- b. Blend repair nicks, scratches, gouges, etc. up to 0.005 inch deep as follows:

- (1) Hand blending is allowed. Refer to T.O. 2J-F100-53-1, SWP 091 01 (SPOP 532).
- (2) Use fine stone or equivalent.
- (3) Remove all raised metal.

- c. Fluorescent inspect blend areas. Refer to T.O. 2J-F100-9. No cracks allowed.



JG001424 (12X2)

1. OD surface

Figure 2. Fourth, Fifth, and Sixth Stage Rear Compressor Stator Synchronizing Ring Assembly - OD Surface Blend Repair

**4. REAR COMPRESSOR STATOR
SYNCHRONIZING ARM ASSEMBLY - BLEND
REPAIR.**

- a. Blending requirements are as follows:
 - (1) All local blending shall extend to a distance of at least 15 times the depth of the damage from the center of the blend.
 - (2) Surface finish of all blends shall be as smooth or smoother than original finish.
- b. Blend repair unserviceable nicks, pits, and dents in arm. Refer to SWP 091 02.
- c. Fluorescent penetrant inspect blend area per T.O. 2J-F100-9.

**5. REAR COMPRESSOR STATOR
SYNCHRONIZING ARM ASSEMBLY -
SELF-ALIGNING BEARING REPLACEMENT.**

(See Figure 3.)

NOTE

This procedure applies only
when referenced by specific
repair paragraphs.

a. Preparation of new bearing.

- (1) Ensure bearing is clean and
free of foreign material.

- (2) Lightly coat all bearing
surfaces with MIL-L-7808
lubricating oil. Wipe off
excess oil.

- (3) Place bearing in freezer for
at least 20 minutes. Do not
remove bearing until ready
to install.

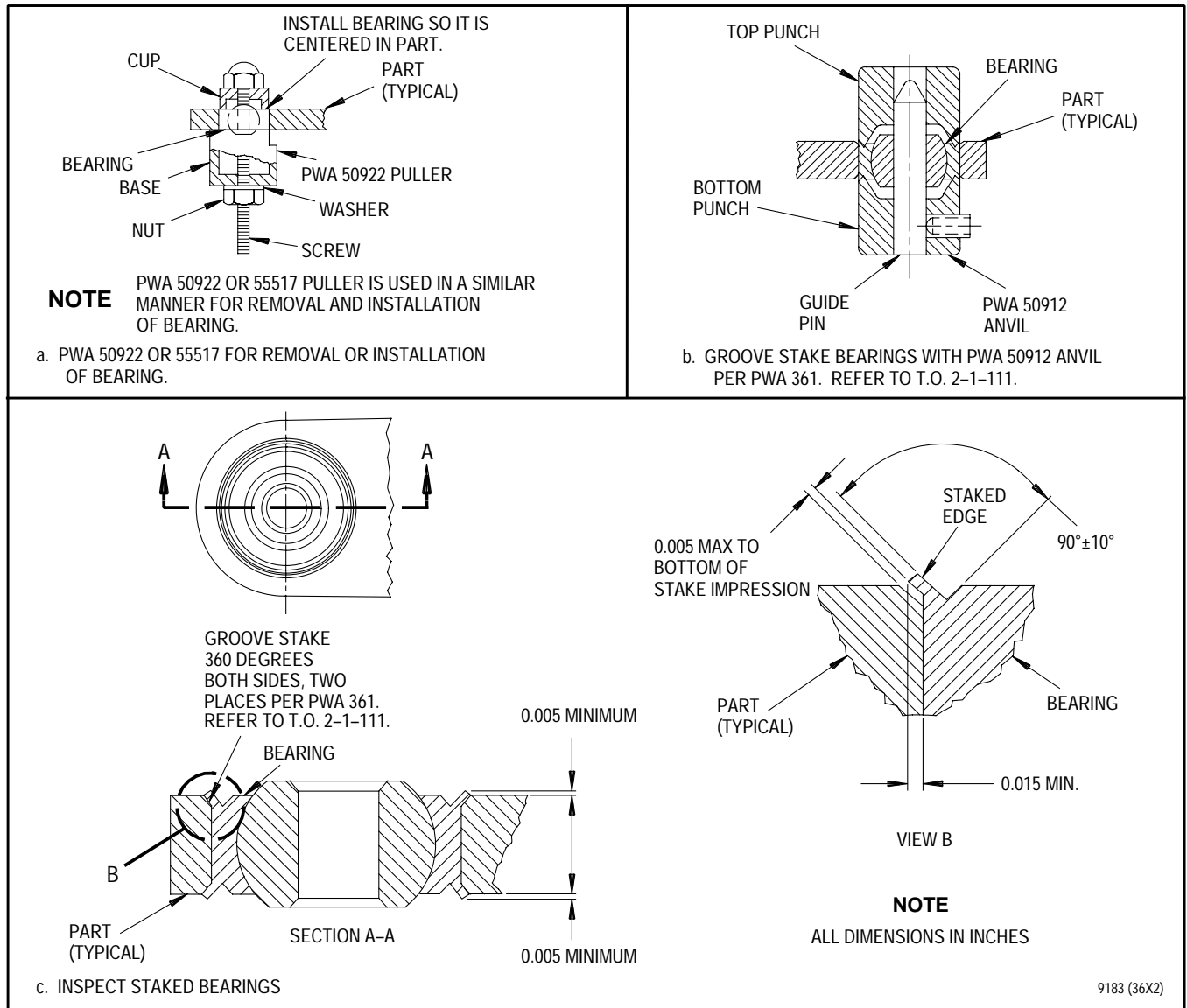


Figure 3. Rear Compressor Stator Synchronizing Arm Assembly - Self-Aligning Bearing Replacement

- b. Prepare arm assembly for bearing removal as follows:

- (1) Provide support for arm assembly.
- (2) Grind or cut staked edge on one side of bearing. Do not grind into arm material when removing bearing.

NOTE

PWA 50922 or PWA 55517 puller is used in a similar manner for bearing removal and installation.

- c. Use either PWA 50922 or PWA 55517 puller to remove bearing as follows:

- (1) Use PWA 50922 puller as follows:
 - (a) Install cup against side of bearing that has staked edge removed, and install screw detail through bearing per figure 3.
 - (b) Install base, washer, and nut or screw. Tighten nut until bearing is removed.
- (2) Use PWA 55517 puller as follows:
 - (a) Install screw detail of PWA 55517 puller against side of bearing that has staked edge removed.
 - (b) Install holder detail over screw detail with legs of holder detail facing in direction of bearing. Secure with nut detail. Tighten nut until bearing is removed.

- d. Prepare arm for installation of new bearing as follows:

- (1) Clean bearing hole in linkage arm. Hand blend score marks with P-C-458 crocus cloth.
- (2) Apply thin film of MIL-L-7808 lubricating oil into bearing hole. Wipe off any excess oil.



Synchronizing arm and bearing could be damaged by attempting to install expanded bearing.

- (3) Remove bearing from freezer and place over hole in synchronizing arm. After removing replacement bearing from freezer, bearing shall be installed in arm immediately before it warms and expands.

- e. Use either PWA 50922 or PWA 55517 puller to install bearing as follows:
 - (1) Use PWA 50922 puller as follows:
 - (a) Install cup against side of bearing and install screw detail through bearing per figure 3. Install assembly through arm assembly hole aligning bearing with hole.
 - (b) Install base detail, washer, and nut on screw.
 - (c) Tighten nut until bearing is installed so bearing and surfaces are flush within 0.005 inch of each other per figure 3.
 - (d) Remove PWA 50922 puller after bearing has warmed to room temperature.
 - (2) Use PWA 55517 puller as follows:
 - (a) Install screw detail of puller through bearing.
 - (b) Install assembly through arm assembly hole aligning bearing with hole.
 - (c) Install holder detail of puller over screw. Install nut detail over screw.
- (d) Tighten nut until bearing is installed so bearing and adjacent surfaces are flush within 0.005 inch of each other per figure 3.
- (e) Remove PWA 55517 puller after bearing has warmed to room temperature.
- f. Groove stake bearing in synchronizing arm assembly as follows:
 - (1) Position bottom punch and guide pin detail of PWA 50912 anvil onto bearing per step b, figure 3.
 - (2) Position top punch detail over guide pin and bearing. Place assembly into arbor press and groove stake bearing to arm assembly.
 - (3) Remove tooling. Inspect groove stake to requirements of step c, figure 3.
- g. Use fingers to inspect bearing for freedom of movement. Ball shall move smoothly through 9 degree minimum cone angle with maximum torque of 5 pound-inches.
- h. Repeat groove staking procedure, step f., if necessary.

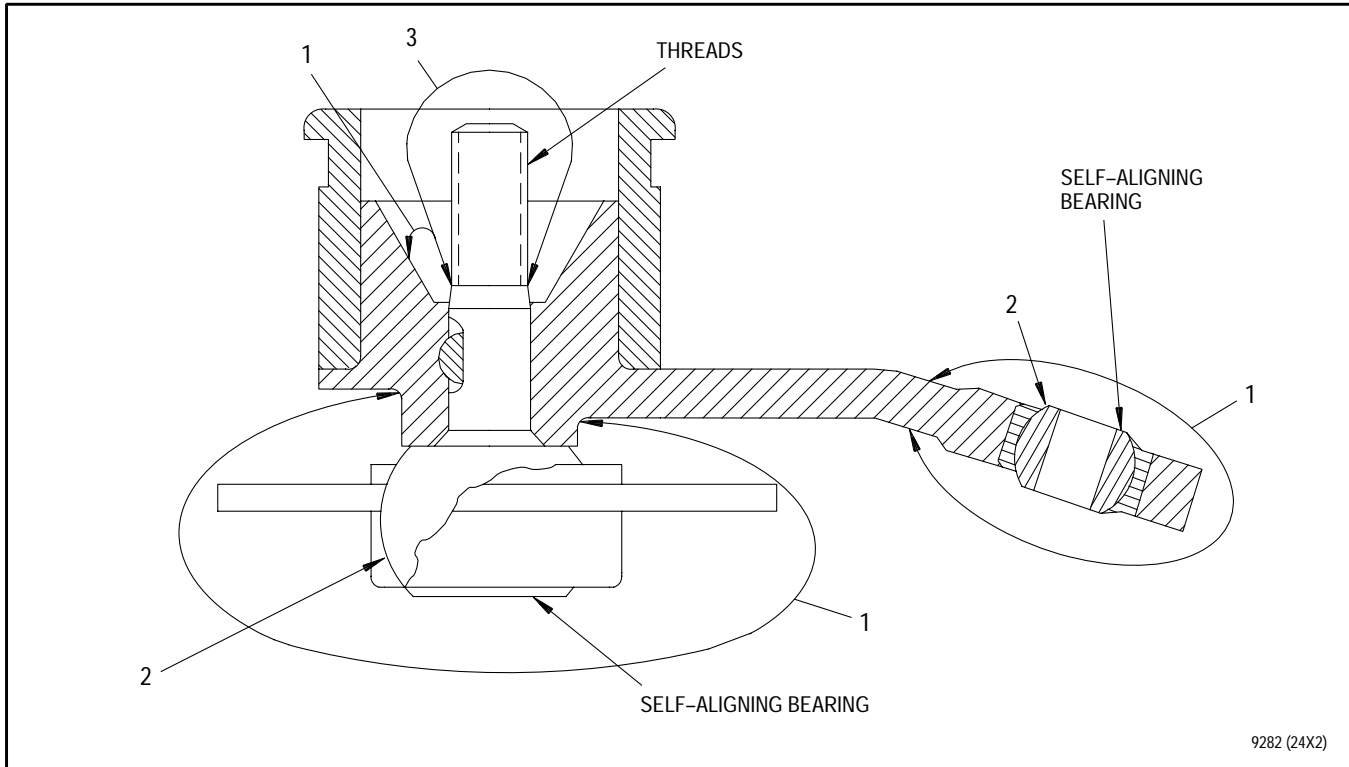
6. COMPRESSOR STATOR LINKAGE ARM ASSEMBLY - ANTIGALLING COMPOUND APPLICATION.

(See Figure 4.)

- a. Remove existing antigalling compound from threads. Refer to T.O. 2J-F100-53-1, SWP 031 16 (SPOP 252).

- b. Mask areas (1) in figure 4 to prohibit stripping solution from coming into contact with fiber linings in bearings. Refer to T.O. 2J-F100-53-1, SWP 092 12 (SPOP 36).

- c. Apply antigalling compound to areas shown. Refer to T.O. 2J-F100-53-1, SWP 098 04 (SPOP 160).



1. Mask in this area required
2. Bearing liner
3. Apply antigallant per text

Figure 4. Rear Compressor Stator Linkage Arm Assembly - Antigalling Compound Application

7. REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY - PIN REPLACEMENT.

(See Figure 5)

- Use standard tools to drill or grind out flare of pin.
- Use punch and mallet to entirely remove pin.
- Chill replacement pin PN 2146277 for 10 minutes with dry ice.

NOTE

Chilled pin has loose fit in bracket.

- Install chilled pin. Use PWA 50921 flaring tool to flare pin and secure.

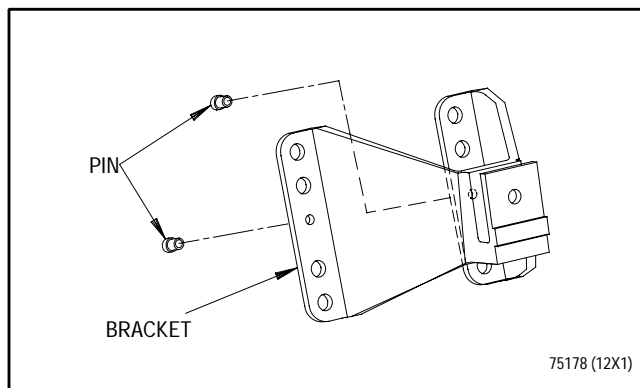
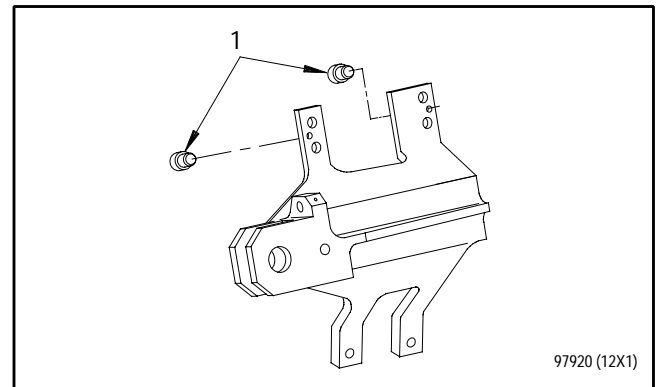


Figure 5. Rear Compressor Stator Linkage Arm Bracket Assembly - Pin Replacement

7A. REAR COMPRESSOR STATOR LINKAGE ARM BRACKET ASSEMBLY (FIXED 6TH STAGE VANES) - PIN REPLACEMENT.

(See Figure 5A.)

- Remove unserviceable pin using a steel drift. Ensure bracket is not distorted and hole diameter is not damaged during pin removal. See figure 5A.
- Chill replacement pin PN 4078408 in dry ice (solid CO₂) for 10 minutes minimum.
- Install replacement pin, using press or brass hammer.



1. Pin

Figure 5A. Rear Compressor Stator Linkage Arm Bracket Assembly (Fixed 6th Stage Vanes) - Pin Replacement

8. REAR COMPRESSOR INLET, FOURTH, FIFTH, AND SIXTH STAGE STATOR SYNCHRONIZING RING ASSEMBLIES - BEARING REPLACEMENT.

(See Figure 6.)

- a. Remove old bearing(2) using PWA 57899 pusher as follows:

- (1) Secure synchronizing ring half(1) to workbench.
- (2) Insert pilot end of PWA 57899 pusher into bearing(2) from inside radius of ring half until pusher shoulder contacts bearing face.



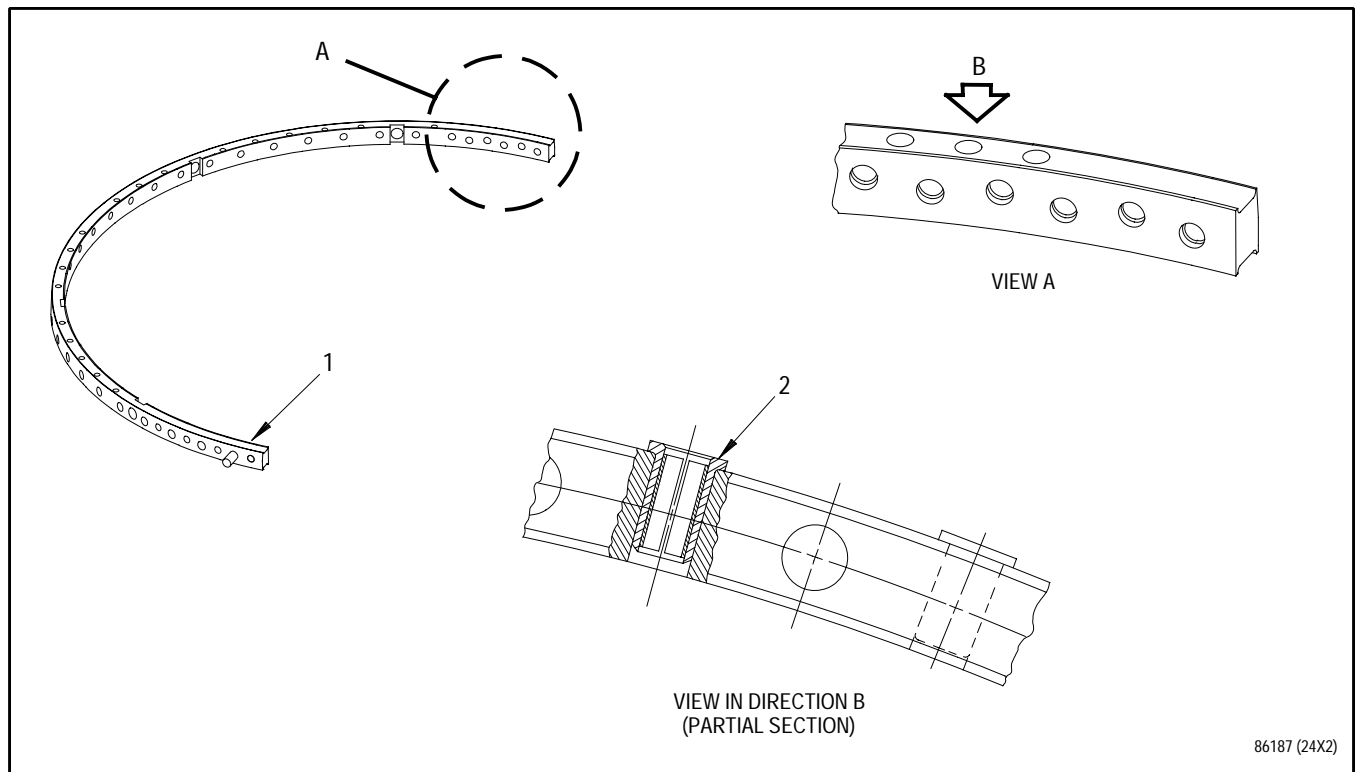
Failure to use soft material for backup support and maintain contact point on ring just adjacent to bearing OD can result in ring bending during bearing removal.

- (3) Provide backup support for ring half and lightly strike end of pusher with mallet to remove bearing. Take care not to remove parent material from ring half.

- b. Clean synchronizing ring half and replacement bearing using clean cloth and TT-I-735 isopropyl alcohol.

- c. Install replacement bearing using PWA 57899 pusher as follows:

- (1) Insert pilot end of PWA 57899 pusher through synchronizing ring bearing bore from inside radius of ring until pusher shoulder contacts ring.
- (2) Install new bearing over pilot end of pusher until bearing contacts ring.
- (3) Hold pusher and lightly strike head of bearing with mallet to press bearing into bore of ring.
- (4) Remove pusher from bearing. Insert pilot end of pusher into bearing from outside radius of ring until pusher shoulder contacts bearing face.
- (5) Lightly strike pusher with mallet until bearing head is fully seated against ring half.



1. Synchronizing ring half (typical)
2. Bearing PN 4075460

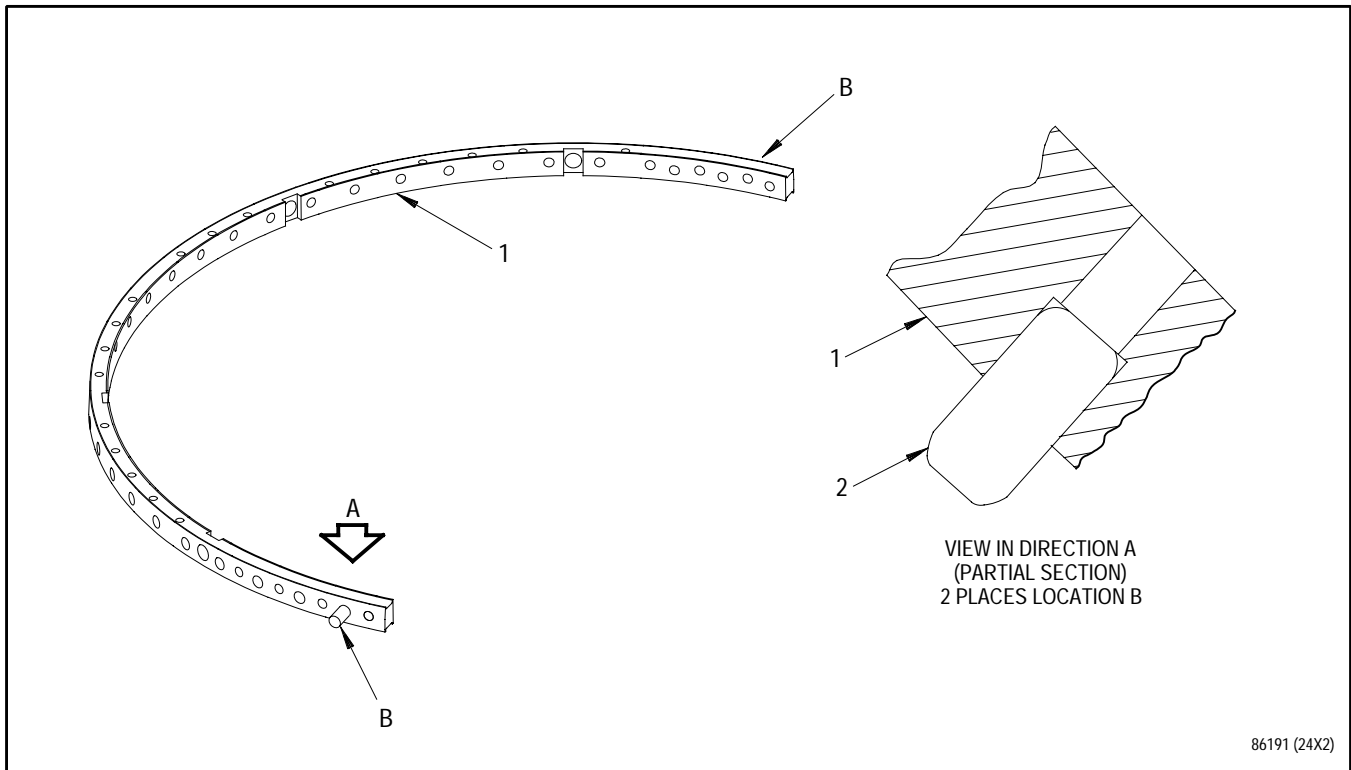
Figure 6. Rear Compressor Inlet, Fourth, Fifth, and Sixth Stage Stator Synchronizing Ring Assemblies - Bearing Replacement

**9. REAR COMPRESSOR INLET STATOR
SYNCHRONIZING RING ASSEMBLY - PIN
REPLACEMENT.**

(See Figure 7.)

- a. Remove old pin(2) from
synchronizing ring half(1)
using standard punch and
mallet. Discard pin.

- b. Install replacement pin to
bottom into hole in ring half.



86191 (24X2)

1. Synchronizing ring half
2. Pin PN 655443

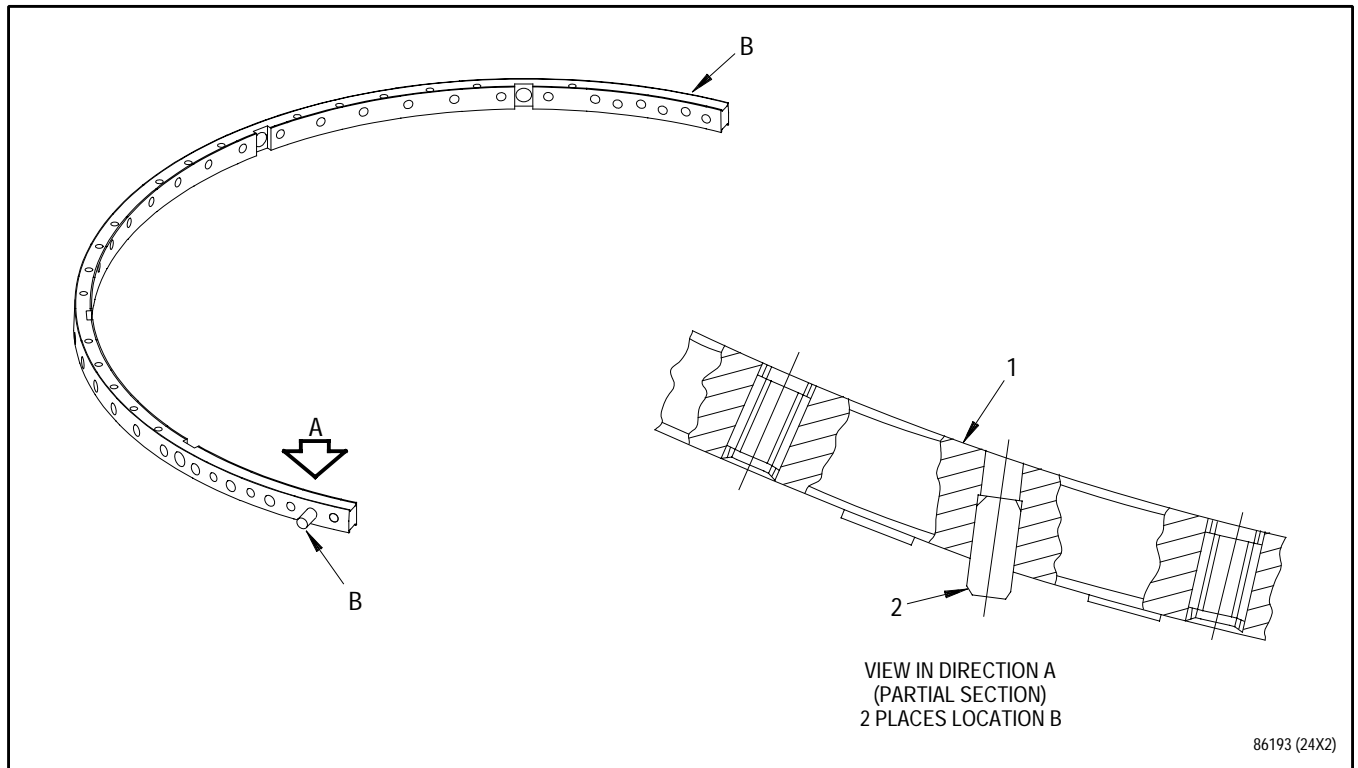
Figure 7. Rear Compressor Inlet Stator Synchronizing Ring Assembly - Pin Replacement

**10. REAR COMPRESSOR FOURTH STAGE
STATOR SYNCHRONIZING RING ASSEMBLY -
PIN REPLACEMENT.**

(See Figure 8.)

- a. Remove old pin(2) from
synchronizing ring half(1)
using standard punch and
mallet. Discard pin.

- b. Install replacement pin to
bottom into hole in ring half.



1. Synchronizing ring half
2. Pin PN 4009810

Figure 8. Rear Compressor Fourth Stage Stator Synchronizing Ring Assembly - Pin Replacement

11. REAR COMPRESSOR INLET, FOURTH, AND FIFTH STAGE STATOR SYNCHRONIZING RING ASSEMBLIES - INSERT REPLACEMENT.

(See Figure 9.)

- a. Remove old insert(2) using PWA 57900 pusher as follows:

- (1) Secure synchronizing ring half(1) to workbench.
- (2) Insert pilot end of PWA 57900 pusher into insert(2) from outside radius of ring half until pusher shoulder contacts insert face.

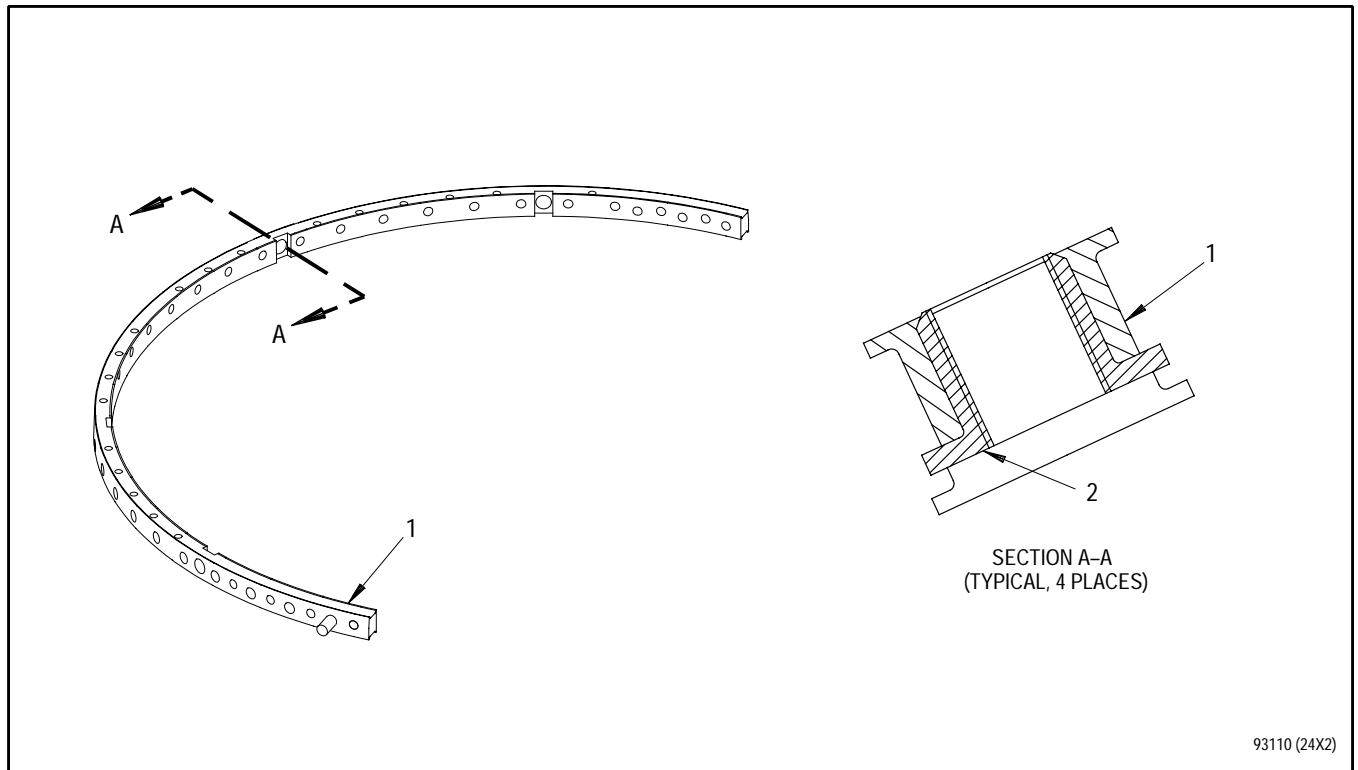


Failure to use soft material for backup support and maintain contact point on ring just adjacent to insert OD can result in ring bending during insert removal.

- (3) Provide backup support for ring half and lightly strike end of pusher with mallet to remove insert. Take care not to remove parent material from ring half.

- b. Install replacement insert using PWA 57900 pusher as follows:

- (1) Insert pilot end of PWA 57900 pusher through synchronizing ring insert bore from outside radius of ring until pusher shoulder contacts ring.
- (2) Install new insert over pilot end of pusher until insert contacts ring.
- (3) Align flats on head of insert with slot in ring half ID. Hold pusher and lightly strike head of insert with mallet to press insert into bore of ring.
- (4) Remove pusher from insert. Insert pilot end of pusher into insert from inside radius of ring until pusher shoulder contacts insert face.
- (5) Lightly strike pusher with mallet until insert head is fully seated against ring.



1. Synchronizing ring half (typical)
2. Insert PN 4075677

Figure 9. Rear Compressor Inlet, Fourth, and Fifth Stage Stator Synchronizing Ring Assemblies - Insert Replacement

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL, AIR, NO. 3 BEARING -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	1	5	0	7 - 8	0
2 - 3	0	6	1	9 - 10	1
4	1				

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-7
Painting, Graphite Varnish (PWA 60) (SPOP 150) - - - - -	SWP 097 06
Peening, Steel Shot (SPOP 501) - - - - -	SWP 091 08
Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Grit, aluminum oxide (PMC 3046)	Blashte BT No. 240 or Fastblast No. 240 or Arrowblast No. 240
Grit or silicon carbide (PMC 3053-38)	Silicon carbide 320
Varnish, graphite premixed	PN 0548

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 3 bearing air seal.

**2. NO. 3 BEARING AIR SEAL - BLEND
REPAIR.**

(See Figure 1.)

NOTE

No straightening of knife-edges
is permitted.

- a. Bends exceeding 0.060 inch and
all damage shall be blended
using fine files and stones.
Observe limits of figure 1.
Stone knife-edges smooth in
blend areas after blending.
- b. After blending of cracks
fluorescent penetrant inspect to
ensure all cracks have been
removed. Refer to
T.O. 2J-F100-9.

Legend for figure 1

1. Blend to 1/8 inch minimum radius.
2. Blend may extend down to pedestal. Remove damage but keep knife-edge removal
to minimum. Do not remove material from pedestal.
3. Blends on adjacent knife-edges shall be separated by one inch.
4. Length of single blend shall not exceed three inches.
5. Total length of all blends shall not exceed four inches.
 - Total applies to all knife-edges or one knife-edge if others are damaged or
blended.
6. Pedestal.

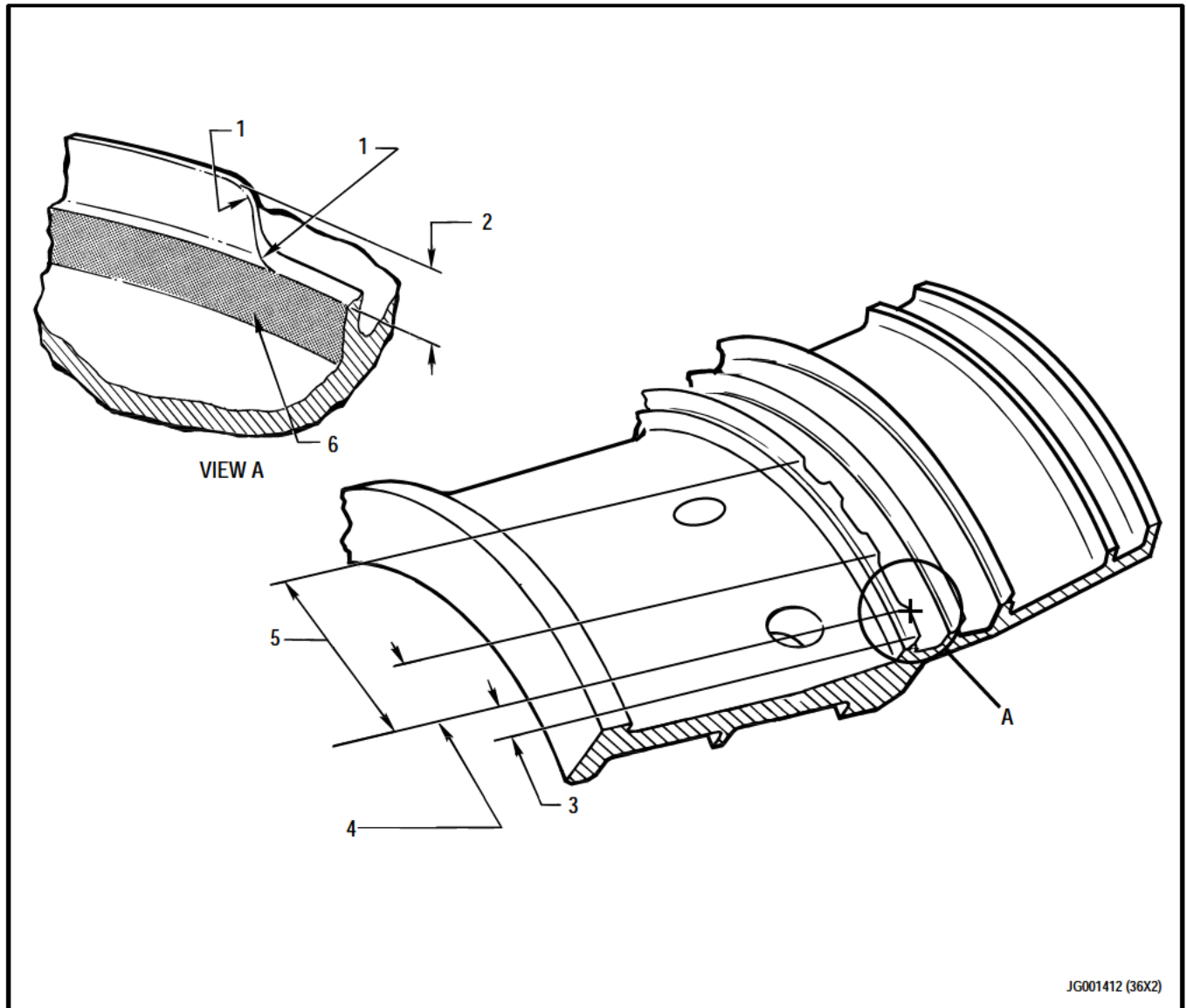


Figure 1. No. 3 Bearing Air Seal - Blend Repair

**3. NO. 3 BEARING AIR SEAL - SNAP
DIAMETER AND FACE REPAIR.**

(See Figure 2.)

NOTE

- Diameter A may be repaired per paragraph 3 if Diameter C is not worn or otherwise damaged.
- Diameter C may be repaired per paragraph 3 if Diameter A is not worn or otherwise damaged.
- a. Clean-up machine to dimensions per figure 2.
- b. Fluorescent penetrant inspect machined surface per T.O. 2J-F100-9. No cracks allowed.
- c. Shot peen area(4) to intensity 6A \pm 1. Refer to T.O. 2J-F100-53-1, SWP 091 08.
- d. Grit blast area requiring coating with No. 240 to 320 silicon carbide grit (preferred method) or 240 to 320 aluminum oxide grit (optional method) at 30 to 40 psi pressure.
- e. Plasma coat repair per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
- f. Finish machine to dimensions per figure 2.
- g. Apply graphite varnish anti-scuffing treatment per PWA 60 and paragraph 4.
- h. Permanently mark beehive symbol in area(1). Refer to T.O. 2-1-111.

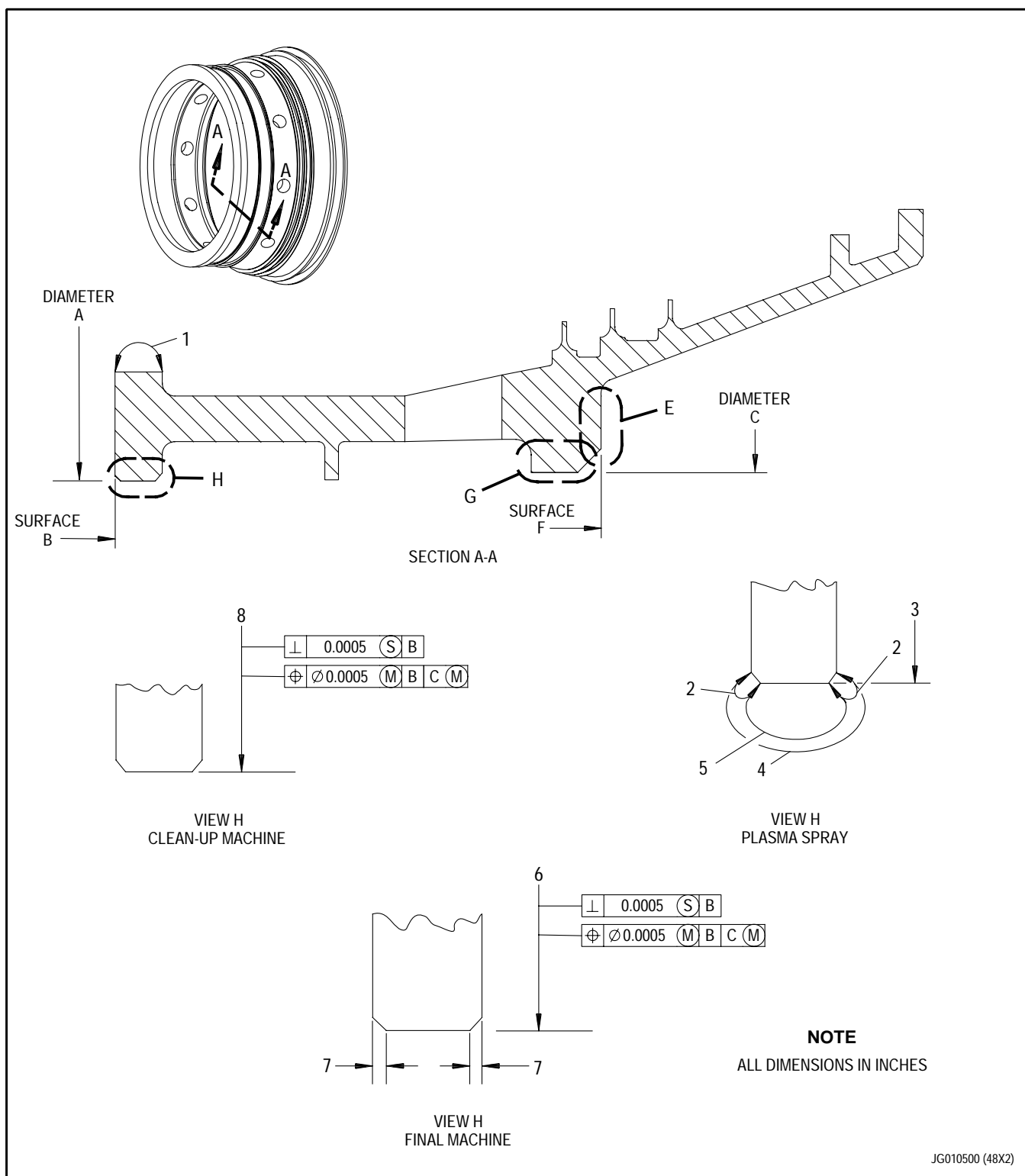


Figure 2. No. 3 Bearing Air Seal - Snap Diameter and Face Repair (Sheet 1 of 2)

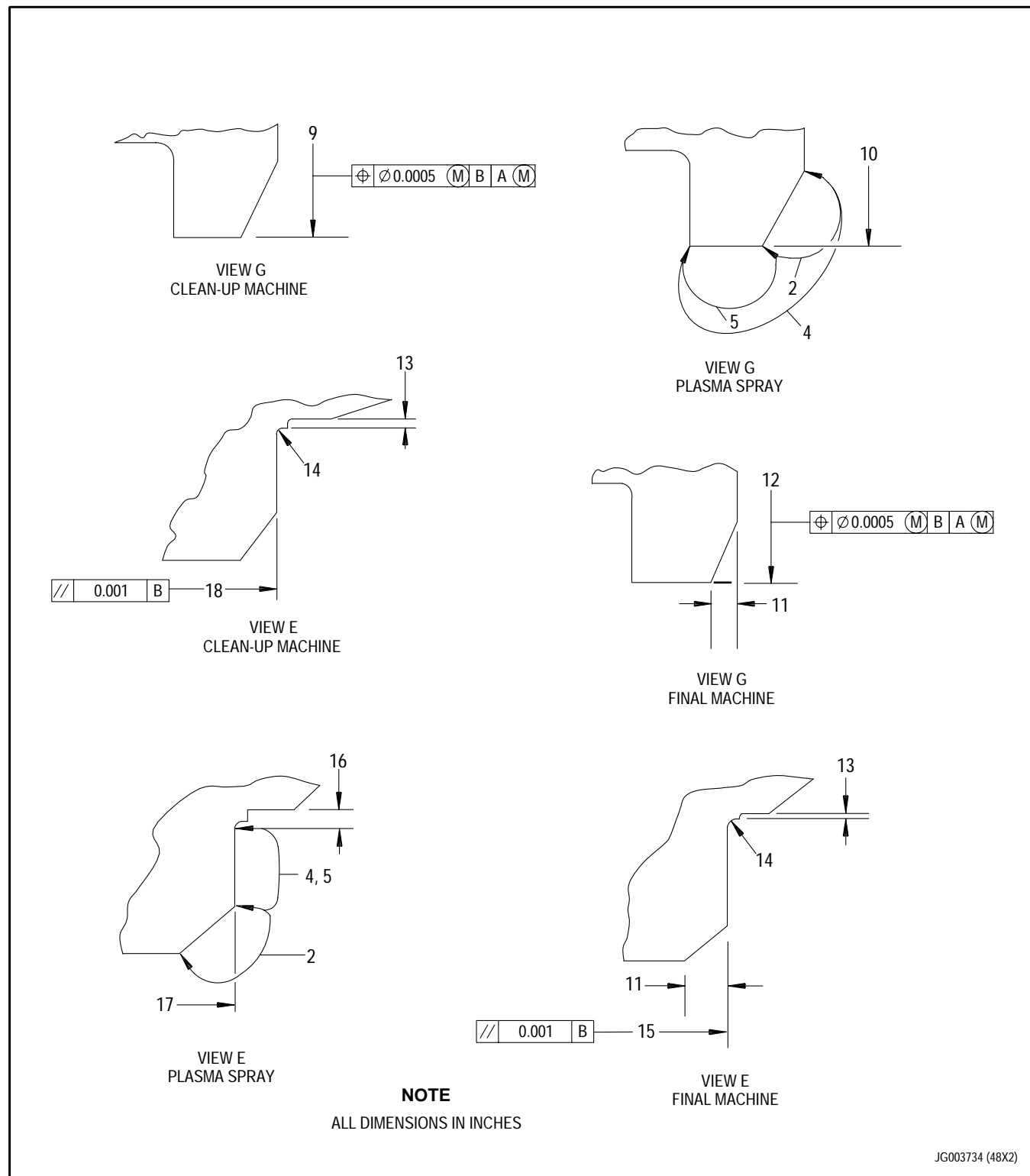


Figure 2. No. 3 Bearing Air Seal - Snap Diameter and Face Repair (Sheet 2 of 2)

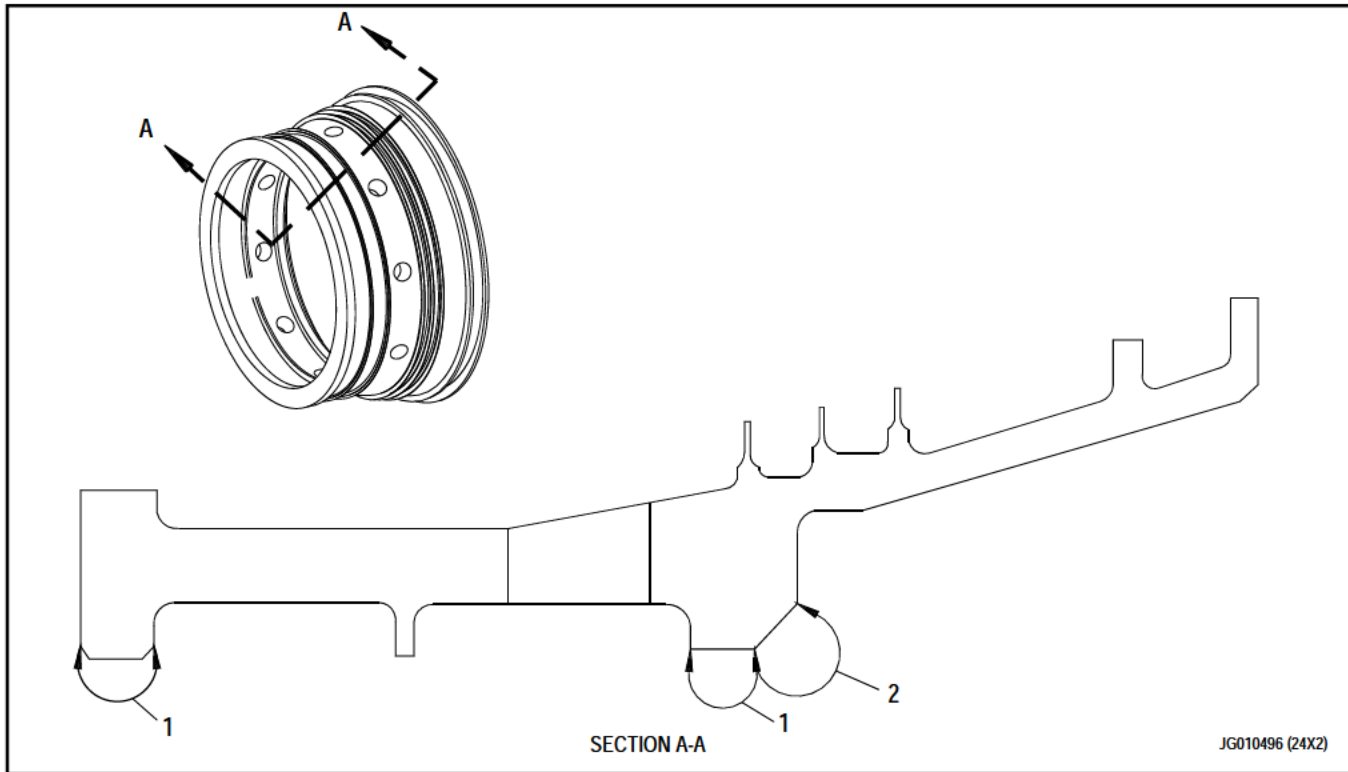
Legend for figure 2

1. Mark this area. Refer to T.O. 2-1-111.
2. Coating optional and may be incomplete in this area.
3. Coat to 5.591 inch diameter maximum.
4. Shotpeen per text.
5. Coat per text.
6. Final machine to 5.6010 to 5.6015 inch diameter. This diameter shall be located within 0.0005 inch of true position at Maximum Material Condition in relation to Diameter C at Maximum Material Condition and surface B. This diameter shall be perpendicular within 0.0005 inch Regardless of Feature Size to Surface B.
7. Chamfer 0.010 to 0.030 inch $\times 45^\circ \pm 2^\circ$.
8. Machine to 5.6075 to 5.6250 inch diameter. Hold to minimum value. This diameter shall be located within 0.0005 inch of true position at Maximum Material Condition in relation to Diameter C at Maximum Material Condition and surface B. This diameter shall be perpendicular within 0.0005 inch Regardless of Feature Size to Surface B.
9. Machine to 5.6565 to 5.6735 inch diameter. Hold to minimum value. This diameter shall be located within 0.0005 inch of true position at Maximum Material Condition in relation to Diameter A at Maximum Material Condition and Surface B.
10. Coat to 5.6395 inch diameter maximum.
11. Chamfer 0.110 to 0.140 inch $\times 45^\circ \pm 2^\circ$. Parallel to Surface B ± 0.0005 inch.
12. Final machine to 5.6495 to 5.6505 inch diameter. This diameter shall be located within 0.0005 inch of true position at Maximum Material Condition in relation to Diameter A at Maximum Material Condition and Surface B.
13. 0.000 to 0.025 inch.
14. 0.047 to 0.078 inch radius.
15. Finish machine 2.2225 to 2.2255 inches to Surface B. This surface shall be parallel to Surface B within 0.0001 inch.
16. 0.100 to 0.120 inch.
17. Coat to 2.230 inch minimum to Surface B.
18. Machine to 2.208 to 2.220 inches to Surface B. Hold to maximum value. This surface shall be parallel to Surface B within 0.0001 inch.

4. NO. 3 BEARING AIR SEAL - GRAPHITE VARNISH ANTISCUFFING TREATMENT. (See Figure 3.)

- b. Apply graphite varnish (PWA 60) to area(1). Refer to T.O. 2J-F100-53-1, SWP 097 06 (SPOP 150).

- a. Surface preparation is not required.



1. Apply graphite varnish antiscuffing treatment per text.
2. Antiscuffing treatment is optional and may be incomplete.

Figure 3. No. 3 Bearing Air Seal - Graphite Varnish Treatment

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, COMPRESSOR STATOR -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4	29	5 - 11 Added	29	12 Blank Added	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Illustrated Parts Breakdown - - - - -	T.O. 2J-F100-54

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
COMPOUND, ANTIGALLING (PWA 36545-3)	ESNALUBE 382
GRIT, ALUMINUM OXIDE, NO. 60 TO 80	NO. 60 ARROWBLAST OR NO. 60 FASTBLAST
GRIT, SILICON CARBIDE, NO. 60 TO 80	SILICON CARBIDE 60 OR 60A
TAPE, HEAT REFLECTIVE (PMC 4235)	NO. 363 OR 2925-7 OR 390
TAPE, HIGH TEMPERATURE, GLASS CLOTH (PMC 4273)	NO. 361

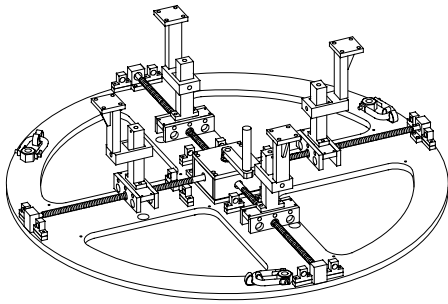
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Rivet	AN123619	As required

APPLICABLE SUPPORT EQUIPMENT

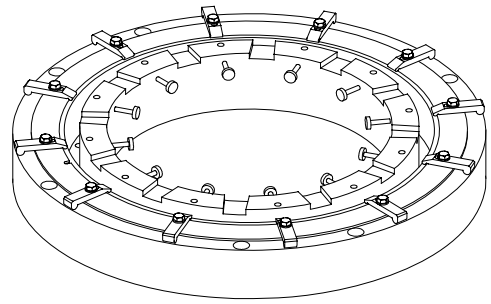
Paragraph	Function - Tool Nomenclature	Tool Number
3	COMPRESSOR STATOR SUPPORT ASSEMBLY - FORWARD SNAP DIAMETER PLASMA SPRAY REPAIR	
	FIXTURE, MACHINING, COMPRESSOR STATOR SUPPORT - - - -	PWA 71170
	MASTER, SET, COMPRESSOR STATOR SUPPORT - - - - -	PWA 71171
	FIXTURE, PLASMA SPRAY AND WATER JET, UNIVERSAL - - -	PWA 70712
	MASK, PLASMA SPRAY, COMPRESSOR STATOR SUPPORT - - - -	PWA 71184
	MASK, PLASMA SPRAY, COMPRESSOR STATOR SUPPORT - - - -	PWA 71179
	GAGE, INDICATOR, COMPRESSOR STATOR SUPPORT - - - - -	PWA 71174
	MASTER, INDICATOR GAGE, COMPRESSOR STATOR SUPPORT -	PWA 71177
4	COMPRESSOR STATOR SUPPORT ASSEMBLY - AFT SNAP DIAMETER PLASMA SPRAY REPAIR	
	FIXTURE, MACHINING, COMPRESSOR STATOR SUPPORT - - - -	PWA 71207
	FIXTURE, PLASMA SPRAY AND WATER JET, UNIVERSAL - - -	PWA 70712
	MASK, PLASMA SPRAY, COMPRESSOR STATOR SUPPORT - - - -	PWA 71184
	MASK, PLASMA SPRAY, COMPRESSOR STATOR SUPPORT - - - -	PWA 71211
	GAGE, INDICATOR, COMPRESSOR STATOR SUPPORT OD - - - -	PWA 71409
	MASTER, INDICATOR GAGE, COMPRESSOR STATOR SUPPORT OD - - - - -	PWA 71410

ILLUSTRATED SUPPORT EQUIPMENT



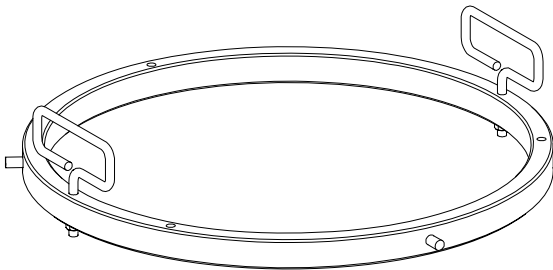
PWA 70712 -C

Figure T1. PWA 70712 FIXTURE



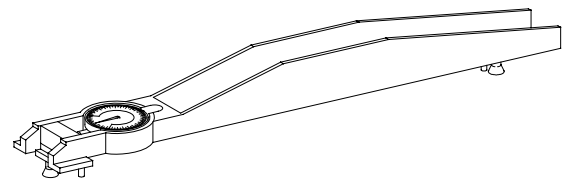
PWA 71170 -C

Figure T2. PWA 71170 FIXTURE



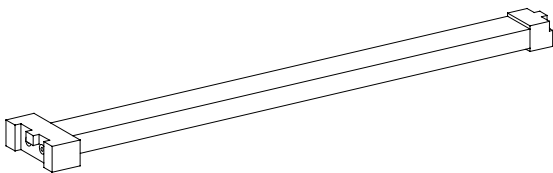
PWA 71171 -C

Figure T3. PWA 71171 MASTER



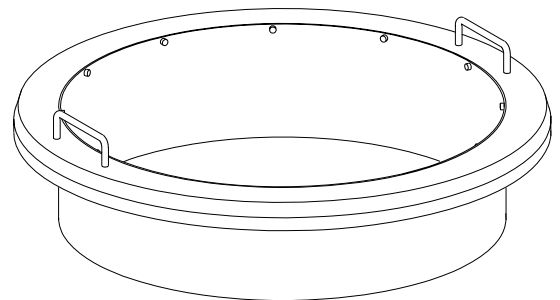
PWA 71174 -C

Figure T4. PWA 71174 GAGE



PWA 71177 -C

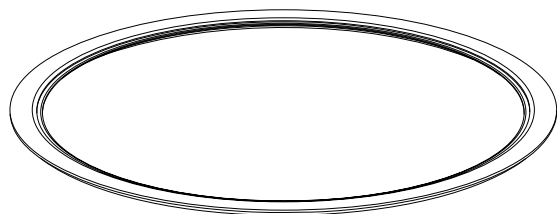
Figure T5. PWA 71177 MASTER



PWA 71179 -C

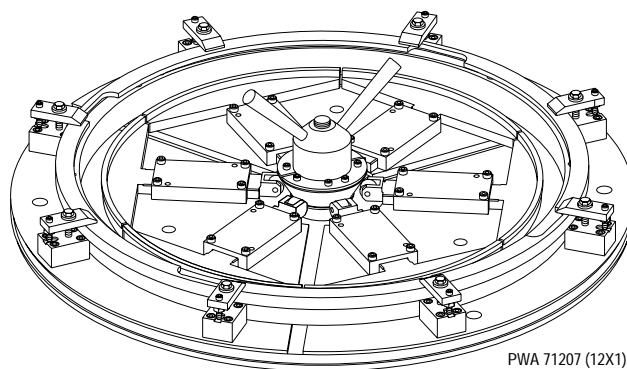
Figure T6. PWA 71179 MASK

ILLUSTRATED SUPPORT EQUIPMENT (continued)



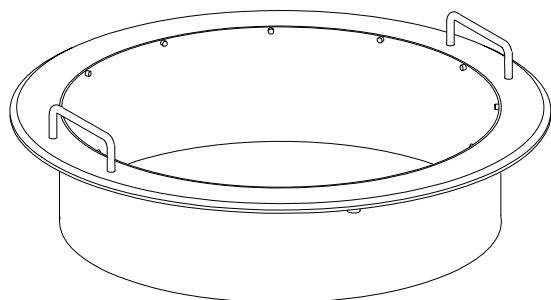
PWA 71184 -C

Figure T7. PWA 71184 MASK



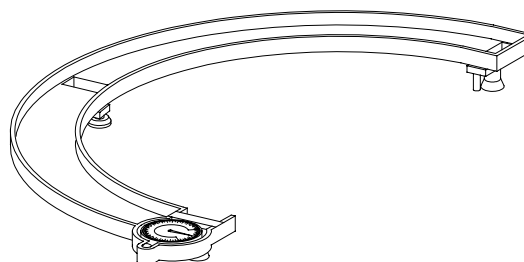
PWA 71207 (12X1)

Figure T8. PWA 71207 FIXTURE



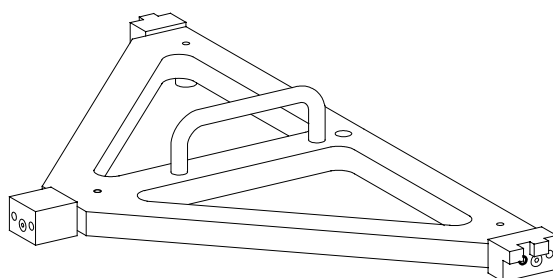
PWA 71211 -C

Figure T9. PWA 71211 MASK



PWA 71409 -C

Figure T10. PWA 71409 GAGE



PWA 71410 -C

Figure T11. PWA 71410 MASTER

1. INTRODUCTION.

- a. This work package contains instructions for repair of compressor stator support assembly.

2. COMPRESSOR STATOR SUPPORT ASSEMBLY - PLATE NUT REPLACEMENT.

(See Figure 1.)

- a. Remove rivets securing plate nut by drilling upset head (on plate nut surface).
- b. Remove unserviceable plate nut.

- b1. Refer to T.O. 2J-F100-54 for proper plate nut and compressor support combinations.
- c. Position new plate nut over existing hole in support.
- d. Deleted.
- e. Install PN AN123619 rivets with manufactured heads against support per figure 1. Upset rivets. Refer to T.O. 2-1-111.

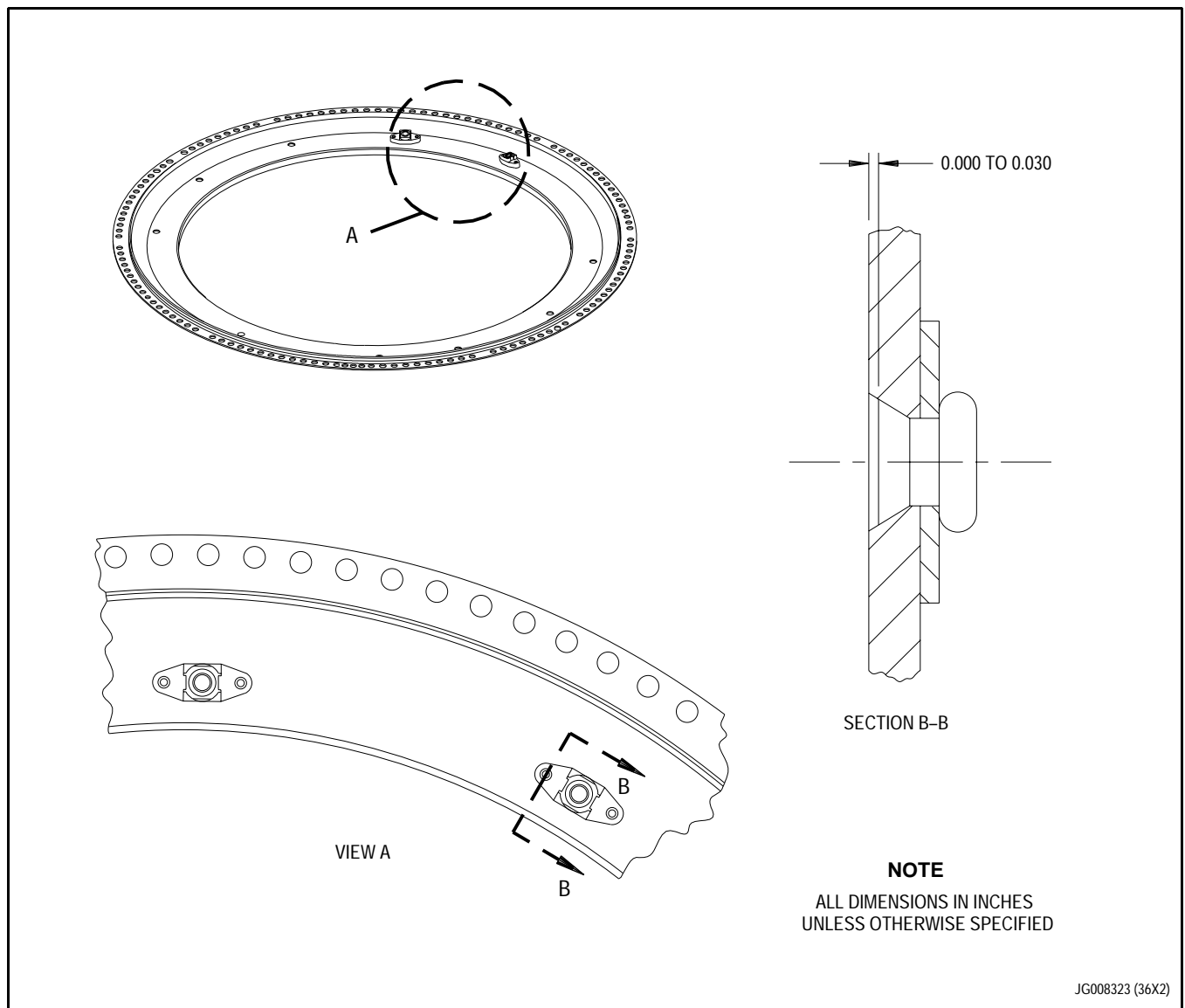


Figure 1. Compressor Stator Support Assembly - Plate Nut Replacement

**3. COMPRESSOR STATOR SUPPORT
ASSEMBLY - FORWARD SNAP DIAMETER
PLASMA SPRAY REPAIR.**

(See Figures 2 and 3.)

NOTE

- When both forward and aft snap diameters require repair, aft diameter repair shall be completed before initiating any repair on forward diameter.
- All SPOPs referenced in this procedure can be found in T.O. 2-1-111.
 - a. Remove pin(1, figure 2), if present.
 - b. Strip existing PWA 36545-3 antigalling compound per SPOP 734. See figure 3 for antigalling compound locations.
 - c. Machine snap diameter to premachine dimensions shown in figure 2, View C. Use PWA 71170 fixture and PWA 71171 set master. Machine to maximum diameter which will completely clean up surface. A snap diameter which has been plasma spray repaired one time shall have all coating removed and meet premachine dimensions shown. Refer to T.O. 2-1-111 for feature control symbol definition.
 - d. Clean snap diameter area per SPOP 208, Method A.
 - e. Locally fluorescent penetrant inspect machined area per SPOP 70. No cracks allowed.
 - f. Clean snap diameter area per SPOP 208, Method A.

- g. Grit blast snap diameter(7, figure 2) as follows:
 - (1) Install support assembly on PWA 70712 fixture. Install PWA 71184 mask and PWA 71179 mask. Mask other areas using PMC 4235 and PMC 4273 tape. Refer to T.O. 2-1-111. Protect cleaned snap diameter area during masking.
 - (2) Grit blast using No. 60 to 80 silicon carbide or aluminum oxide grit at 45 psi maximum. Refer to T.O. 2-1-111.
 - (3) If grit blasted surface becomes contaminated with dust, fingerprints or oil, clean per SPOP 208, Method A.
- h. Plasma spray snap diameter(7) within two hours after grit blast as follows:
 - (1) Install masking per step g.(1).
 - (2) Apply plasma coat PWA 53-37. No coating allowed outside of enclosed area. Refer to T.O. 2-1-111.
 - (3) Remove masking.
- i. Clean per SPOP 208, Method A to remove tape residue.
- j. Machine snap diameter and chamfer to final machine dimensions shown in figure 2, View C. Use PWA 71170 fixture, PWA 71171 set master, PWA 71174 gage and PWA 71177 master. Refer to T.O. 2-1-111 for feature control symbol definition.

k. Inspect coating for correct application. Refer to T.O. 2-1-111.

l. Apply antigalling compound per paragraph 5.

m. Permanently identify support assembly with beehive symbol on Surface C adjacent to part number. Use shallow electrolytic etch per SPOP 401.

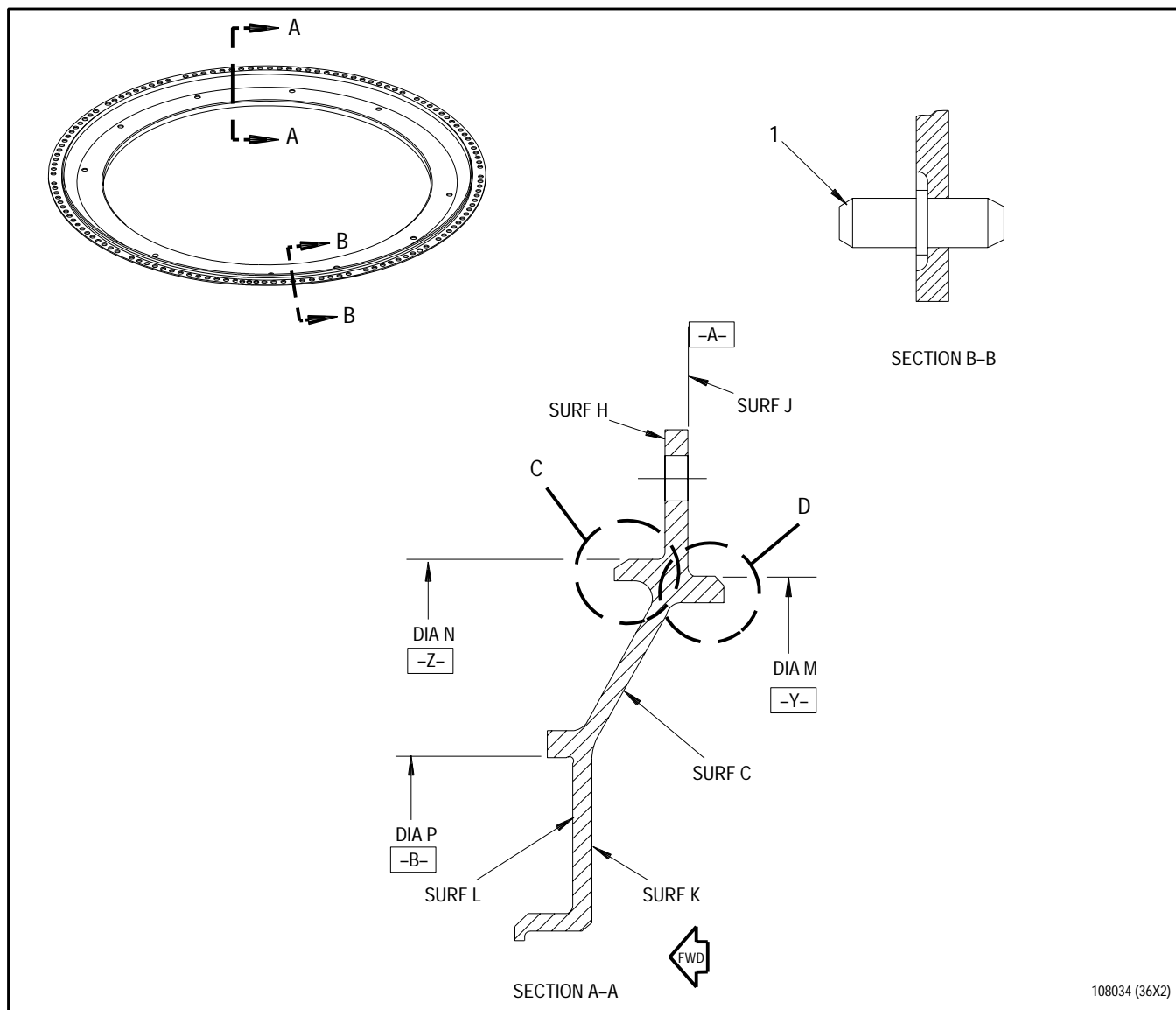
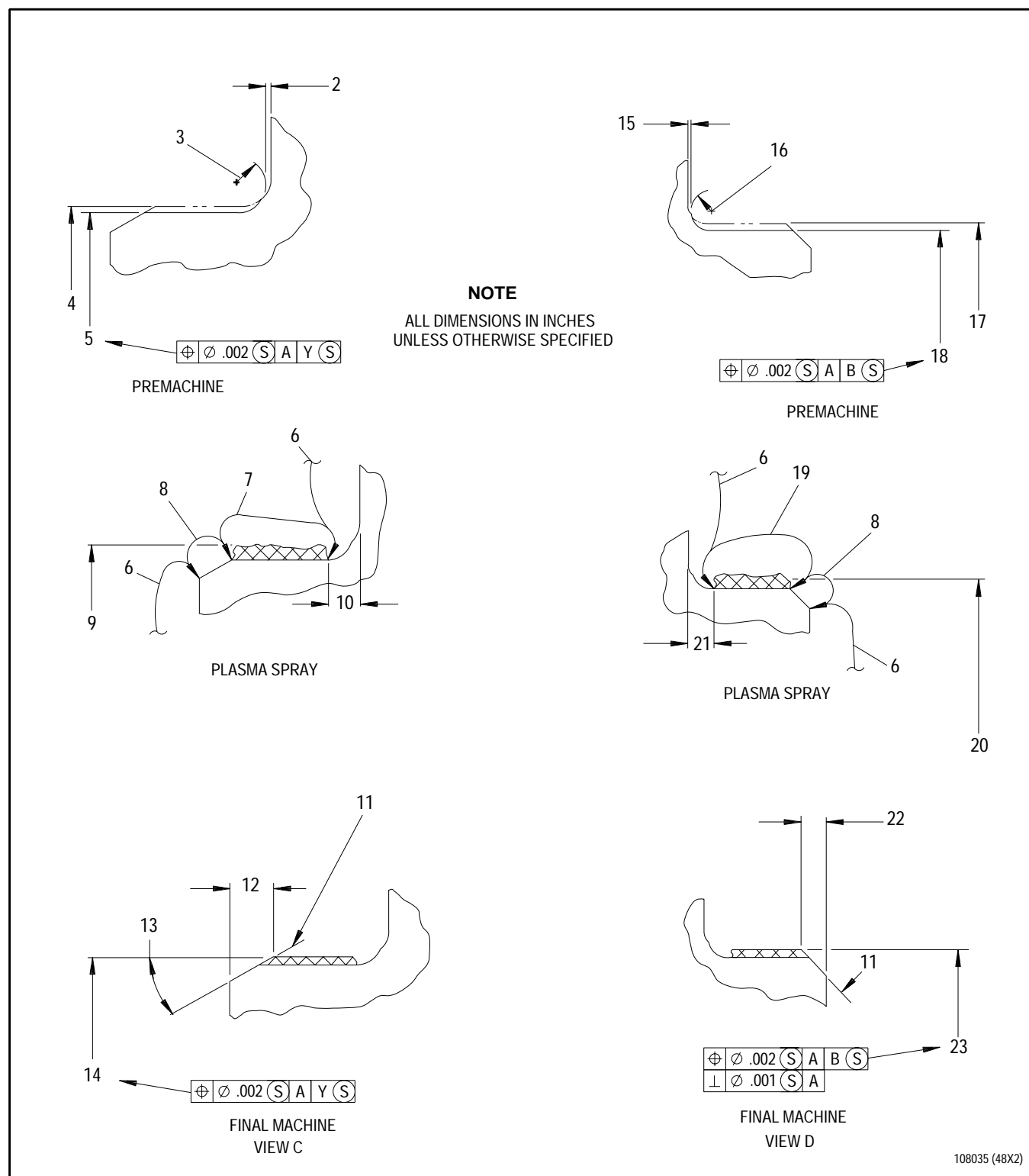


Figure 2. Compressor Stator Support Assembly - Forward and Aft Snap Diameter Plasma Spray Repair (Sheet 1 of 2)



**Figure 2. Compressor Stator Support Assembly - Forward and Aft Snap Diameter Plasma Spray Repair
(Sheet 2 of 2)**

Legend for figure 2**NOTE**

- Unless otherwise specified, all dimensions apply when Surfaces H and L are flat within 0.001 inch and Diameters N, M, and P maintain clearance envelopes of 22.856 inches, 22.683 inches, and 20.903 inches respectively in free state or constrained. Constraint contact allowed only on Surfaces J, L, H, and K and Diameters N and M.
- In free state, Surfaces H and L are flat within 0.005 inch and Diameters N, M, and P are 22.846 to 22.860 inches, 22.673 to 22.687 inches, and 20.899 to 20.913 inches respectively.

1. Pin
2. 0.000 to 0.005 inch
3. 0.030 to 0.060 inch modified radius
4. 22.851 to 22.855 inches diameter, reference
5. 22.835 to 22.841 inches diameter
6. Grit blast and plasma spray prohibited.
7. Forward snap diameter, grit blast and plasma spray per text.
8. Overspray permitted but must be removed during final machining.
9. 22.865 inches diameter minimum
10. 0.060 to 0.070 inch
11. Machine within dimensional limits to obtain smooth continuous surface.
12. 0.060 to 0.080 inch
13. $30^{\circ} \pm 5^{\circ}$
14. 22.851 to 22.855 inches diameter
15. 0.000 to 0.005 inch
16. 0.025 to 0.040 inch modified radius
17. 22.678 to 22.682 inches diameter, reference
18. 22.662 to 22.668 inches diameter
19. Aft snap diameter, grit blast and plasma spray per text.
20. 22.700 inches diameter minimum
21. 0.040 to 0.050 inch
22. Chamfer 0.030 to 0.050 inch x $45^{\circ} \pm 5^{\circ}$
23. 22.678 to 22.682 inches diameter

**4. COMPRESSOR STATOR SUPPORT
ASSEMBLY - AFT SNAP DIAMETER PLASMA
SPRAY REPAIR.**

(See figures 2 and 3.)

NOTE

All SPOPs referenced in this procedure can be found in T.O. 2-1-111.

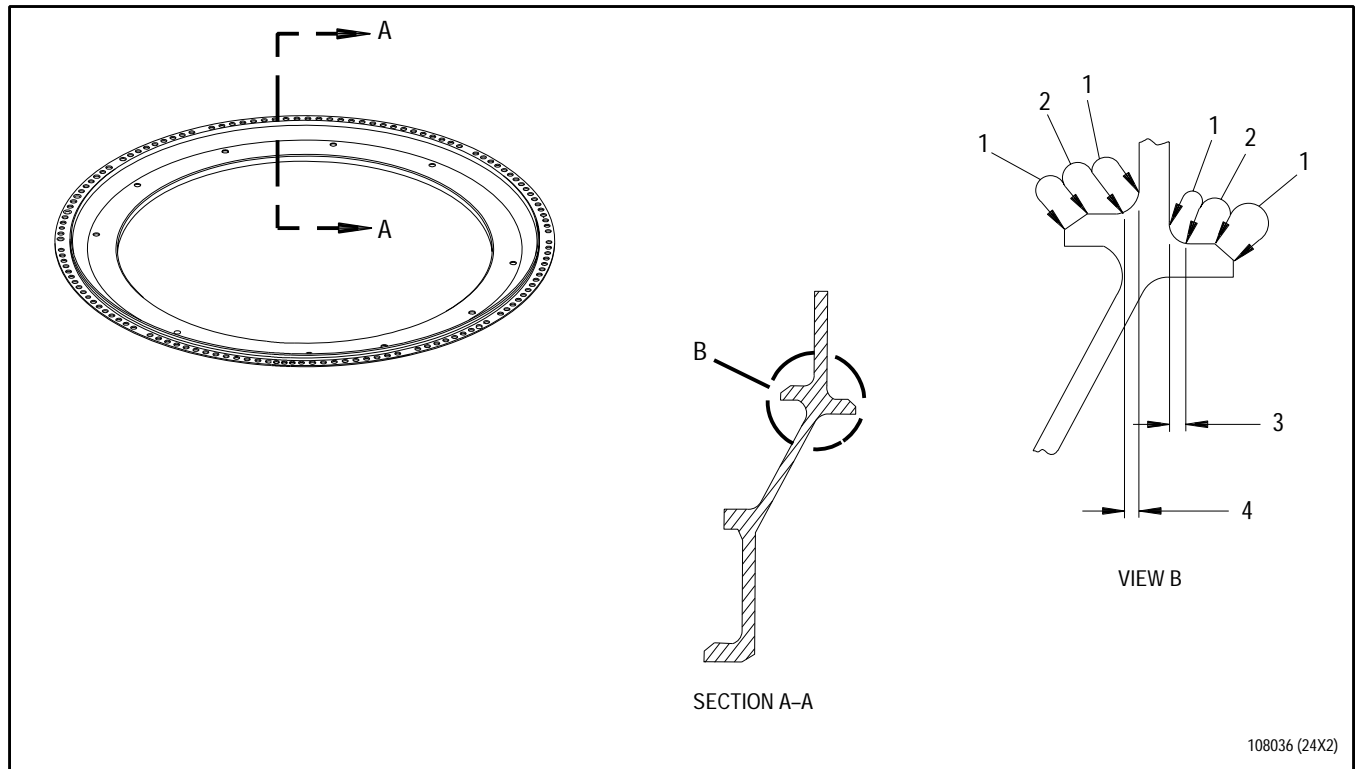
- a. Remove pin(1, figure 2), if present.
- b. Strip existing PWA 36545-3 antigalling compound per SPOP 734. See figure 3 for antigalling compound locations.
- c. Machine snap diameter to premachine dimensions shown in figure 2, View D. Use PWA 71207 fixture. Machine to maximum diameter which will completely clean up surface. A snap diameter which has been plasma spray repaired one time shall have all coating removed and meet premachine dimensions shown. Refer to T.O. 2-1-111 for feature control symbol definition.
- d. Clean snap diameter area per SPOP 208, Method A.
- e. Locally fluorescent penetrant inspect machined area per SPOP 70. No cracks allowed.
- f. Clean snap diameter area per SPOP 208, Method A.
- g. Grit blast snap diameter(19, figure 2) as follows:
 - (1) Install support assembly on PWA 70712 fixture. Install PWA 71184 mask and PWA 71211 mask. Mask other areas using PMC 4235 and PMC 4273 tape. Refer to T.O. 2-1-111. Protect cleaned snap diameter area during masking.
 - (2) Grit blast using No. 60 to 80 silicon carbide or aluminum oxide grit at 45 psi maximum. Refer to T.O. 2-1-111.
 - (3) If grit blasted surface becomes contaminated with dust, fingerprints or oil, clean per SPOP 208, Method A.
- h. Plasma spray snap diameter(19) within two hours after grit blast as follows:
 - (1) Install masking per step g.(1).
 - (2) Apply plasma coat PWA 53-37. No coating allowed outside of enclosed area. Refer to T.O. 2-1-111.
 - (3) Remove masking.
- i. Clean per SPOP 208, Method A to remove tape residue.
- j. Machine snap diameter and chamfer to final machine dimensions shown in figure 2, View D. Use PWA 71207 fixture, PWA 71409 gage and PWA 71410 master. Refer to T.O. 2-1-111 for feature control symbol definition.
- k. Inspect coating for correct application. Refer to T.O. 2-1-111.
- l. Apply antigalling compound per paragraph 5.
- m. Permanently identify support assembly with beehive symbol on Surface C adjacent to part number. Use shallow electrolytic etch per SPOP 401.

5. COMPRESSOR STATOR SUPPORT ASSEMBLY - ANTIGALLING COMPOUND APPLICATION.

(See figure 3.)

- a. Ensure all repairs have been completed before this operation.
- b. Ensure support assembly snap diameter surfaces are dry. No surface preparation is required.

- c. Apply PWA 36545-3 antigalling compound to support assembly snap diameter areas(2, figure 3) per SPOP 748. Refer to T.O. 2-1-111.



1. Coating optional and may be incomplete.
2. Apply antigalling compound per text.
3. 0.070 inch maximum
4. 0.050 inch maximum

Figure 3. Compressor Stator Support Assembly - Antigalling Compound Application

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL, AIR, NO. 4 BEARING, FRONT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	29	6 Blank	29		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
Qualified Repair Source List (QRS�) Core Engine Module -	WP 603 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 4 bearing front air seal.

2. NO. 4 BEARING FRONT AIR SEAL - KNIFE-EDGE BLEND REPAIR.

(See Figure 1.)

NOTE

- Do not attempt to straighten knife-edge air seals.
- Knife-edge blending repairs are to be completed after aluminum oxide coating is removed. Aluminum oxide coating must be reapplied once blend repair is complete.
- a. All damage shall be blended using fine files and stones. Refer to T.O. 2J-F100-53-1, WP 091 00. Remove all pickup and raised metal. Observe following limits:

NOTE

Unless otherwise specified, limits apply to both Group E and Group F knife-edges.

- (1) Blending shall be limited to one continuous inch on any one knife-edge or two total inches of noncontinuous blends per knife-edge.
- (2) Blending shall be limited to four total inches of noncontinuous blends per group of knife-edges (six knife-edges for Group E and three knife-edges for Group F).

- (3) Noncontinuous blends shall be separated by minimum of one inch of unblended knife-edge. One inch separation required for blends adjacent to bend with displacement from radial center plane greater than 0.010 inch but less than 0.050 inch.

- (4) Maximum blend depth shall be 0.075 inch for Group E knife-edges and 0.020 inch for Group F knife-edges.

- (5) Each blended area shall have 0.500 inch minimum radius at each end of blend and 0.500 inch minimum transition radius into unblended material.

- (6) Blended areas on two or more knife-edges shall be separated by minimum of one inch of unblended area.

- b. Blend shall be smooth and continuous with aspect ratio (length to depth) equal to 14 to 1 or greater.

- c. Surface finish of all blends shall be smooth as, or smoother than adjacent non-grit blasted surfaces.

- d. Fluorescent penetrant inspect per SPOP 84. Refer to T.O. 2-1-111. Examine indications under white light at 10X magnification. No cracks allowed.

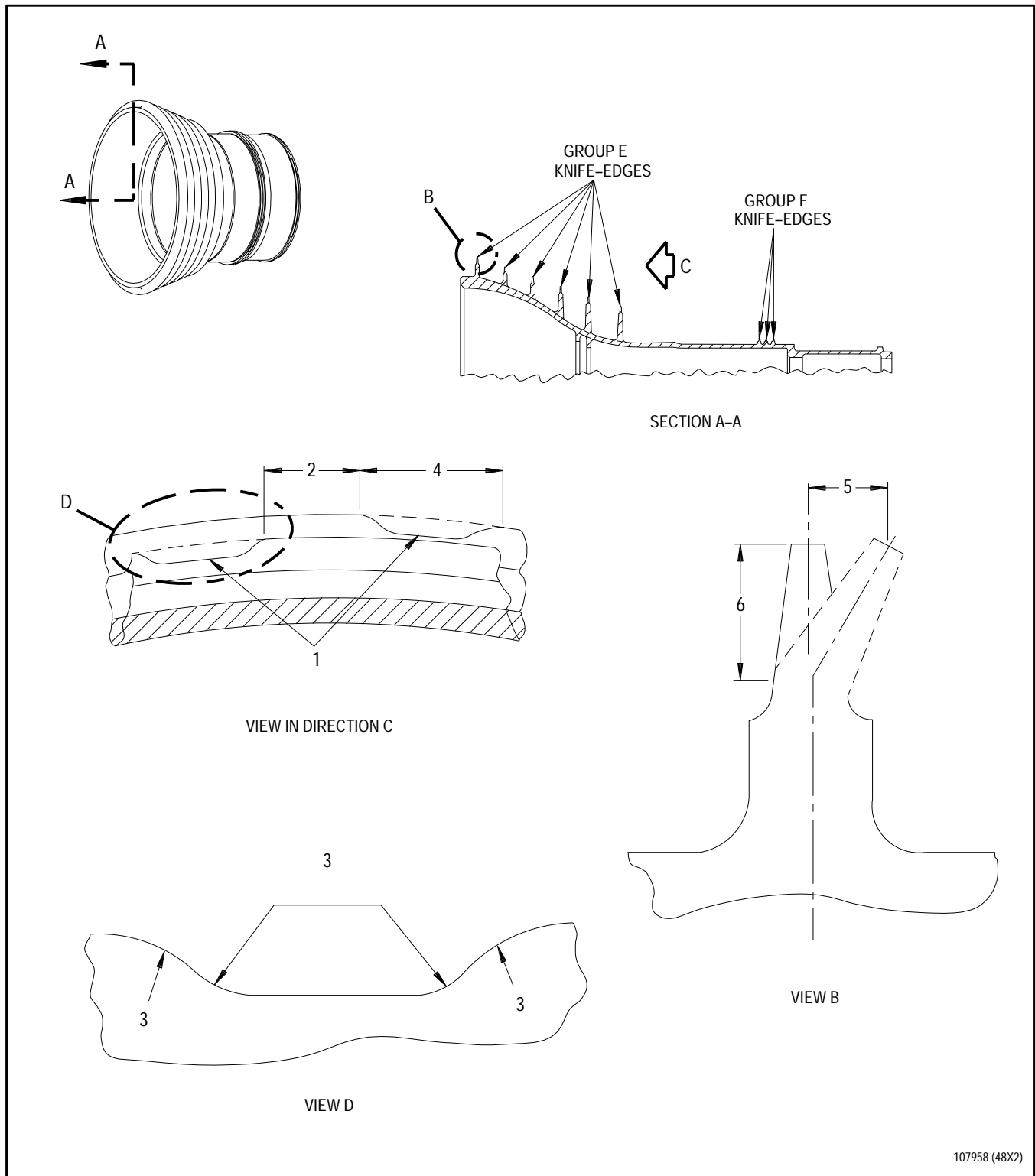


Figure 1. No. 4 Bearing Front Air Seal - Knife-Edge Blend Repair

Legend for figure 1A

1. Example of blended area (all knife-edges)
2. 1.000 inch minimum between blends on same or adjacent knife-edges
3. 0.500 inch radius minimum, all locations
4. 1.000 inch maximum blend length
5. Any amount of bending is reparable provided final blend meets maximum allowable blend depth (6) and length (4) limits.
6. 0.075 inch maximum blend depth. Blends requiring blend depth greater than this are not serviceable and not reparable.

**3. NO. 4 BEARING FRONT AIR SEAL -
KNIFE-EDGE COATING REPAIR.****NOTE**

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor desires to revise procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

a. Perform proprietary repair as follows:

- (1) Proprietary repair for following distress mode may be performed only by qualified repair sources identified in QRSL. Refer to T.O. 2J-F100-53-1, WP 603 00.

- JGDFGZC Worn knife-edge coating

WORK PACKAGE

TECHNICAL PROCEDURES

BEARINGS -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3 - 4	29	5 Added	29
2	18			6 Blank Added	29

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O.2J-F100-53-1
Qualified Repair Source List (QRSL) - Core Engine Module	WP 603 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of No. 2, 3, and 4 bearings.

2. NO. 2, 3, AND 4 BEARINGS - REPAIR.

(See Tables 1, 2, and 3.)

NOTE

Vendor repair procedures listed in QRS� shall be kept current by incorporating all T.O. changes that affect the repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRS�.

- a. This is a proprietary repair. Refer to T.O. 2J-F100-53-1, WP 603 00 for qualified repair source list (QRS�).

Table 1. No. 2 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBAEAD	JGDFGAA	Cage	Plating flaking/peeling
EEBBAEAD	JGDFGAB	Cage	Plating wear
EEBBAEAD	JGDFGAC	Cage	Out of round
EEBBAEAD	JGDFGAD	Cage	Cracking
EEBBAEAD	JGDFGAE	Inner ring	Galling
EEBBAEAD	JGDFGAF	Inner ring	Brinelling
EEBBAEAD	JGDFGAG	Inner ring	Pitting
EEBBAEAD	JGDFGAH	Inner ring	Dents/nicks
EEBBAEAD	JGDFGAJ	Inner ring	Scratches, scuffs, and scoring
EEBBAEAD	JGDFGAK	Inner ring	Skidding
EEBBAEAD	JGDFGAL	Inner ring	Spalling
EEBBAEAD	JGDFGAM	Ball	Heat discoloration
EEBBAEAD	JGDFGAN	Ball	Brinelling
EEBBAEAD	JGDFGAP	Ball	Pitting
EEBBAEAD	JGDFGAQ	Ball	Dents/nicks
EEBBAEAD	JGDFGAR	Ball	Scratches, scuffs, and scoring
EEBBAEAD	JGDFGAS	Ball	Skidding

Table 2. No. 3 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBAP	JGDFGAA	Cage	Plating flaking/peeling
EEBBAP	JGDFGAB	Cage	Plating wear
EEBBAP	JGDFGAC	Cage	Out of round
EEBBAP	JGDFGAD	Cage	Cracking
EEBBAP	JGDFGAE	Inner ring	Galling
EEBBAP	JGDFGAF	Inner ring	Brinelling
EEBBAP	JGDFGAG	Inner ring	Pitting
EEBBAP	JGDFGAH	Inner ring	Dents/nicks
EEBBAP	JGDFGAJ	Inner ring	Scratches, scuffs, and scoring
EEBBAP	JGDFGAK	Inner ring	Skidding
EEBBAP	JGDFGAL	Inner ring	Spalling
EEBBAP	JGDFGAM	Ball	Heat discoloration
EEBBAP	JGDFGAN	Ball	Brinelling
EEBBAP	JGDFGAP	Ball	Pitting
EEBBAP	JGDFGAQ	Ball	Dents/nicks
EEBBAP	JGDFGAR	Ball	Scratches, scuffs, and scoring
EEBBAP	JGDFGAS	Ball	Skidding

Table 3. No. 4 Bearing - Distress Modes

Logistics Control Number Code	Task Code	Location	Distress
EEBBFU	JGDFGAA	Outer ring	Unacceptable hardness
EEBBFU	JGDFGAB	Outer ring	Heat discoloration
EEBBFU	JGDFGAC	Outer ring	Galling
EEBBFU	JGDFGAD	Outer ring	Brinelling
EEBBFU	JGDFGAE	Outer ring	Cracks
EEBBFU	JGDFGAF	Outer ring	Pitting
EEBBFU	JGDFGAG	Outer ring	Dents/nicks
EEBBFU	JGDFGAH	Outer ring	Scratches, scuffs, and scoring
EEBBFU	JGDFGAJ	Outer ring	Skidding
EEBBFU	JGDFGAK	Outer ring	Spalling
EEBBFU	JGDFGAL	Roller	Heat discoloration
EEBBFU	JGDFGAM	Roller	Galling
EEBBFU	JGDFGAN	Roller	Heat discoloration
EEBBFU	JGDFGAP	Roller	Brinelling
EEBBFU	JGDFGAQ	Roller	Pitting
EEBBFU	JGDFGAR	Roller	Nicks/dents
EEBBFU	JGDFGAS	Roller	Scratches, scuffs, and scoring
EEBBFU	JGDFGAT	Roller	Skidding
EEBBFU	JGDFGAU	Roller	Spalling
EEBBFU	JGDFGAV	Roller	End wear
EEBBFU	JGDFGAW	Inner race	Inner diameter wear
EEBBFU	JGDFGAX	Cage	Plating flaking/peeling
EEBBFU	JGDFGAY	Cage	Plating wear
EEBBFU	JGDFGAZ	Cage	Out of round
EEBBFU	JGDFGBA	Cage	Cracking
EEBBFU	JGDFGBB	Cage	Pitting
EEBBFU	JGDFGBC	Cage	Nicks/dents

WORK PACKAGE

TECHNICAL PROCEDURES

MANIFOLD ASSEMBLIES, FUEL SUPPLY, LEFT AND RIGHT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	8
2	-	3	.	.	0
4	8

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature

Specification/Vendor Part Number

Cloth, abrasive, crocus

P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of left and right fuel supply manifold assemblies.

2. LEFT AND RIGHT FUEL SUPPLY MANIFOLDS - BLEND REPAIR.

(See Figure 1.)

- a. No blending permitted within 0.250 inch of any braze joint or within Area A. Power grinding not permitted. No blending in bends.
- b. Blend damage by hand using abrasive stick or crocus cloth P-C-458.

- c. Depth of blend shall not exceed 0.005 inch. Blend shall provide a minimum radius of 0.060 inch. Blend length to depth ratio shall be a minimum of 15 to 1. Blended area shall be as smooth as or smoother than surrounding area.

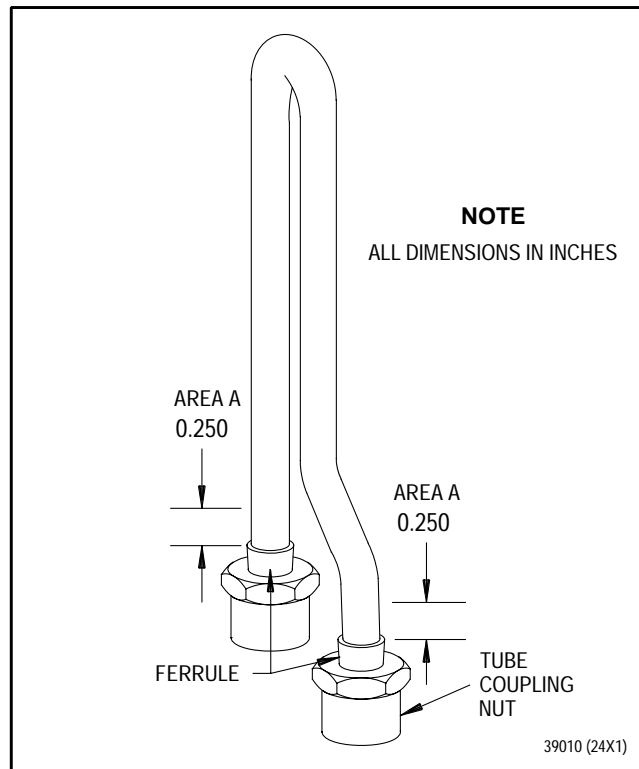


Figure 1. Left and Right Fuel Supply Manifolds - Blend Repair

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, FAN EXIT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	18	4 Blank	18		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Stator, Fan Exit - Inspection - - - - -	WP 348 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of fan exit stator assembly.

2. FAN EXIT STATOR ASSEMBLY - VANE BLENDING.**NOTE**

Limits stated in WP 348 00 pertain to isolated damage areas and shall not be interpreted as authority for removal of material all across leading or trailing edge as might be done in a single machine cut.

- a. Minor damage shall be repaired by blending, using fine files and/or stones. A minimum amount of material shall be removed and surface finish must compare to that of a new part. Maximum reparable limits in WP 348 00 shall be maintained.
- b. All blend repaired damage and acceptable round-bottom dents shall be nondestructive inspected for cracks per SPOP 62. Refer to T.O. 2-1-111. No cracks allowed.
- c. All blends shall be at least 15 times as long as they are deep and as smooth as adjacent unblended surfaces.
- d. Blends in airfoil fillet radii shall maintain original fillet radius size.
- e. Surface blends shall not reduce original thickness by more than 20%.
- f. Airfoil edge blends shall maintain original minimum radius.

WORK PACKAGE**TECHNICAL PROCEDURES**

**SUPPORT BRACKET, STRAP AND ACTUATING LINKAGE,
BUMPER AND CARRIAGE, BLEED VALVE;
ELBOW AND SLEEVE, AIR SUPPLY MANIFOLD -**

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	29	7 - 8	29	9 Added	29
4 - 6	1			10 Blank Added	29

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Compound, Antigalling (PWA 474) Application to Steel or Titanium Parts (SPOP 160) - - - - -	SWP 098 04

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

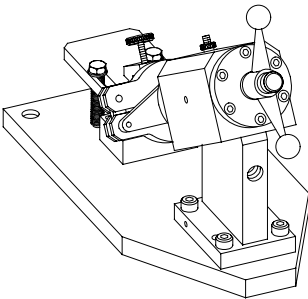
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
8	AIR SUPPLY MANIFOLD ELBOW SEALING SLEEVE - REPLACEMENT	
	PUSHER/PULLER, SLEEVE, SEALING, COMPRESSOR CASE, ELBOW, 229 - - - - -	PWA 57904

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57904 -C

Figure T1. PWA 57904 PUSHER/PULLER

1. INTRODUCTION.

- a. This work package contains instructions for repair of the bleed valve actuation system details and air supply manifold elbow and sleeve.

**2. BLEED VALVE STRAP RIGID
CONNECTING LINK - ANTIGALLING COMPOUND
APPLICATION.**

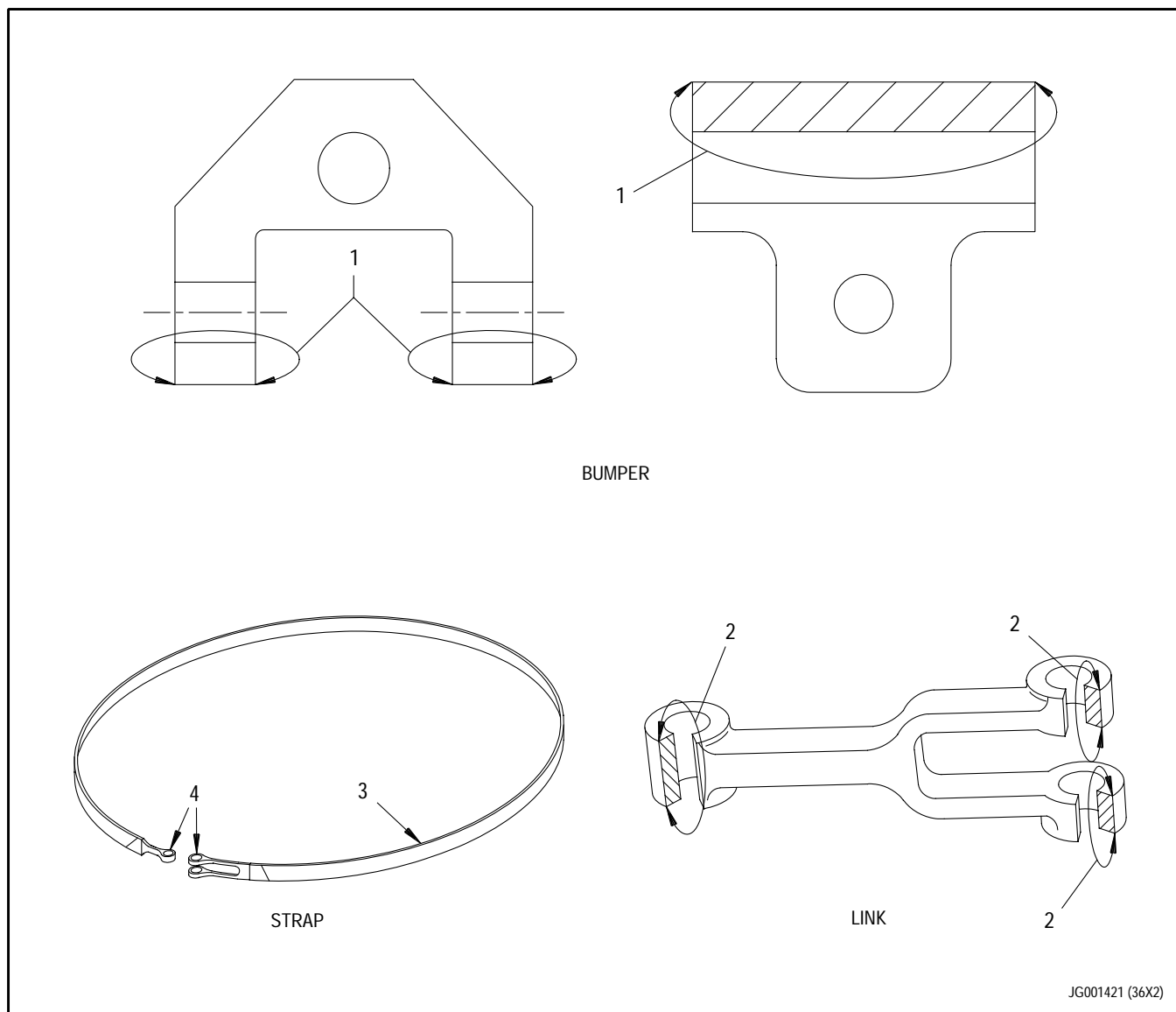
(See Figure 1.)

- a. Replace antigalling compound as follows:
 - (1) If old antigalling compound is still present, remove it. Refer to T.O.2J-F100-53-1, SWP 031 16 (SPOP 252).
 - (2) Apply antigalling compound to areas shown in figure 1. Refer to T.O.2J-F100-53-1, SWP 098 04 (SPOP 160). No grit blast allowed.

**3. BLEED VALVE STRAP ASSEMBLY -
ANTIGALLING COMPOUND APPLICATION.**

(See figure 1.)

- a. Replace antigalling compound as follows:
 - (1) If old antigalling compound is still present, remove it. Refer to T.O.2J-F100-53-1, SWP 031 16 (SPOP 252).
 - (2) Apply antigalling compound to areas shown in figure 1. Refer to T.O.2J-F100-53-1, SWP 098 04 (SPOP 160). No grit blast allowed.



1. Apply antigalling compound per text. Treatment shall not restrict hole size below 0.2510 inch diameter.
2. Apply antigalling compound per text. Treatment shall not restrict hole size below 0.2525 inch diameter.
3. Apply antigalling compound to entire strap per text.
4. Treatment shall not restrict hole size below 0.2510 inch diameter.

Figure 1. Compressor Bleed Valve Actuation System Details - Antigalling Compound Application

3. BLEED VALVE STRAP ASSEMBLY - BLEND REPAIR

(See Figure 2.)

- a. Lightly blend wear on single clevis end to remove sharp edges using fine stone. Maintain 0.061 inch minimum after blend.

- b. Lightly blend double clevis end to remove sharp edges using fine stone. Blend shall not exceed 0.006 inch depth.

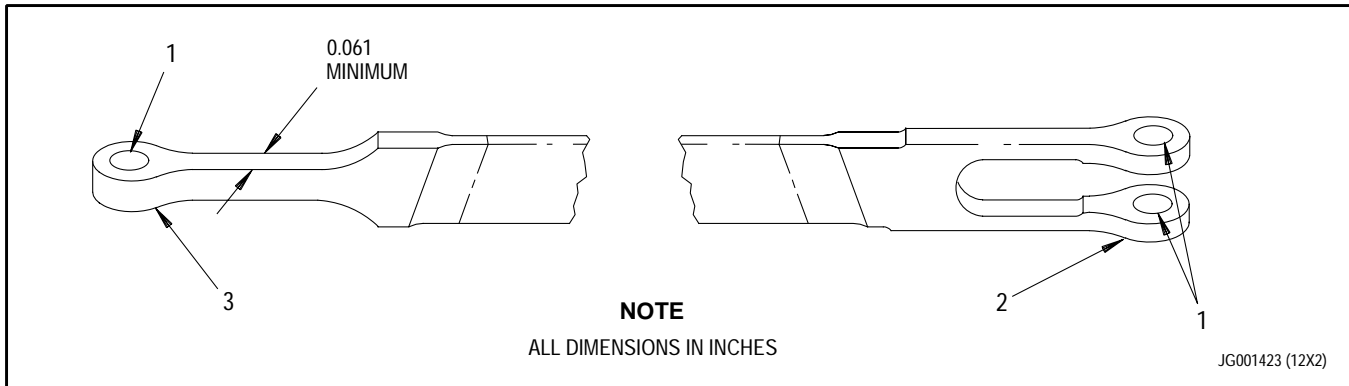


Figure 2. Bleed Valve Strap Assembly - Blend Repair

4. BLEED VALVE STRAP RIGID CONNECTING LINK - BLEND REPAIR.

(See figure 1.)

- a. Blend wear all over except in link bolt holes to 0.010 inch deep maximum to remove sharp edges. Remove a minimum amount of material.
- b. Use a fine stone.

6. BLEED VALVE STRAP CARRIAGE GUIDE ASSEMBLY - PIN REPLACEMENT.

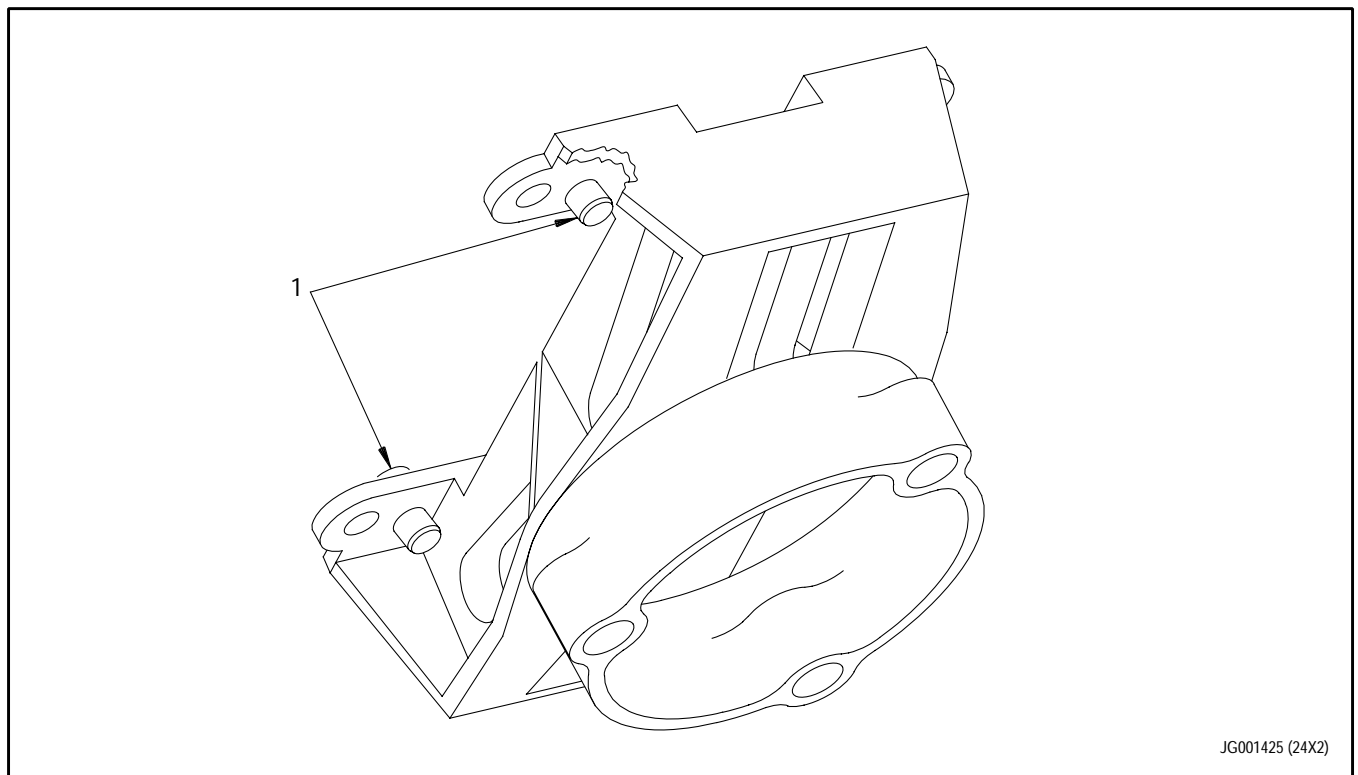
(See Figure 3.)

a. Replace pin as follows:

- (1) Remove damaged pin(1) by drifting through hole behind pin.
- (2) Chill replacement pin.
- (3) Install replacement pin using standard drift. Pin shall bottom.

7. AIR SUPPLY MANIFOLD ELBOW - BLEND REPAIR.

- a. Blend dents, pits, and scratches on external surface of elbow up to 0.020 inch deep, using fine files and/or stones. Minimum amount of material shall be removed and surface finish shall compare to that of new part.



JG001425 (24X2)

1. Pin

Figure 3. Bleed Valve Strap Carriage Guide Assembly - Pin Replacement

8. AIR SUPPLY MANIFOLD ELBOW SEALING SLEEVE - REPLACEMENT.

(See Figure 4.)

- a. Remove damaged or worn compressor case elbow sealing sleeve(1, figure 4) from air supply manifold elbow(2), using PWA 57904 pusher/puller as follows:

- (1) Retract shaft and loosen clamp of PWA 57904 pusher/puller, allowing for installation of elbow(2). Open puller details on end of shaft.
- (2) Install elbow(2) loosely onto support base of pusher/puller with base of elbow over dowel pins and sealing sleeve(1) facing shaft of pusher/puller.
- (3) Using speed ball handle of pusher/puller, insert shaft of pusher/puller into bottom of sleeve(1).
- (4) Adjust and tighten clamp of pusher/puller to secure elbow(2) to pusher/puller base, maintaining clamp level with pusher/puller base.
- (5) Close puller details of pusher/puller around sleeve(1) lip and secure with knurled knob.
- (6) Turn speed ball handle of pusher/puller clockwise until sleeve(1) is removed from elbow(2).

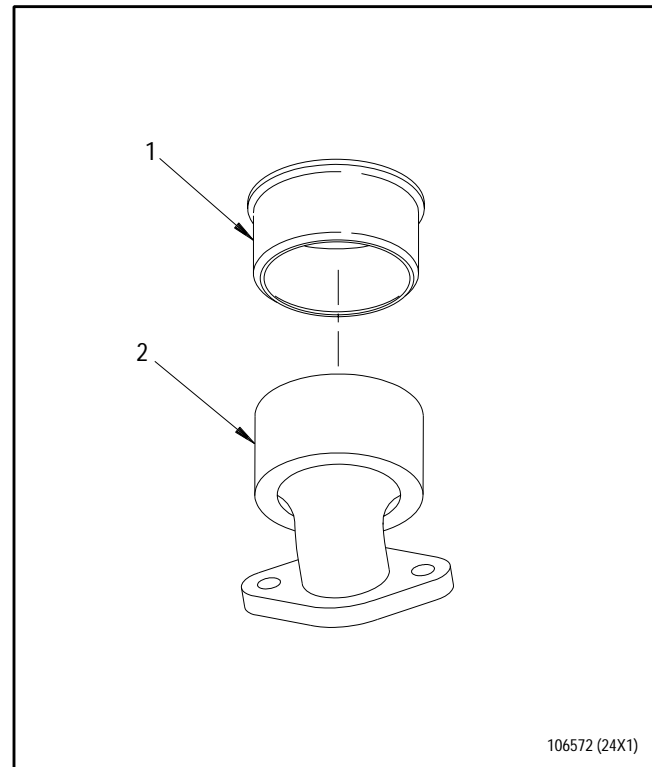
- b. Install new compressor case elbow sealing sleeve(1) into air supply manifold elbow(2), using PWA 57904 pusher/puller as follows:

- (1) Install elbow(2) into pusher/puller per steps a.(1) and a.(2).

NOTE

Compressor case elbow sealing sleeve may be chilled in dry ice or liquid nitrogen to ease installation.

- (2) With pusher/puller shaft retracted, position new sleeve(1) onto end of shaft.



1. Compressor case elbow sealing sleeve
2. Air supply manifold elbow

Figure 4. Air Supply Manifold Elbow Sealing Sleeve - Replacement

- (3) Close puller details of
pusher/puller around
sleeve(1) lip and secure
with knurled knob.
- (4) Slowly turn speed ball
handle of pusher/puller
counterclockwise until
sleeve(1) makes contact with
elbow(2), aligning sleeve
with sleeve hole in elbow.
- (5) Adjust and tighten clamp of
pusher/puller to secure
elbow(2) to pusher/puller
base, maintaining clamp
level with pusher/puller
base.
- (6) Resume turning speed ball
handle counterclockwise
until sleeve(1) is seated
into elbow(2).
- (7) Remove air supply manifold
elbow and sleeve from
pusher/puller.

WORK PACKAGE

TECHNICAL PROCEDURES

NUT, REAR COMPRESSOR DRIVESHAFT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	3	8	1	9 - 11 Added	3
3 - 7	0			12 Blank Added	3

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Marking - - - - -	WP 023 00
Cleaning, Vapor Degreaser (SPOP 3) - - - - -	SWP 031 01
Cleaning, Glass Bead Blast, Wet (SPOP 16) - - - - -	SWP 031 03
Cleaning Steel or Titanium Parts, Antigalling and Varnish Removal (SPOP 252) - - - - -	SWP 031 16
Peening, Glass Bead (SPOP 500) - - - - -	SWP 091 07
Stripping Plasma Spray Coatings with Nickel Strip Solution (SPOP 53) - - - - -	SWP 092 20
Welding - Inert Gas Fusion - - - - -	SWP 093 01
Heat Treatment: Solution, Stabilization, or Precipitation Cycles (SPOP 767) - - - - -	SWP 095 01
Plasma and Flame Spray Coating Procedures, General - - - -	WP 096 00
Compound, Antigalling Application (SPOP 748) - - - - -	SWP 098 07
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Compound, antigalling (PWA 36545-3)	Everlube 382
Compound, lapping, 400 grit	Carborundum No. AA-400-V7-OS
Paper, lapping	400 grit
Plate, flat glass	1/4 inch thick X 12 inches square minimum

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of the rear compressor driveshaft nut.

- b. Wipe off excess antigalling compound.

- c. Cure per PWA 36545-3.

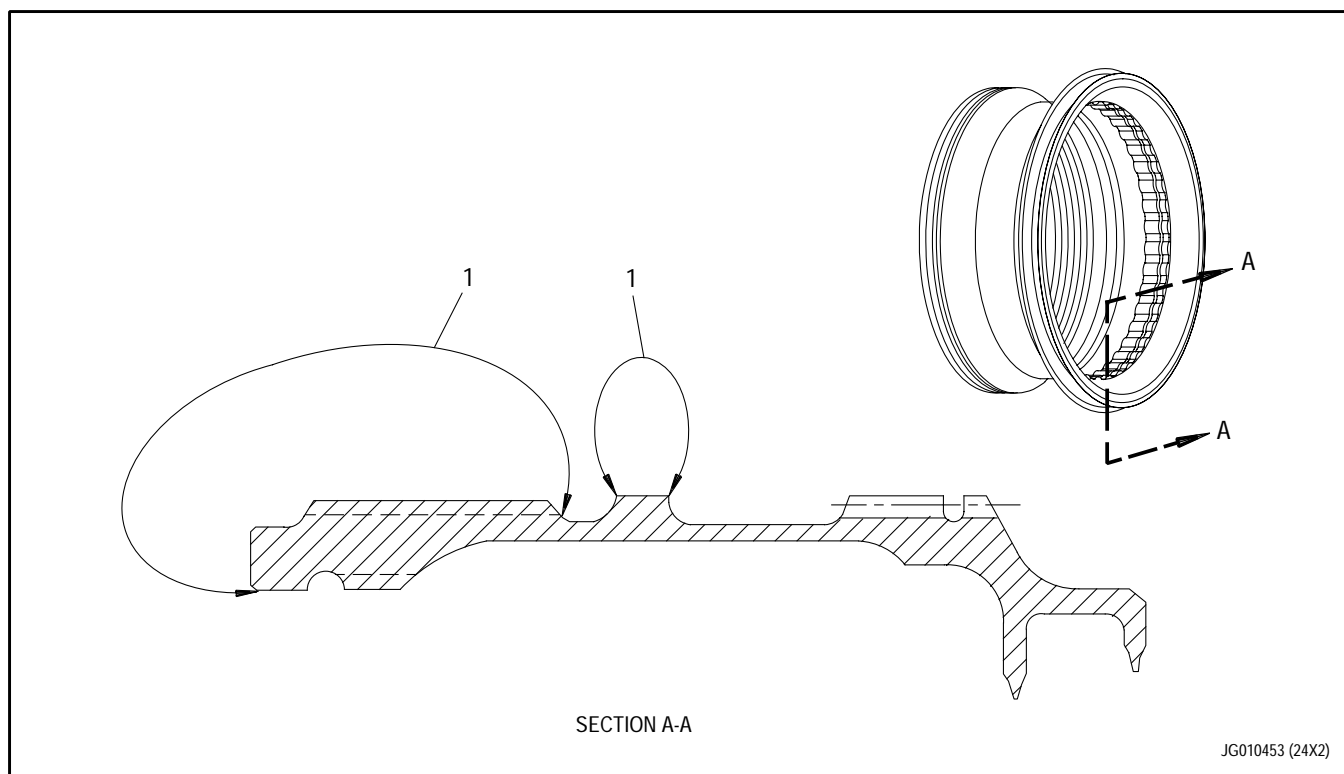
2. REAR COMPRESSOR DRIVESHAFT NUT - ANTIGALLING COMPOUND APPLICATION.

(See Figure 1.)

NOTE

Parent material is PWA 1022 nickel alloy. Surface preparation is not required.

- a. Apply antigalling compound per PWA 36545-3 to area(1). Refer to T.O. 2J-F100-53-1, SWP 098 07 (SPOP 748).



1. Apply antigalling compound per text.

Figure 1. Rear Compressor Driveshaft Nut - Antigalling Compound Application

**3. REAR COMPRESSOR DRIVESHAFT NUT -
HARDFACE REPLACEMENT ON FRONT FACE.**

(See Figure 2.)

NOTE

Parent material is PWA 1022
nickel alloy.

a. Remove hardface from area(1) by
one of the following methods:

(1) Machine Surface A to remove
hardface. Remove a minimum
amount of material. Maintain
dimension(3).

(2) Wet glass bead blast per
T.O. 2J-F100-53-1,
SWP 031 03 (SPOP 16).

(3) Chemically strip per
T.O. 2J-F100-53-1,
SWP 092 20 (SPOP 53).

b. Fluorescent penetrant inspect
area(1) per T.O. 2J-F100-9. No
cracks allowed.

(1) Remove antigalling
compound(2) per
T.O. 2J-F100-53-1,
SWP 031 16 (SPOP 252).

c. Measure and record Dimension(3)
regardless of the hardface
removal method used in step a.

d. Plasma spray area(1) per
PWA 53-2, to 0.010 to 0.012 inch
thick. Refer to
T.O. 2J-F100-53-1, WP 096 00.

e. Using Dimension(3) recorded in
step c, machine hardface as
required. Maintain Dimension(3)
plus hardface thickness of
0.003 to 0.008 inch. Surface A
shall be perpendicular to
Diameter B within 0.001 inch
Regardless of Feature Size.

f. Treat area(2) per paragraph 2.

Legend for figure 2

1. Remove hardface from this area per text.
2. After plasma spray treat per PWA 36545-3. Refer to T.O. 2J-F100-53-1, SWP 098 07 (SPOP 748).
3. 2.554 inch minimum from Surface C.
4. Plasma spray optional and may be incomplete.
5. Plasma spray per text.
6. Final machine Surface A after hardface to 2.562 to 2.572 inches.
7. This surface to be perpendicular to the true position of Diameter B ± 0.0005 inch regardless of feature size. Flatness of this surface to be ± 0.0005 inch.
8. Chamfer 0.005 to 0.015 inch $\times 45^\circ \pm 5^\circ$, 2 places.
9. Break edge 0.005 inch maximum before coat, both sides.

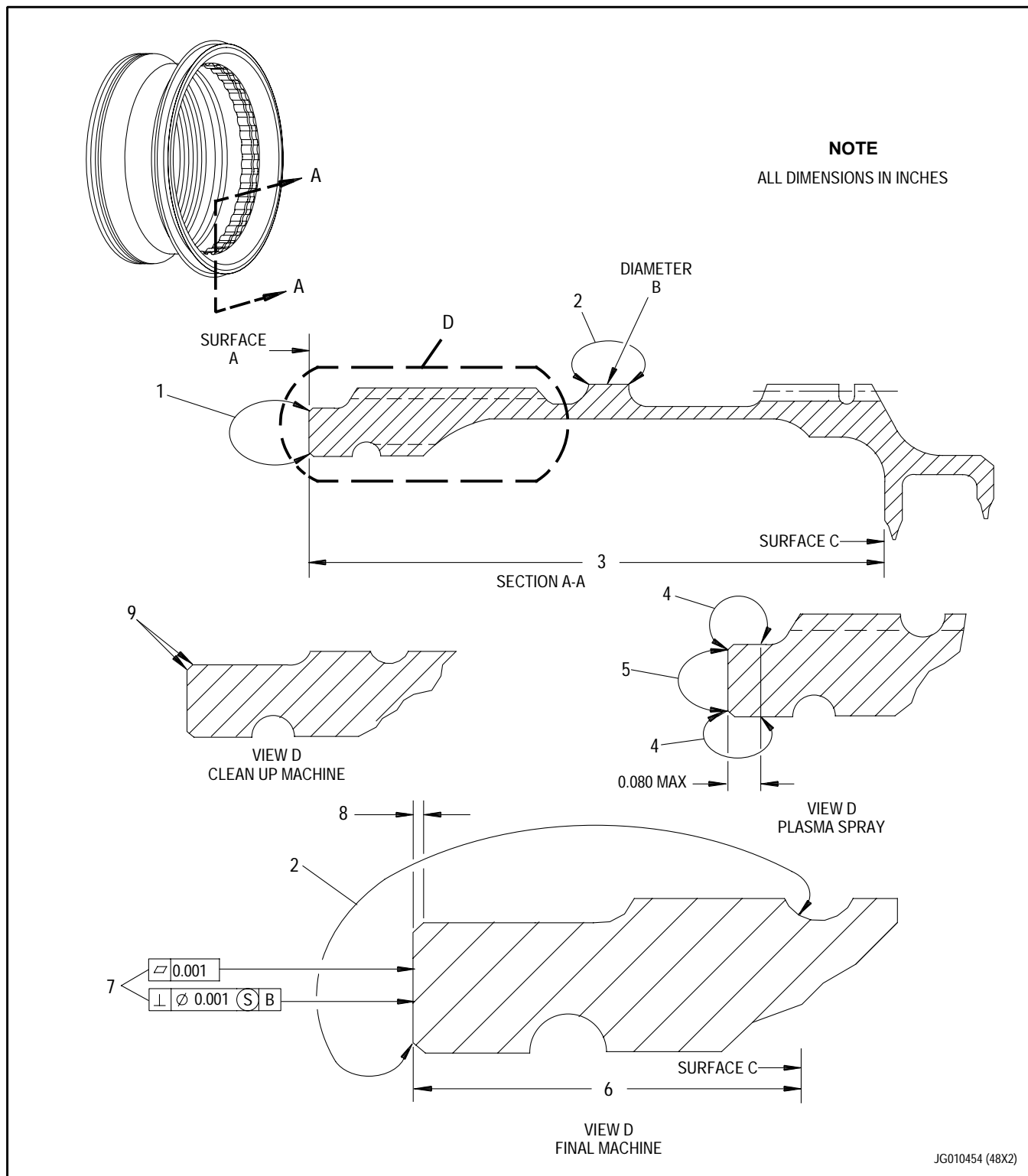


Figure 2. Rear Compressor Drive Shaft Nut - Hardface Replacement on Front Face

**4. REAR COMPRESSOR DRIVE SHAFT NUT -
KNIFE EDGE SEAL REPAIR/REPLACEMENT.**

(See Figure 3.)

NOTE

Material is PWA 1022 nickel alloy.

- a. Check material hardness for overtemperature at Point F, four places. Material must be at least 32 HRC or equivalent for repair.
- b. Remove hardface from Surface A per paragraph 3. Dimension X must be at least 2.554 inches for repair.

c. Remove antigalling compound per T.O. 2J-F100-53-1, SWP 031 16 (SPOP 252).

d. Machine damaged knife-edge seal(s) as needed (figure 3).

e. Fluorescent penetrant inspect repair area for cracks per T.O. 2J-F100-9. No cracks allowed.

Legend for figure 3

- 1. 5.775 to 5.778 inch diameter, reference.
- 2. 0.390 to 0.420 inch, reference.
- 3. 0.030 to 0.060 inch to Point F, 4 places.
- 4. 6.962 to 6.966 inch final machined diameter.
- 5. Both knife edges shall have maximum circular runout of 0.004 inch with respect to Surface A and Diameter B.
- 6. 7.162 to 7.166 inch final machined diameter.
- 7. 6.754 to 6.774 inch diameter after knife-edge removal.
- 8. 6.954 to 6.974 inch diameter after knife-edge removal.
- 9. 0.005 inch minimum.
- 10. All balance cut intersection surface must be smooth and continuous.
- 11. 0.250 inch minimum radius.
- 12. Remove material in Area G(23) to correct static unbalance as required, within limits shown for balancing per text.
- 13. $15^{\circ} \pm 0^{\circ}30'$, both sides.
- 14. 0.031 to 0.062 inch radius, both sides.
- 15. 0.025 inch
- 16. Break edge 0.000 to 0.003 inch, both sides.
- 17. 0.022 to 0.026 inch
- 18. 0.013 to 0.033 inch
- 19. 0.090 to 0.110 inch, both sides.
- 20. 0.000 to 0.005 inch, both sides.
- 21. 0.050 inch maximum, both sides.
- 22. 0.065 to 0.075 inch, reference.
- 23. Area G. Material removal area to correct static unbalance, as required.
- 24. Hardface area
- 25. Antigalling area

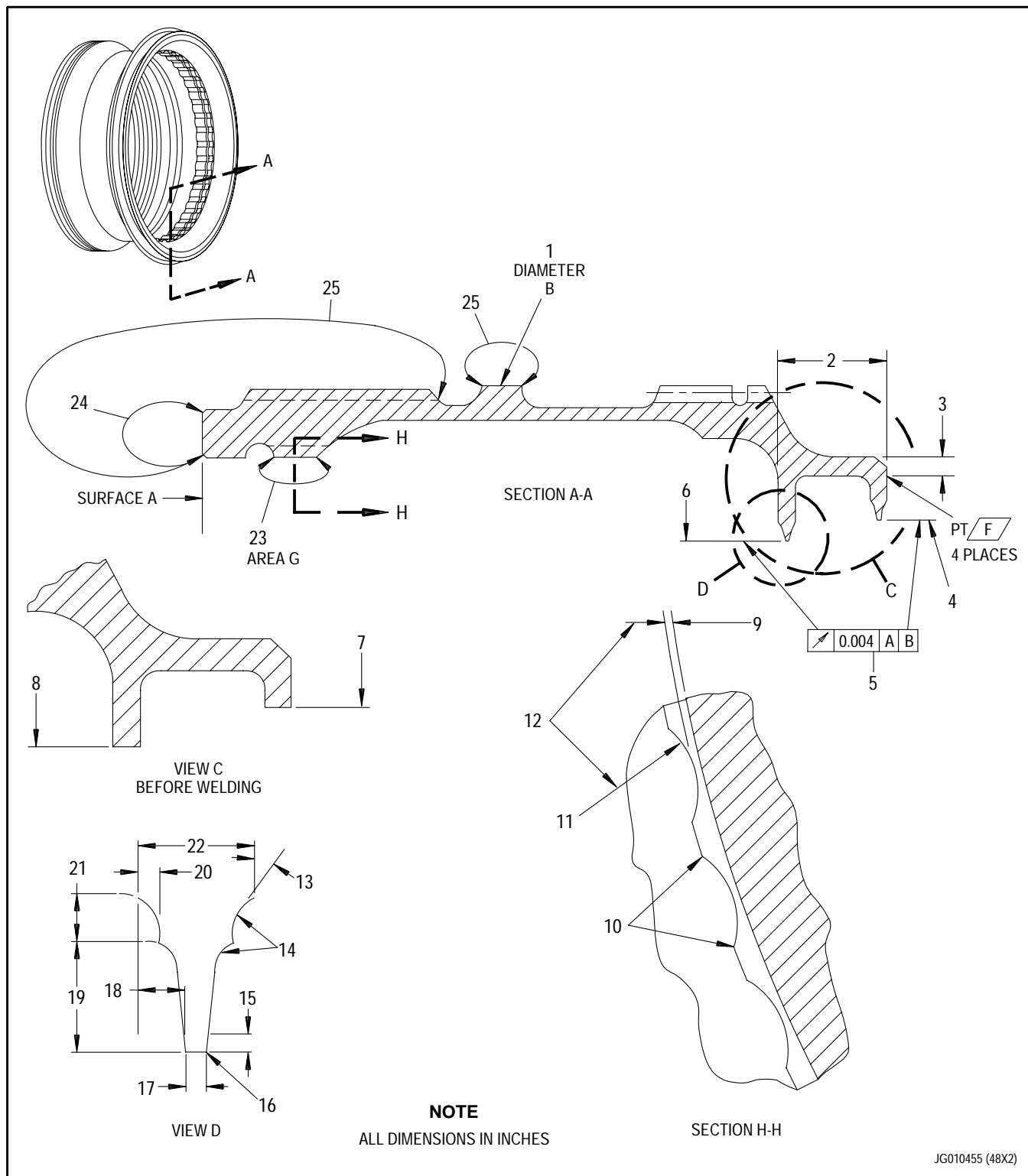


Figure 3. Rear Compressor Driveshaft Nut - Knife-Edge Replacement

T.O. 2J-F100-53-7

WP 450 00

- f. Optional glass or ceramic bead peen immediate knife-edge area per T.O. 2J-F100-53-1, SWP 091 07 (SPOP 500). Maximum intensity is 5N.
- g. Vapor degrease part per T.O. 2J-F100-53-1, SWP 031 01 (SPOP 3).
- h. Build up knife-edge using tungsten inert gas weld and an Incoloy 901 filler. Refer to T.O. 2J-F100-53-1, SWP 093 01. Dabber weld is acceptable.
- i. Precipitation heat treat per T.O. 2J-F100-53-1, SWP 095 01 (SPOP 767), except at 1335° to 1365°F (724° to 741°C) for 18 hours in a vacuum or argon atmosphere.
- j. Machine finish knife-edge seals as shown. Blend surface imperfections left by weld.
- k. Fluorescent penetrant inspect knife-edge seals for cracks. Refer to T.O. 2J-F100-9.. No cracks allowed.
- l. Replace hardface per paragraph 3.
- m. Static balance part. Unbalance may not exceed 0.050 inch at 600 rpm.
- n. Mark part each time a knife-edge is repaired with an underlined symbol: F for front and R for rear. A knife-edge may only be repaired twice. Vibration peen, engrave, or deep electrolytic etch symbol in area of part number. Refer to T.O. 2J-F100-53-1, WP 023 00.
- o. Apply antigalling compound per paragraph 2.

5. REAR COMPRESSOR DRIVE SHAFT NUT - LAPPING OF HARDCOAT .

(See Figure 4.)

NOTE

- Hardcoat is PWA 53-2 or PWA 53-5.

- Maintain all lapping equipment per the following procedure. Check flatness of lap surface frequently. Resurface as necessary to achieve satisfactory flatness check.

- Do not use abrasive compounds to lap or polish hardcoat. Abrasive particles can become embedded in hardcoat material that will cause wear damage to hardcoat and mating shaft during assembly.

- a. Either of the procedures provided may be used, provided the following conditions are met:
 - (1) Proper surface finish is obtained.
 - (2) Proper flatness is obtained.
 - (3) No abrasive becomes embedded in hardcoat.

- b. Compound Hand Lapping of Nut Front Face Hardcoat.

NOTE

This procedure shall produce a flatness of each nut within 0.001 inch.

- c. Prepare lapping plates as follows:
 - (1) Use three flat glass plates(1/4 inch thick minimum by 12 inches square minimum) and size 400 grit lapping compound, Carborundum No. AA-400-V7-OS (or equivalent).

NOTE

Use only one side of each plate. The other side is for contact with the bench.

- (2) Flatten the surface of each plate within 0.001 inch by lapping one against the other as shown in figure 4(a) using the above compound. Lap for a maximum of 10 minutes per plate set (No. 1 and No. 2 etc.) and no more than four times. (Two complete cycles per Figure 4.)
- (3) Wash each plate with warm water to remove all abrasive before lapping nut front face.

NOTE

•Lap a maximum of five nuts on each plate, then set plate aside for reconditioning. When all three plates have been used, recondition them per step c.

•This procedure will provide a flat, smooth surface of material and is not intended to eliminate chipped hardcoat. A maximum of 0.001 inch of hardcoat material will be removed.

d. Lap each nut front face on one plate using a metal fixture padded with sponge rubber to guide nut and to maintain a uniform pressure, producing an even and satisfactory finish on the hardcoat. Use a sliding, circular motion, and distribute pressure evenly. Lap until the surface is flat within 0.001 inch or for 10 minutes maximum.

e. Paper Hand Lapping of Nut Front Face Hardcoat.

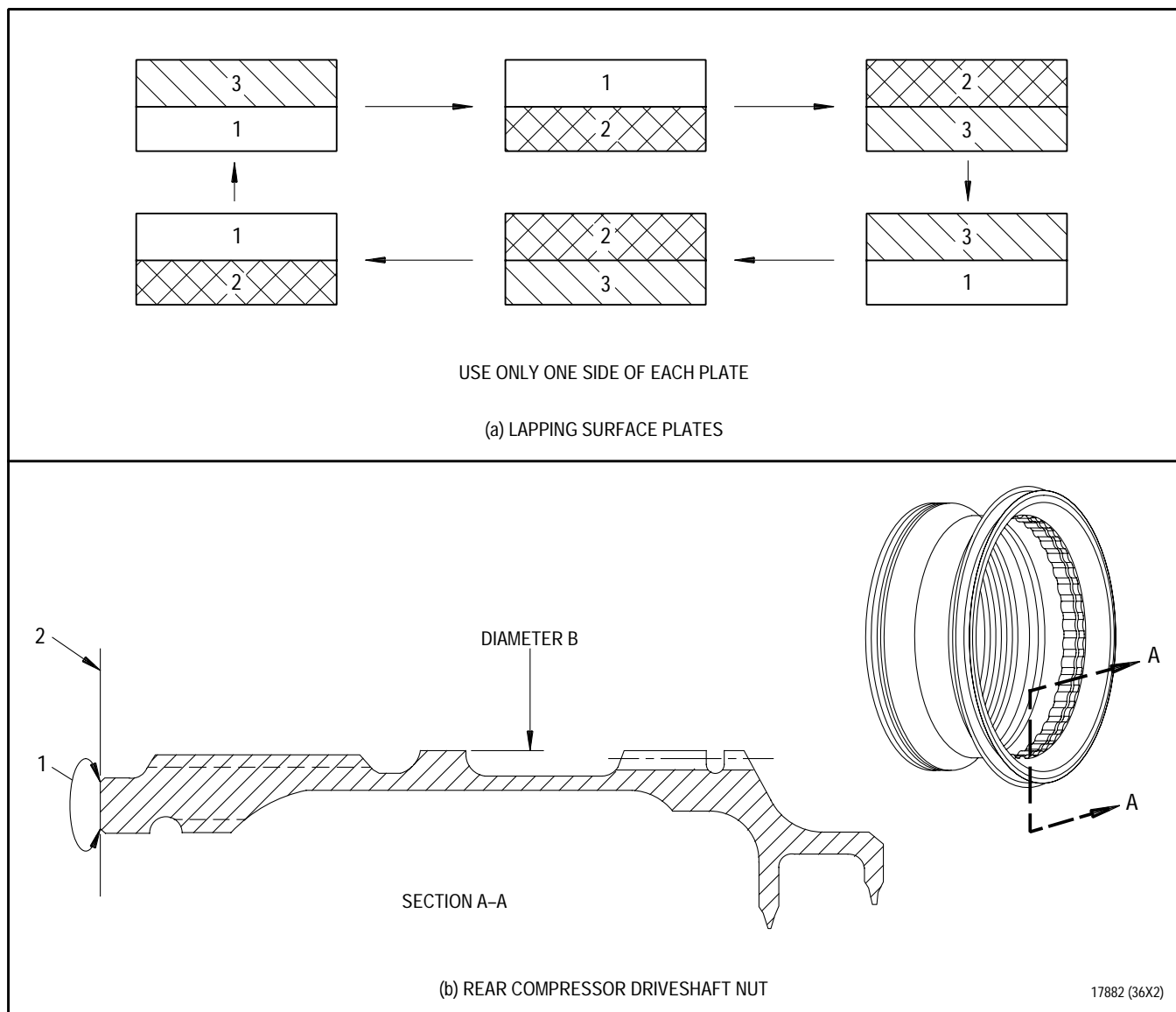
NOTE

This procedure shall produce a flatness of each nut within 0.001 inch.

f. Lap each nut front face on a series of polished marble plates, or equivalent, covered with lapping paper beginning with No. 400 grit or finer. Lap until the surface is flat within 0.001 inch or for 10 minutes maximum.

(1) Hold part to be lapped with a suitable metal fixture padded with sponge rubber to guide the nut and to maintain a uniform pressure, producing an even and satisfactory finish on the hardcoat.

(2) Use a sliding, circular motion, and distribute pressure evenly. Proceed through increasing degrees of fineness of papers used.



1. Lap hardcoat in this area.
2. This surface to be perpendicular to the true position of Diameter B ± 0.0005 inch, regardless of feature size. Flatness of this surface to be ± 0.0005 inch.

Figure 4. Rear Compressor Driveshaft Nut -Lapping of Hardcoat

WORK PACKAGE

TECHNICAL PROCEDURES

CASE SET, COMPRESSOR, FOURTH THROUGH NINTH STAGE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 22

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	26	2B Blank Added	26	7 - 8	26
2A Added	26	3 - 6	25	9 - 20 Added	26

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ALCOHOL, ISOPROPYL COMPOUND, ANTIGALLANT GRIT, ALUMINUM OXIDE MASKANT PENCIL (CRAYON), SILVER, METAL MARKING (HARD) (PMC 4059-7)	TT-I-735 PWA 36545, ESNALUBE 382 NO. 60 TO NO. 80 PMC 1835, TURCO 5580-G COLORBRITE NO. 2101

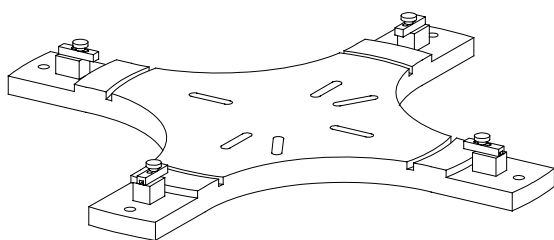
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BUMPER	4077054	8
BUMPER	4077055	8
BUMPER	4077056	8
INSERT OPTION	ST2786-01	20
INSERT OPTION	ST2786-02	1
RIVET-SOLID, COUNTERSUNK	2099409	16
RIVET	AN123641	16
RIVET	AN123683	16

APPLICABLE SUPPORT EQUIPMENT

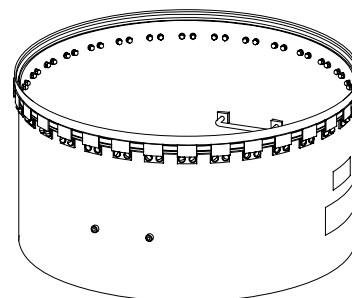
Paragraph	Function - Tool Nomenclature	Tool Number
4	FOURTH THROUGH NINTH STAGE COMPRESSOR CASE - W SEAL PLASMA SPRAY REPAIR	
	FIXTURE, MACHINE, 4TH-9TH STAGE COMPRESSOR CASE SET	PWA 71039
	FIXTURE, STRESS - - - - -	PWA 70997
	MASK, PLASMA, 4TH-9TH STAGE COMPRESSOR CASE SET, FWD ID - - - - -	PWA 70998
	MASK, PLASMA, 4TH-9TH STAGE COMPRESSOR CASE SET, AFT ID - - - - -	PWA 70999

ILLUSTRATED SUPPORT EQUIPMENT



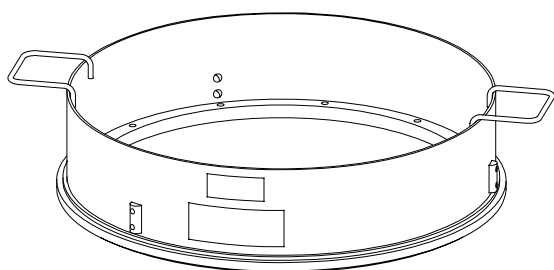
PWA 70997 -C

Figure T1. PWA 70997 FIXTURE



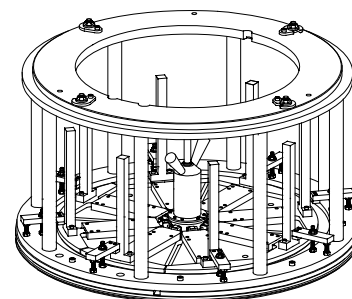
PWA 70998 -C

Figure T2. PWA 70998 MASK



PWA 70999 -C

Figure T3. PWA 70999 MASK



PWA 71039 -C

Figure T4. PWA 71039 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for repair of fourth through ninth stage compressor case set.

2. FOURTH THROUGH NINTH STAGE COMPRESSOR CASE SET - BUMPER REPLACEMENT.

(See Figures 1 and 2.)

- a. Remove rivets securing bumper to case by drilling through rivet manufactured head and driving rivet out with a steel drift. Refer to T.O. 2-1-111.
- b. Discard rivet and bumper.

- c. Locally clean bumper area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- d. Align rivet holes in replacement bumper and case.
- e. Rivet bumper to case. Refer to T.O. 2-1-111. See figure 1.

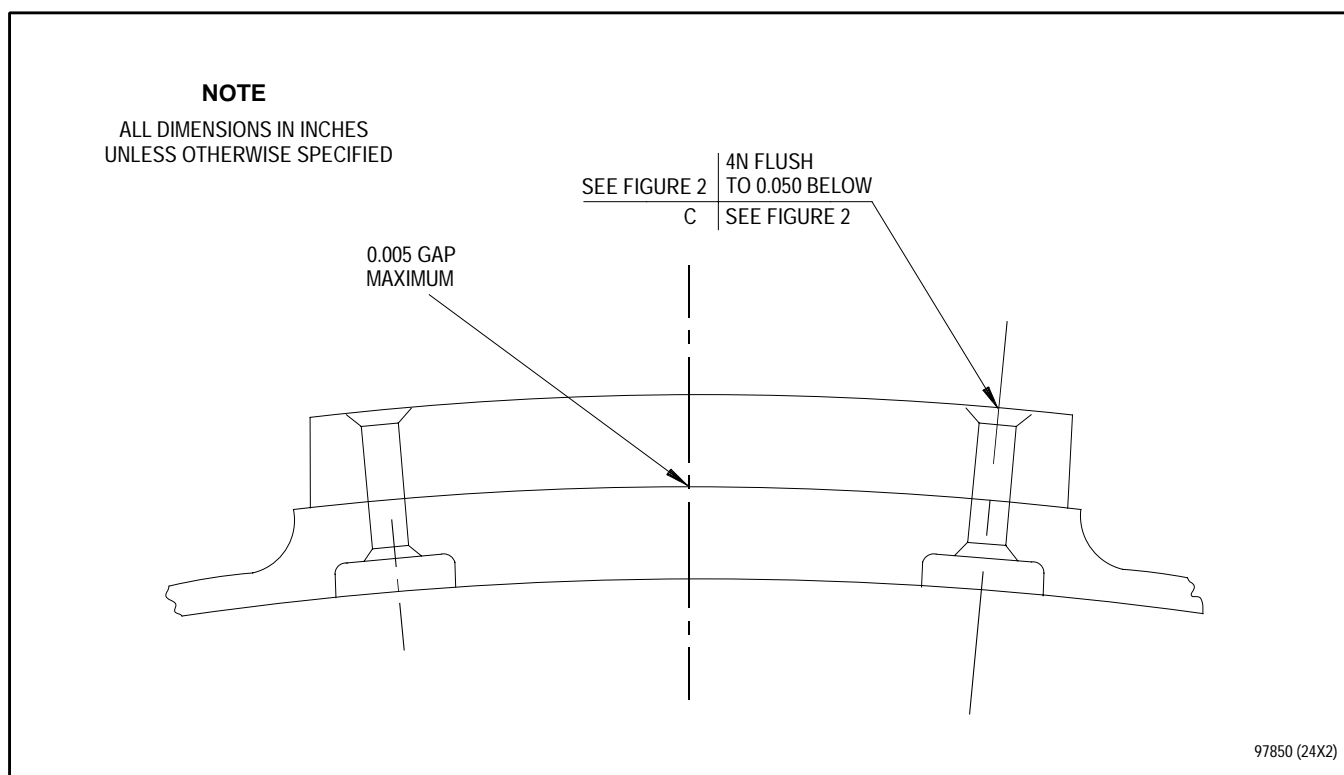


Figure 1. Fourth Through Ninth Stage Compressor Case Set - Bumper Replacement

**3. FOURTH THROUGH NINTH STAGE
COMPRESSOR CASE SET - SELF-LOCKING
SCREW THREAD INSERT REPLACEMENT.**

(See figure 2, Figure 3 and Table 1.)

NOTE

- Key insert features a hardened key that is broached into parent material at original manufacture, providing a positive mechanical lock against vibration.
- Use of cutting oil and cobalt drill bit are recommended for drilling operations.

a. Remove keyed insert(1 and 8, figure 2) as follows:

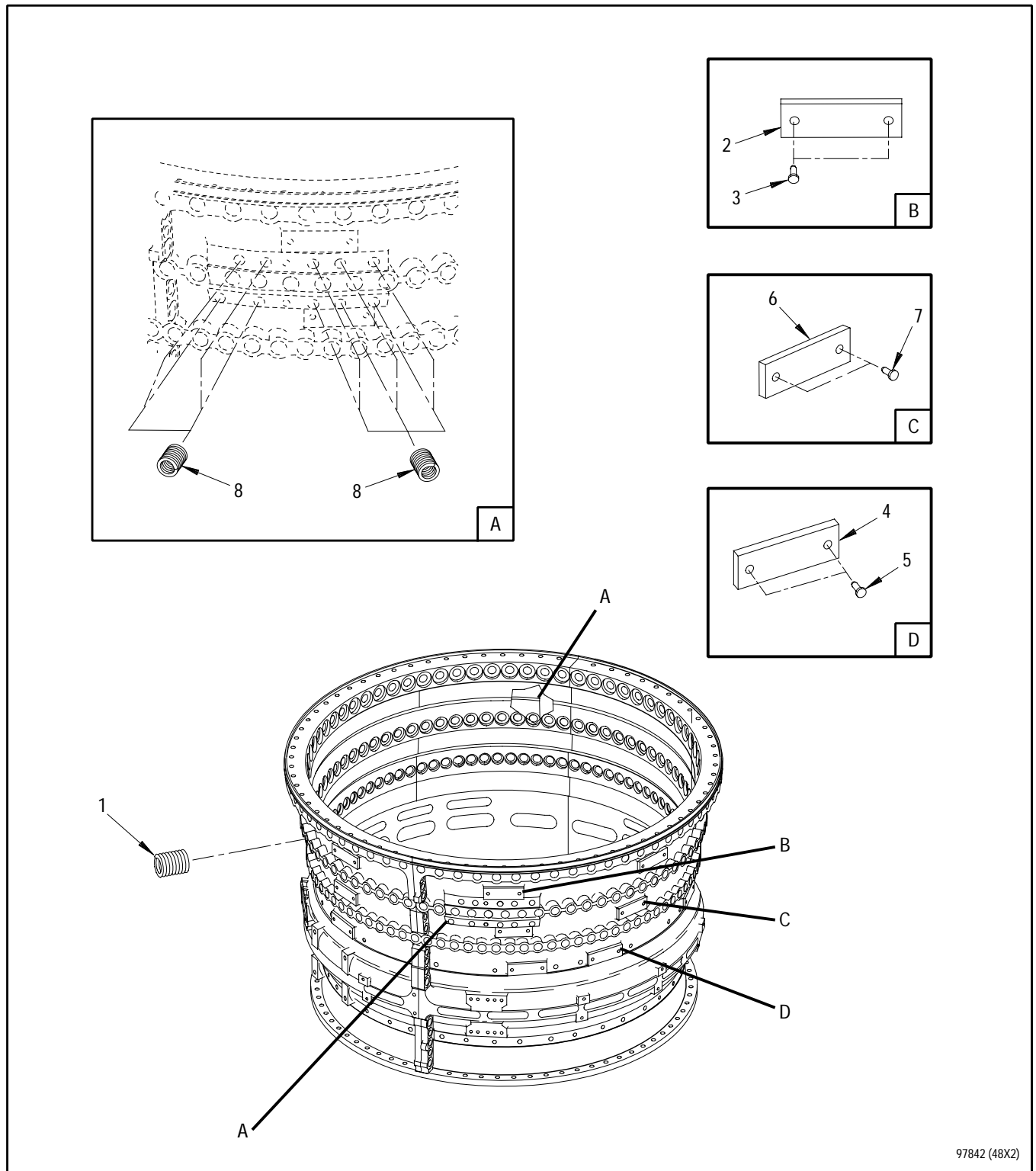
- (1) Use standard drill to remove insert material between keys. See figure 3 and table 1. Drill bit shall be held perpendicular and centered to work to ensure proper alignment of material removal between keys.
- (2) Deflect keys inward and break off, using a sharp point punch or equivalent. Remove keys.
- (3) Remove remaining insert using an extractor type tool. Rotate counterclockwise to remove.
- (4) Visually inspect insert thread hole for burrs, raised material and debris that would interfere with installation of new insert.
- (5) If required, using appropriate size tap, retap hole and remove burrs.
- (6) Using compressed air, blow out any debris that could interfere with installation of new keyed stud.

b. Install keyed insert as follows:

- (1) Temporarily mark part surface using Colorbrite No. 2101 pencil or equivalent, where one of the keys has broached the threaded hole in accordance with T.O. 2-1-111.
- (2) Install keyed insert using insert mandrel rotating insert and mandrel in a clockwise motion.
- (3) Align insert key with the mark that was previously made while ensuring that the insert is 0.010 to 0.035 inch below the part surface.
- (4) Locate key driver over insert with key driver tip in contact with keys. Drive the keys into the part until the top of keys are 0.000 to 0.005 inch below part surface. If resistance is encountered while driving in keys, then keys have not been properly aligned with broaches in the threads. If this occurs, remove stud and replace with new.

c. Inspect keyed insert after installation into case as follows:

- (1) Keys must be flush or below the part surface.
- (2) Keys cannot be bent or mushroomed. If keys are bent or mushroomed, replace with new insert.



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Figure 2. Fourth Through Ninth Stage Compressor Case Set - Self-Locking Screw Thread Insert Replacement

Legend for figure 2

- | | |
|---|---|
| 1. Insert (PN ST2786-02) | 5. Rivet (PN 2099409) (use only on PN 4075413-01) |
| 2. Bumper (PN 4077054) | 6. Bumper (PN 4077055) |
| 3. Rivet (PN AN123683) | 7. Rivet (PN AN123641) |
| 4. Bumper (PN 407756) (use only on PN 4075413-01) | 8. Insert (PN ST2786-01) |

Table 1. Self-Locking Screw Thread Insert - Installation

Insert Part Number	ST2786-01	ST2786-02
Drill Size	9/32 inch	11/32 inch
Drill Depth	0.210 inch	0.240 inch
Tap Size	0.375-16UNC-2B MOD Minor Diameter: 0.331 to 0.336 inch MOD	0.4375-14UNC-2B MOD Minor Diameter: 0.396 to 0.401 inch MOD
Installation Tools		
Tridair Tool Number	THD1032L	THD428L
Microdot Tool Number	KHT9000-3	KHT9000-4

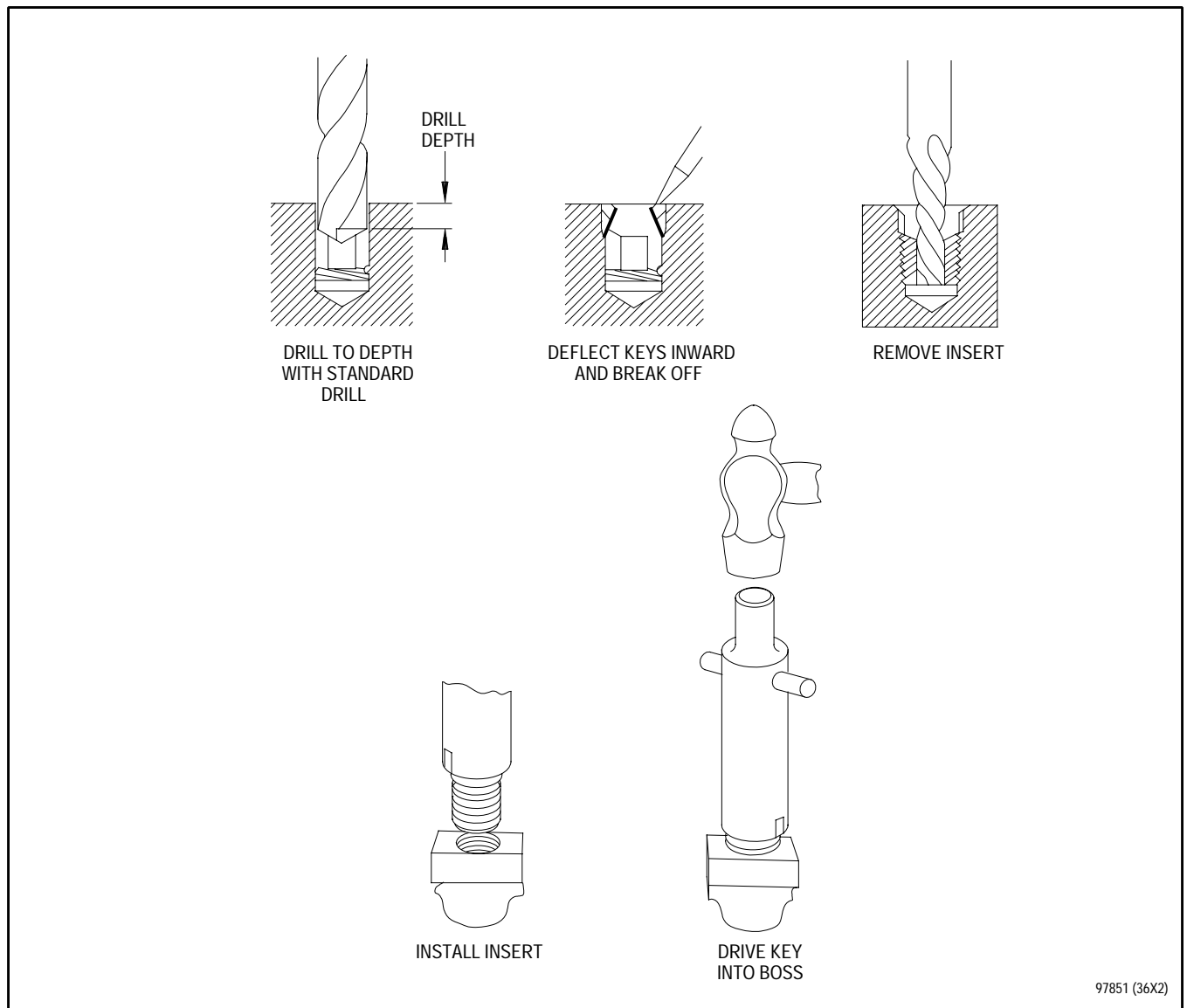


Figure 3. Self-Locking Screw Thread Insert - Installation

**4. FOURTH THROUGH NINTH STAGE
COMPRESSOR CASE - W SEAL PLASMA SPRAY
REPAIR.**

(See Figure 4.)

NOTE

Parent material is 6-2-4-2
titanium alloy.

- a. Strip antigallant compound from case per paragraph 5.
- b. Mask entire case except Area E(12, figure 4), with PMC 1835 maskant per SPOP 36. Refer to T.O. 2-1-111. Plug all entrapment areas to avoid containment of residual maskant.
- c. Strip copper-nickel coating from Area E per SPOP 710. Refer to T.O. 2-1-111.

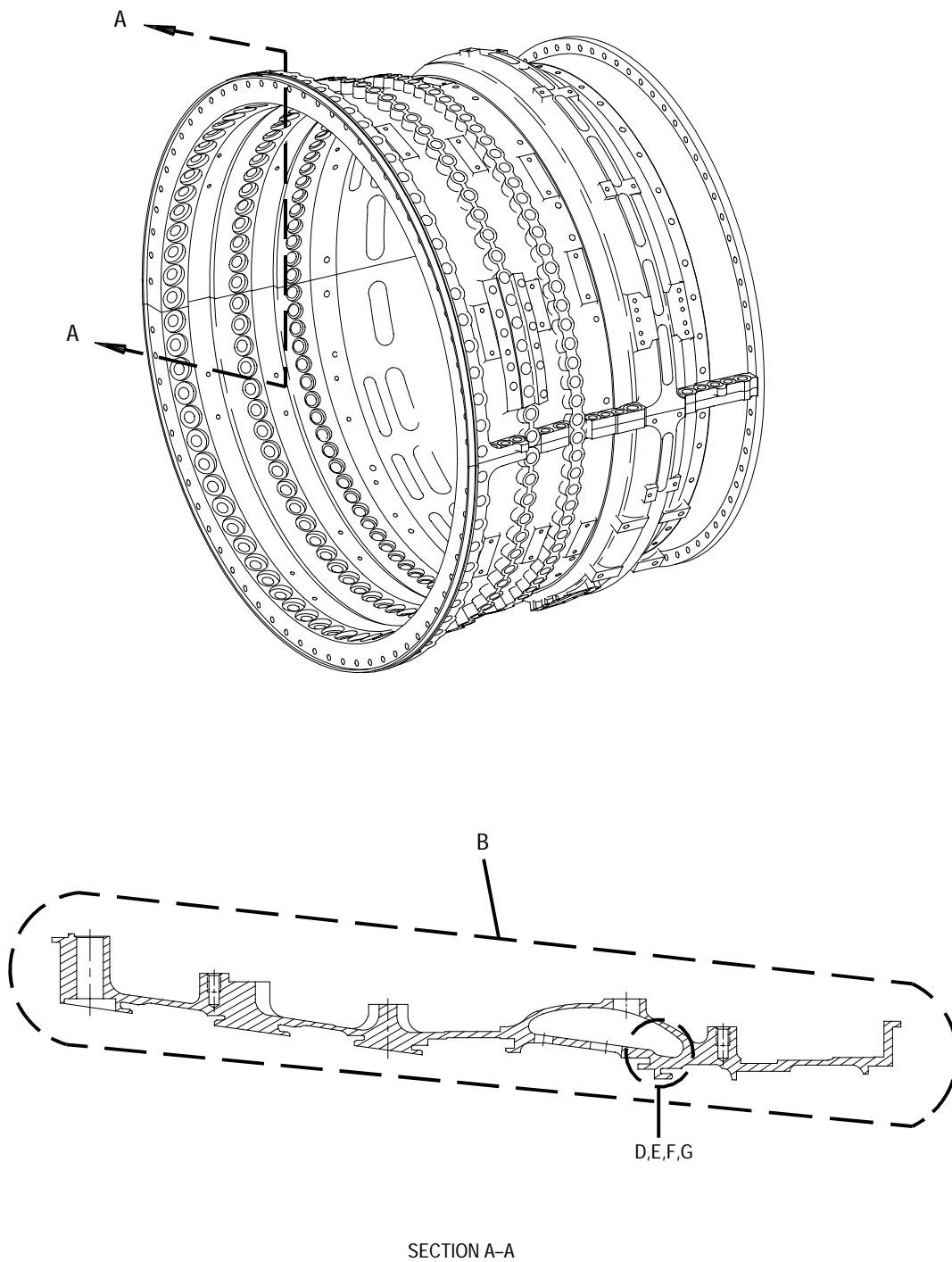


Careless removal of maskant may scratch and damage case.

- d. Remove maskant by cutting and peeling. Do not scratch case.
- e. Clean case per SPOP 208, Method A. Refer to T.O. 2-1-111.
- f. Visually inspect W seal surface for wear grooves. Seal surface is Surface B(11).
- g. If no wear grooves are present on Surface B, go to step u. If wear grooves exist, go to step h.
- h. Set up and machine worn surface prior to plasma spray per View E using PWA 71039 fixture. Remove minimum material within dimensional requirements to clean up wear. Maintain minimum 0.075 inch wall thickness. Record diameter of Surface B. Refer to T.O. 2-1-111, SPOP 530.

- i. Clean case per SPOP 208, Method A. Refer to T.O. 2-1-111.
- j. Fluorescent Penetrant Inspect (FPI) machined area only per SPOP 62. No cracks allowed. Refer to T.O. 2-1-111.
- k. Clean case per SPOP 208, Method A. Refer to T.O. 2-1-111.
- l. Mask entire case except seal surface per View D using PWA 70997 fixture and PWA 70998 and PWA 70999 masks. Use additional tape masking per SPOP 36 as necessary to complete masking per View D.
- m. Grit blast seal surface per SPOP 170, except use No. 60 to No. 80 aluminum oxide grit at 40 to 45 psig per View E. Refer to T.O. 2-1-111.
- n. Remove and replace masking as necessary to remove all trapped grit.
- o. Apply plasma spray to Surface B per PWA 53-37 and View E. Use minimum coating thickness to achieve minimum diameter of 23.165 inches. Refer to T.O. 2J-F100-53-1, WP 096 00.
- p. Remove masking, PWA 70997 fixture, and PWA 70998 and PWA 70999 masks.

- q. Set up and machine plasma spray repaired area of seal surface to final dimensions per View E using PWA 71039 fixture. Remove minimum material within dimensional requirements to clean up plasma coating. Unless otherwise specified, all dimensions apply when Surfaces N and P are flat within 0.002 inch and Diameters AD and DW maintain a clearance envelope of 28.201 and 24.915 inches diameter respectively in free state or constrained. Constraint contact allowed only on Surfaces N, P, DY, and DZ and Diameters AD and DW. See View B.
- r. Dimensional inspect diameter after machining and record results for later reference.
- s. If wear grooves were repaired by plasma, use beehive symbol per SPOP 401 to identify case. Refer to T.O. 2-1-111.
- t. Clean case to remove masking residue per SPOP 208, Method A. Refer to T.O. 2-1-111.
- u. Mask entire case except Area C(15) and Area D(17) per View F using PWA 70997 fixture and PWA 70998 and PWA 70999 masks. Use additional tape masking per SPOP 36 as necessary to complete masking per View F.
- v. Grit blast seal surface per SPOP 170, except use No. 60 to No. 80 aluminum oxide grit at 25 to 30 psig per View F. Maintain nozzle distance of 3 to 4 inches and nozzle passing speed of 5 inches per second. Refer to T.O. 2-1-111.
- w. Remove and replace masking as necessary to remove all trapped grit.
- x. Apply plasma spray to Area D per PWA 53-69, PWA 256-6, or PWA 269 to thickness of 0.002 to 0.008 inch per side and View F. Coating in Area C is optional and thickness is waived. Refer to T.O. 2J-F100-53-1, WP 096 00.
- y. Remove masking, PWA 70997 fixture, and PWA 70998 and PWA 70999 masks.
- z. Apply antigallant compound to case per paragraph 5.



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Figure 4. Fourth Through Ninth Stage Split Compressor Case - W Seal Gland Repair (Sheet 1 of 5)

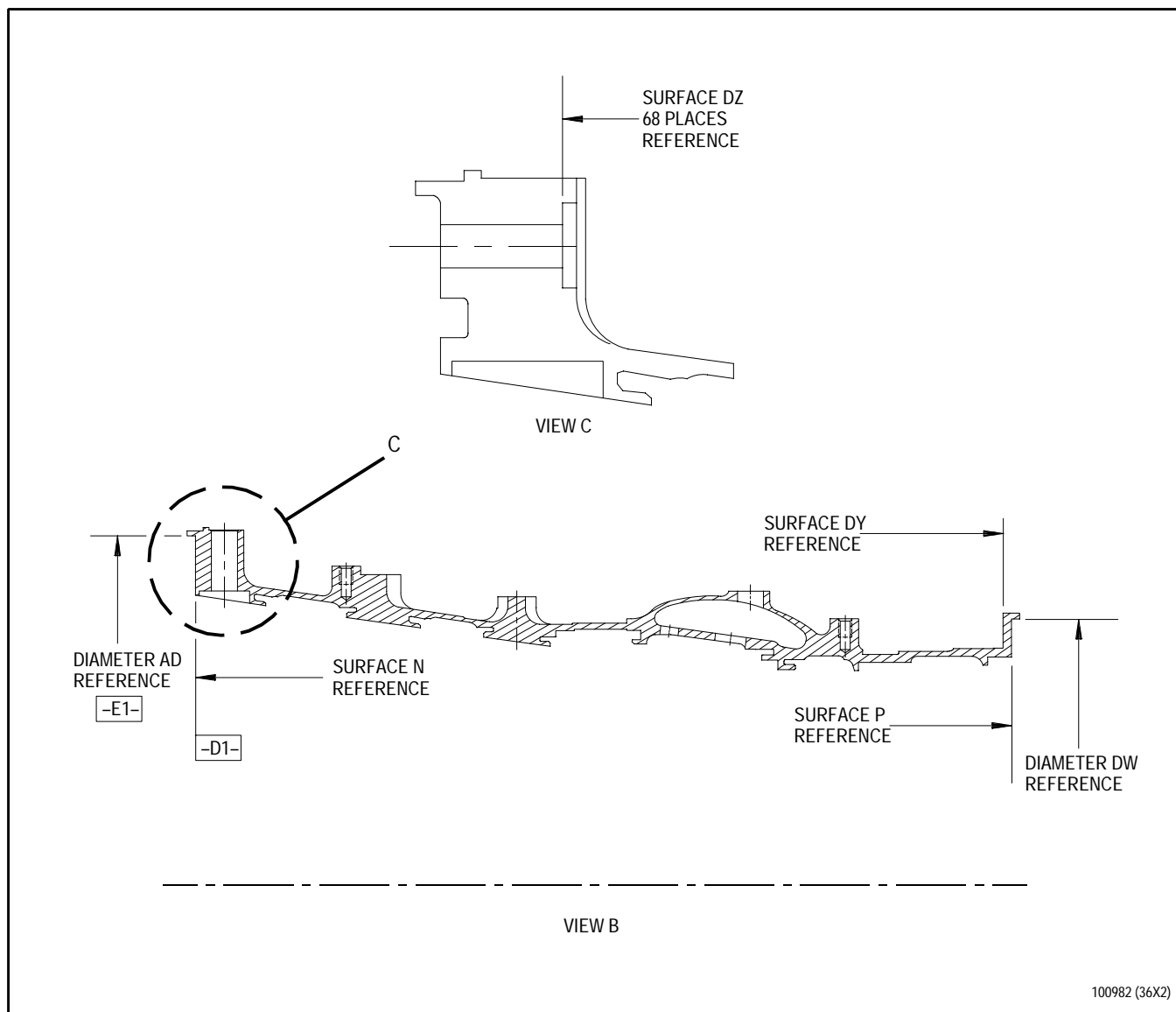
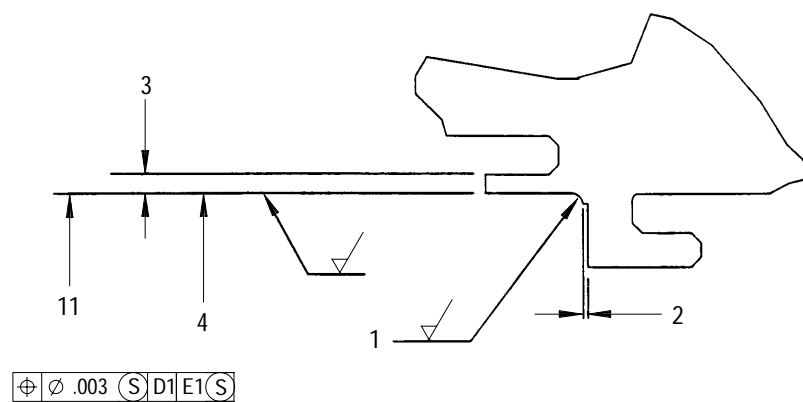
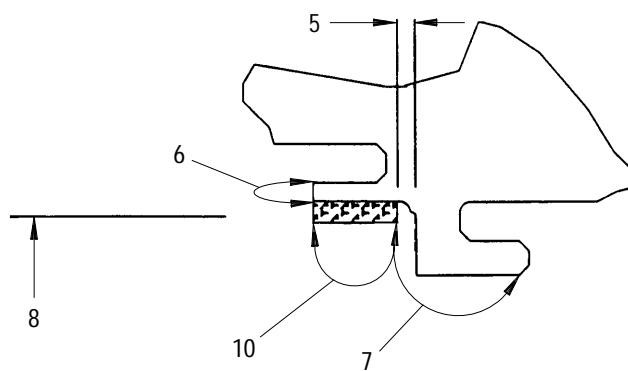


Figure 4. Fourth Through Ninth Stage Split Compressor Case - W Seal Gland Repair (Sheet 2 of 5)



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MACHINE PRIOR TO PLASMA

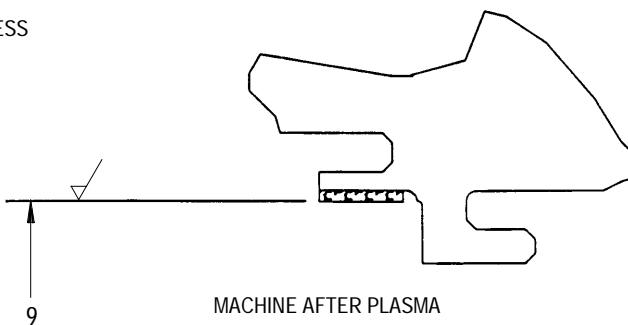


PLASMA SPRAY

NOTE

- ∇ - FINISH BY MATERIAL REMOVAL
- BREAK SHARP EDGES 0.003 TO 0.015
- ALL DIMENSION IN INCHES UNLESS OTHERWISE SPECIFIED

$\oplus \varnothing .003 (S) D1 E1 (S)$



MACHINE AFTER PLASMA
VIEW E

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Figure 4. Fourth Through Ninth Stage Split Compressor Case - W Seal Gland Repair (Sheet 3 of 5)

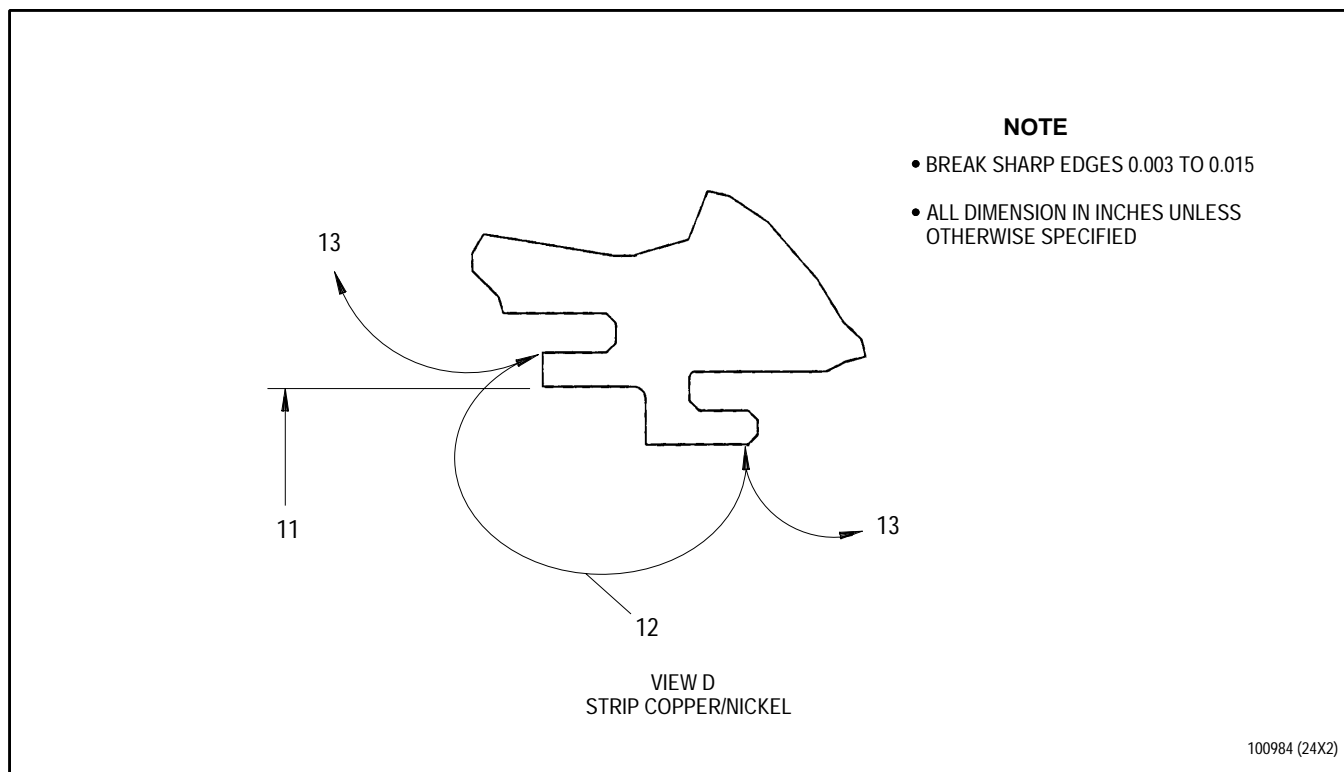


Figure 4. Fourth Through Ninth Stage Split Compressor Case - W Seal Gland Repair (Sheet 4 of 5)

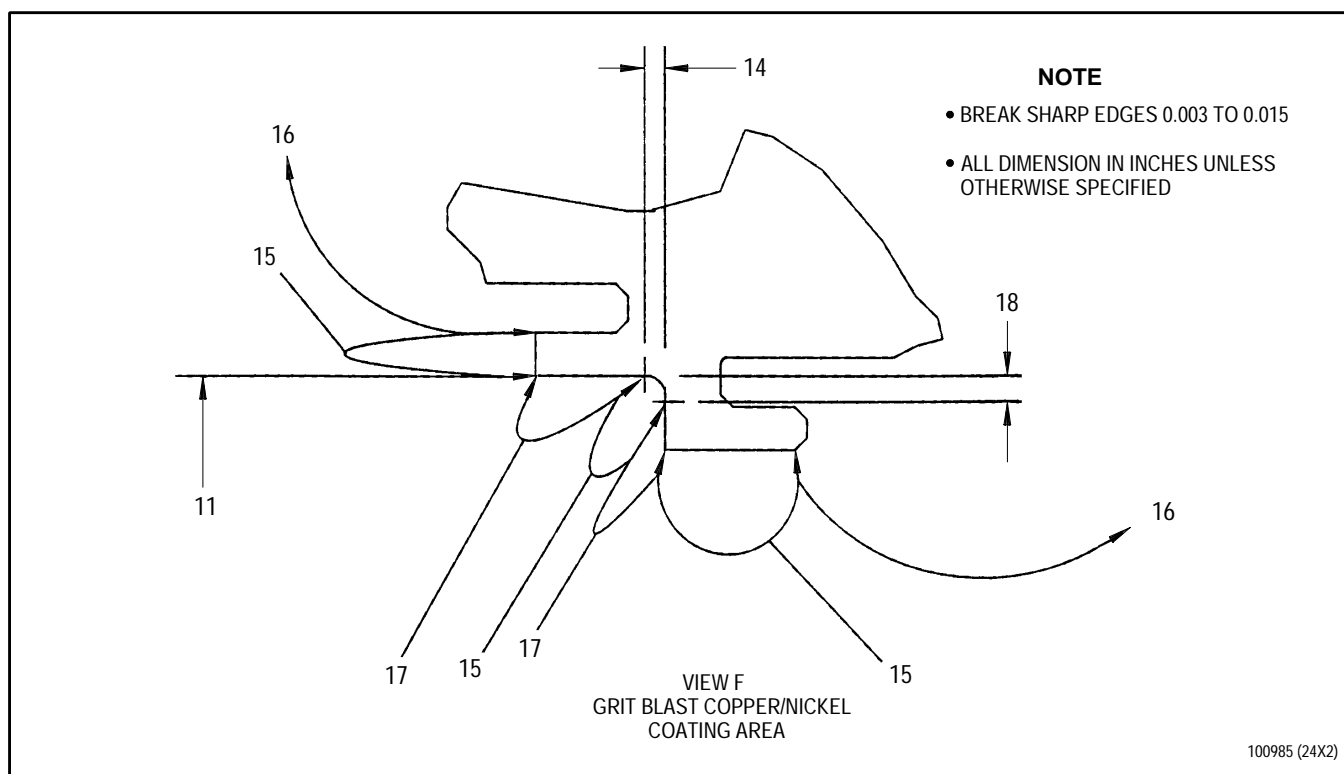


Figure 4. Fourth Through Ninth Stage Split Compressor Case - W Seal Gland Repair (Sheet 5 of 5)

Legend for figure 4

NOTE

Unless otherwise specified, all dimensions apply when Surfaces N and P are flat within 0.002 inch and Diameters AD and DW maintain a clearance envelope of 28.201 and 24.915 inches diameter respectively in free state or constrained. Constraint contact allowed only on Surfaces N, P, DY, DZ, and Diameters AD and DW.

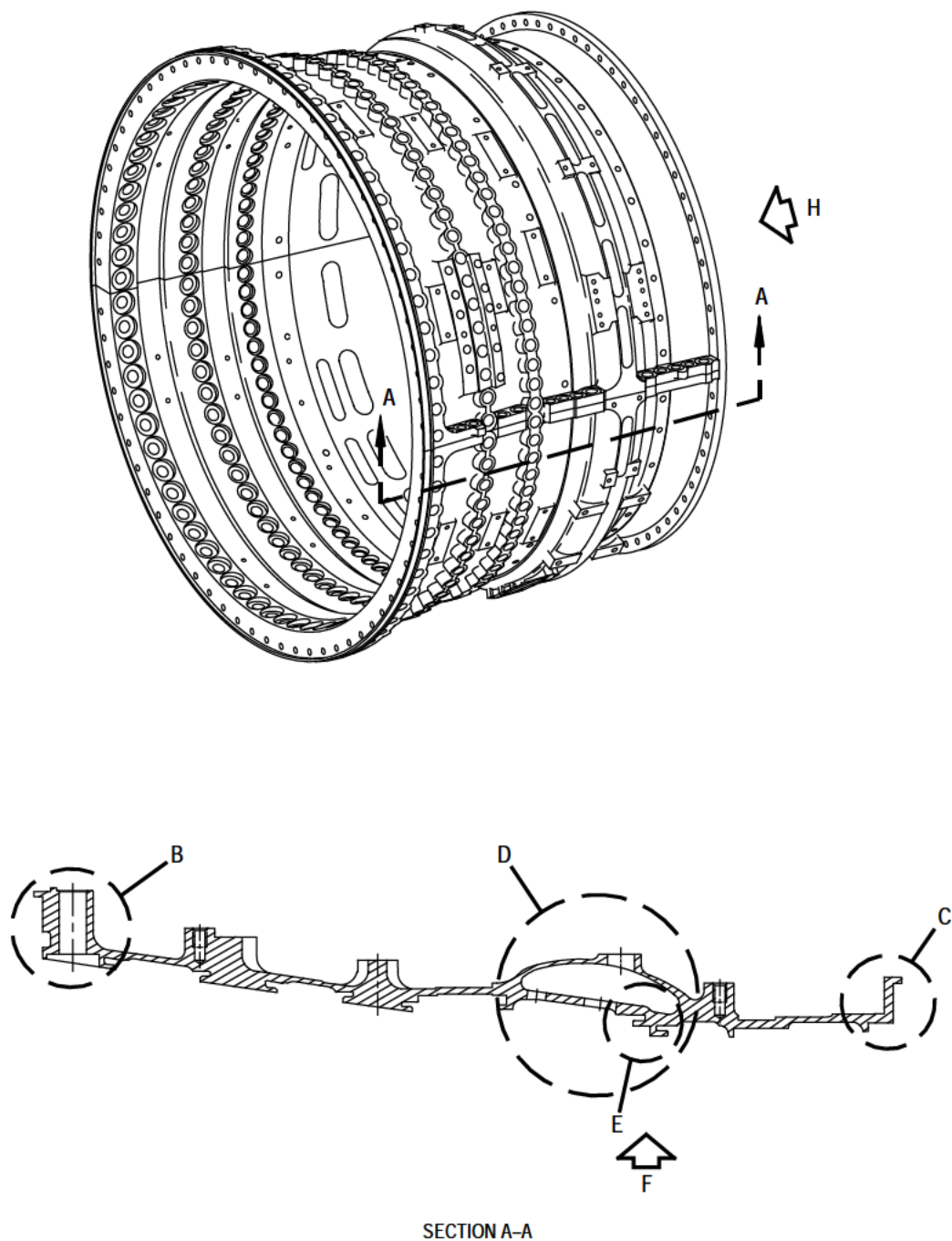
In free state, Surfaces N and P are flat within 0.010 inch and Diameters AD and DW are 28.199 to 28.209 inches and 24.913 to 24.923 inches respectively. Requirements apply when split cases are bolted together.

1. 0.020 to 0.030 inch, modified radius
2. 0.000 to 0.010 inch to tangency of radius
3. 0.075 inch, minimum
4. Surface B prior to plasma spray. Pre-plasma machine to 23.187 to 23.192 inches diameter. Diameter shall be within 0.003 inch of true position to Datums D1 and E1, regardless of feature size.
5. 0.020 to 0.030 inch
6. Coating optional and may be incomplete
7. No grit blast or coating permitted
8. Plasma spray Surface B to achieve a minimum diameter of 23.165 inches to allow for finish machining.
9. Finish machine to 23.168 to 23.174 inches diameter. Diameter shall be within 0.003 inch of true position to Datums D1 and E1, regardless of feature size.
10. Grit blast and plasma spray enclosed area per PWA 53-37
11. Surface B
12. Area E, strip copper-nickel coating this area
13. Mask entire case except where indicated by Area E.
14. 0.030 inch, maximum
15. Area C, coating optional and may be incomplete. Coating thickness waived.
16. Mask entire case except where indicated by Areas C and D.
17. Area D, grit blast and coat per PWA 53-69, 256-6, or 269 per text.
18. 0.080 inch, maximum

5. FOURTH THROUGH NINTH STAGE COMPRESSOR CASE SET - ANTIGALLANT COMPOUND REPLACEMENT.

(See Figure 5.)

- a. Strip antigallant compound from case per SPOP 16 or 17 at all locations shown in figure 5. Use 30 psig air pressure maximum for stripping. Mask or plug all entrapment areas to avoid trapping glass beads in case. Refer to T.O. 2-1-111. Wipe blasted areas with isopropyl alcohol.
- b. Apply PWA 36545-3 antigallant compound to all locations shown in figure 5. Refer to T.O. 2-1-111, SPOP 748. Wipe to remove excess material before baking.
- c. Cure coating for 2 hours at $150^{\circ}\pm 25^{\circ}\text{F}$ ($66^{\circ}\pm 14^{\circ}\text{C}$), followed by 2 hours at $400^{\circ}\pm 25^{\circ}\text{F}$ ($204^{\circ}\pm 14^{\circ}\text{C}$).



101044 (48X2)

Figure 5. Split Compressor Case - Antigallant Compound Application (Sheet 1 of 4)

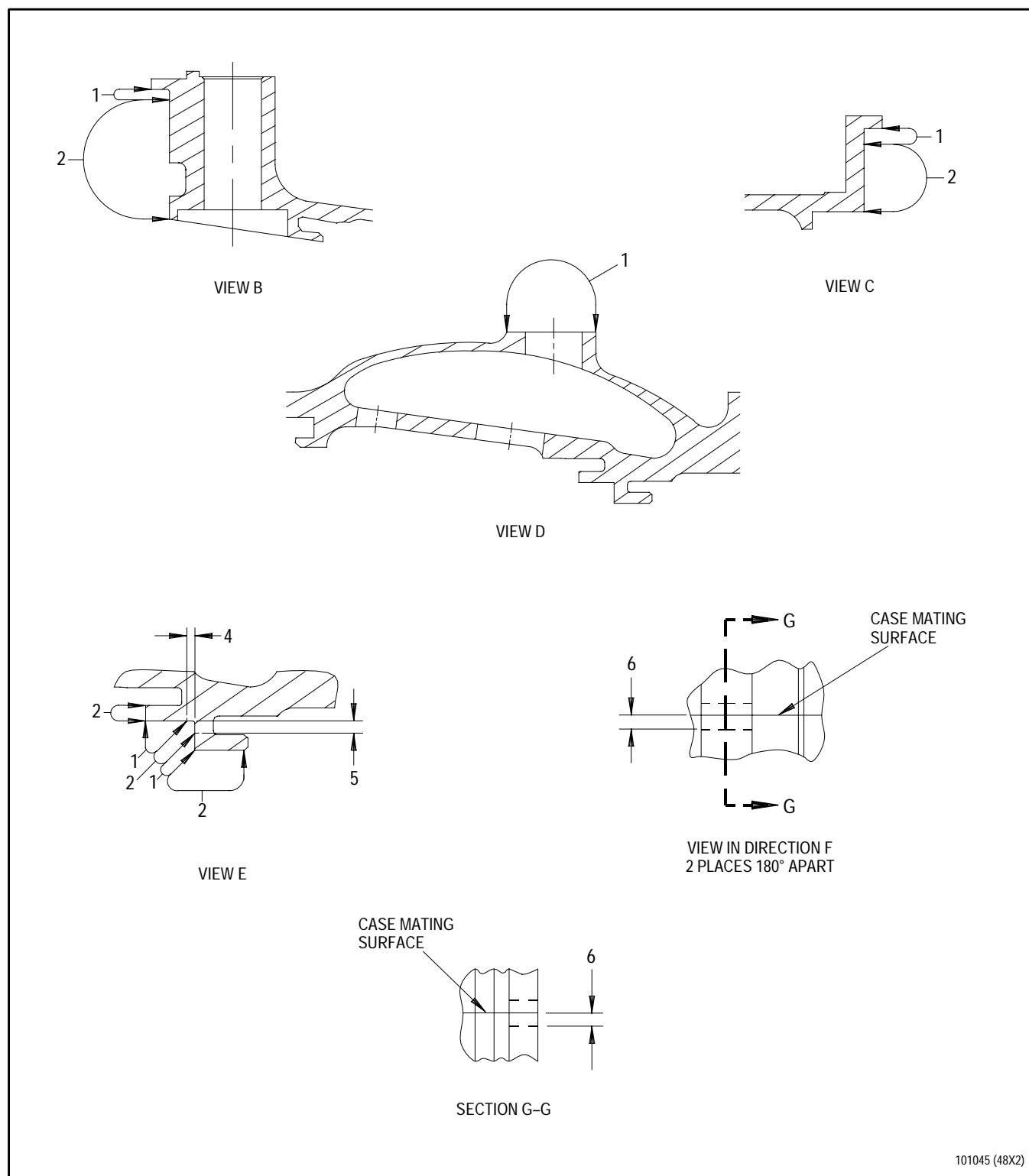
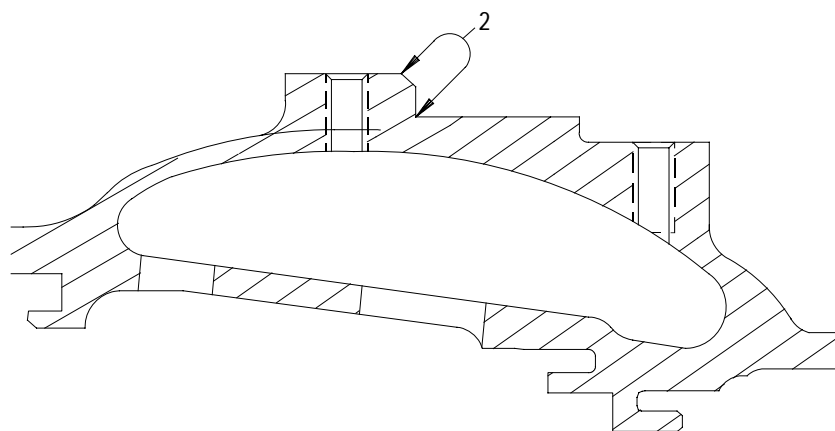
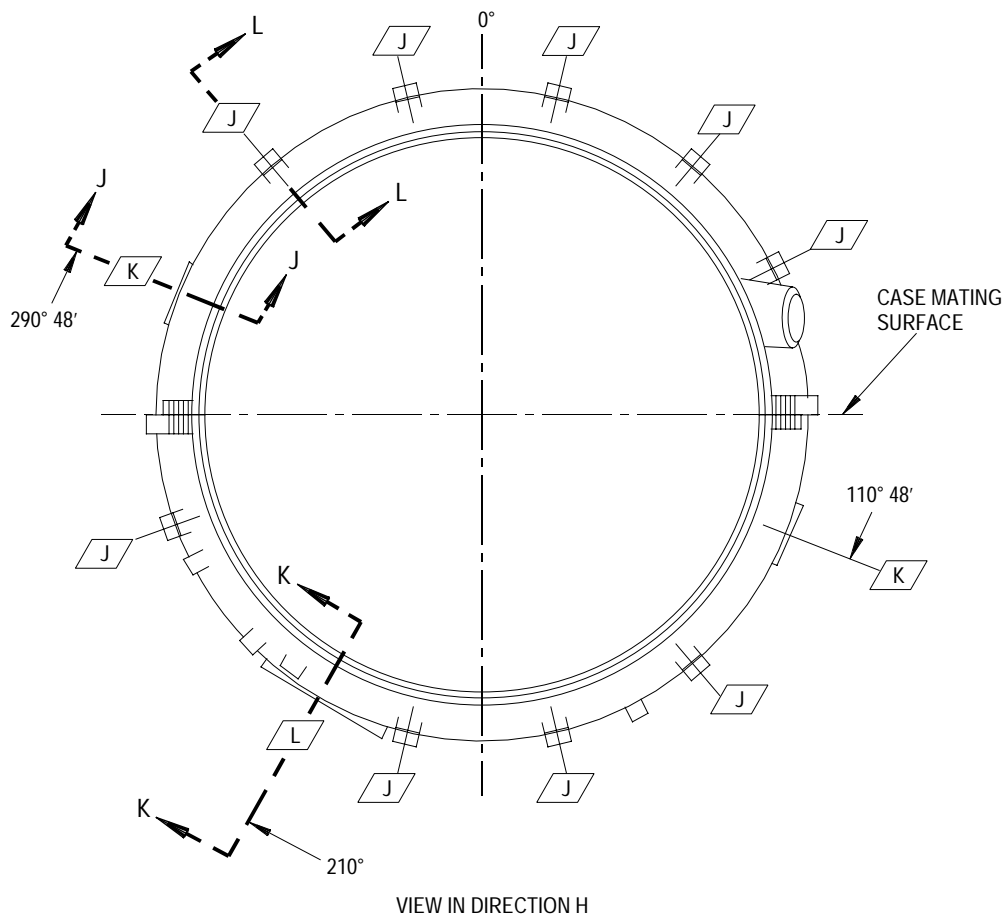
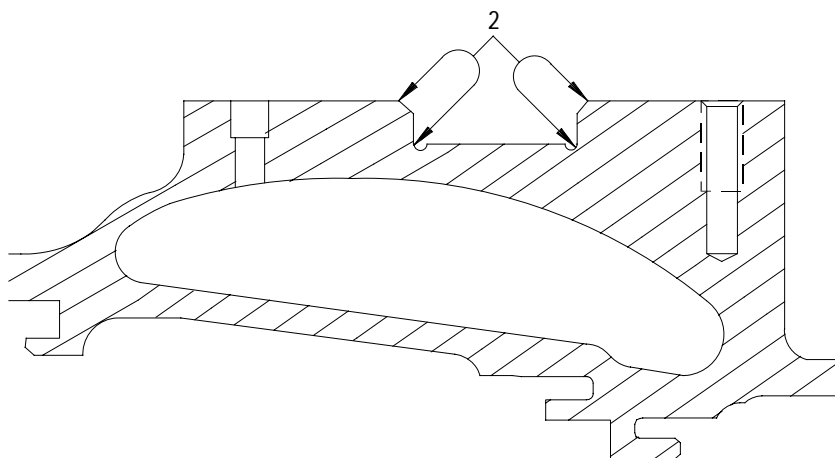



Figure 5. Split Compressor Case - Antigallant Compound Application (Sheet 2 of 4)

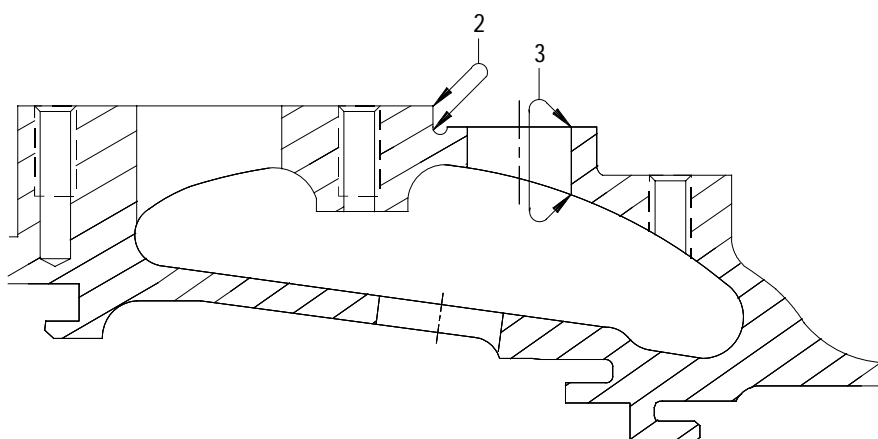



101046 (48X2)

Figure 5. Split Compressor Case - Antigallant Compound Application (Sheet 3 of 4)



SECTION J-J
2 PLACES AT LOCATION 
(SEE VIEW IN DIRECTION H)



SECTION K-K
AT LOCATION 
(SEE VIEW IN DIRECTION H)

101047 (48X2)

Figure 5. Split Compressor Case - Antigallant Compound Application (Sheet 4 of 4)

Legend for figure 5

1. Apply PWA 36545-3 antigallant compound in area shown, all around.
2. PWA 36545-3 antigallant compound coating optional and may be incomplete.
3. PWA 36545-3 antigallant compound coating optional and may be incomplete all around in slots, 21 places.
4. 0.030 inch, maximum
5. 0.080 inch, maximum
6. PWA 36545-3 antigallant compound coating optional and may be incomplete for 0.080 inch either side of case mating surface.

WORK PACKAGE**TECHNICAL PROCEDURES****STATOR SEGMENT, COMPRESSOR,
TENTH THROUGH TWELFTH STAGE ASSEMBLY****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 26

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	29	7	25	18 - 20	25
4 - 5	25	8 - 15	29	21 - 23	29
6	29	16 Blank	29	24 Blank	29
6A Added	29	17	29	25 Deleted	29
6B Blank Added	29			26 Blank Deleted	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Qualified Repair Source List (QRSLS) - - - - -	WP 600 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
TAPE, MASKING, VARIOUS	PMC 4000, 4001, 4134, 4138, 4139, OR 4188
WIRE, WELDING	AMS 5837

EXPENDABLE ITEMS

None

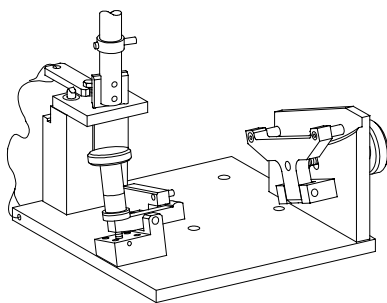
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	STATOR SEGMENT ASSEMBLY - EARED ANTIROTATION LUG REPLACEMENT (LUG PN 4083727, 4083726, AND 4083725)	
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 01 - - - - -	PWA 71516
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 02 - - - - -	PWA 71538
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71539
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 01 - - - - -	PWA 71540
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 02 - - - - -	PWA 71541
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71542
	FIXTURE, EDM, LUG 12TH STAGE COMPRESSOR SEGMENT DETAIL, 01/, 02 - - - - -	PWA 71543
	FIXTURE, EDM, LUG 12TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71544
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593

APPLICABLE SUPPORT EQUIPMENT (continued)

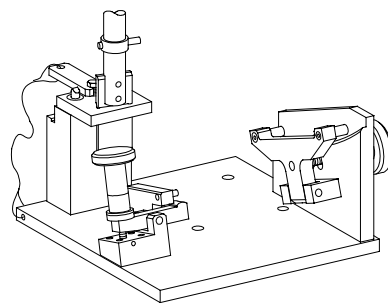
Paragraph	Function - Tool Nomenclature	Tool Number
3	STATOR SEGMENT ASSEMBLY - RECTANGULAR ANTIROTATION LUG REPLACEMENT	
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593
4	TENTH THROUGH TWELFTH STAGE STATOR SEGMENT ASSEMBLY - MISSING LUGS OR HALF-MOON ANTIROTATION LUG REPLACEMENT (ALL ASSEMBLIES EXCEPT PN 4077880 AND 4083880)	
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 01 - - - - -	PWA 71516
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 02 - - - - -	PWA 71538
	FIXTURE, EDM, LUG 10TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71539
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 01 - - - - -	PWA 71540
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 02 - - - - -	PWA 71541
	FIXTURE, EDM, LUG 11TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71542
	FIXTURE, EDM, LUG 12TH STAGE COMPRESSOR SEGMENT DETAIL, 01/, 02 - - - - -	PWA 71543
	FIXTURE, EDM, LUG 12TH STAGE COMPRESSOR SEGMENT DETAIL, 03/, 04 - - - - -	PWA 71544
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593

ILLUSTRATED SUPPORT EQUIPMENT



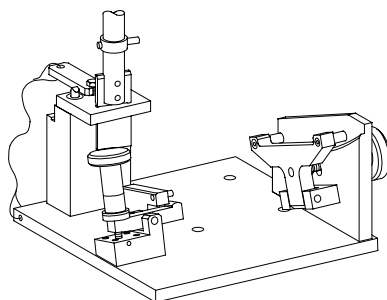
PWA 71516 -C

Figure T1. PWA 71516 FIXTURE



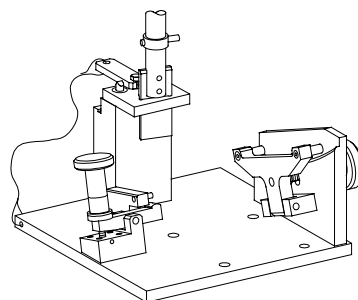
PWA 71538 -C

Figure T2. PWA 71538 FIXTURE



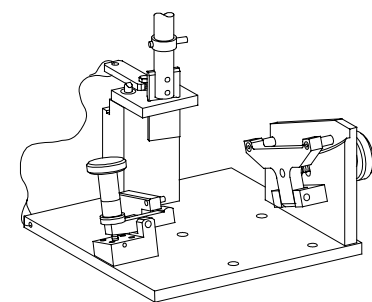
PWA 71539 -C

Figure T3. PWA 71539 FIXTURE



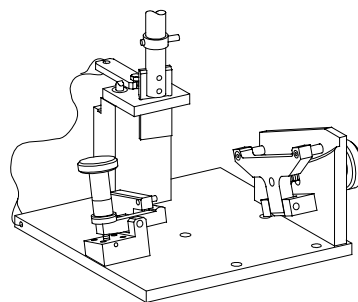
PWA 71540 -C

Figure T4. PWA 71540 FIXTURE



PWA 71541 -C

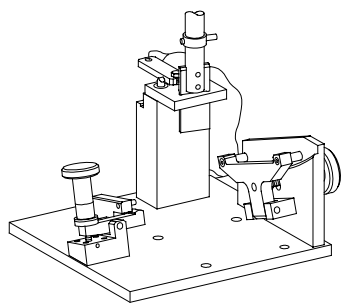
Figure T5. PWA 71541 FIXTURE



PWA 71542 -C

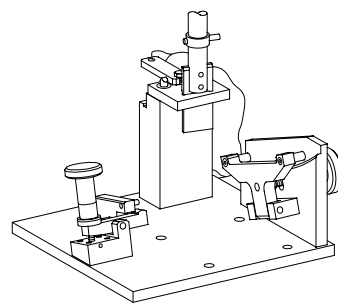
Figure T6. PWA 71542 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



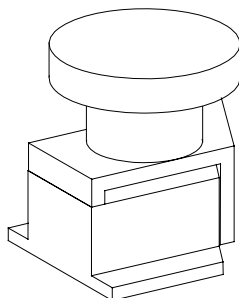
PWA 71543 -C

Figure T7. PWA 71543 FIXTURE



PWA 71544 -C

Figure T8. PWA 71544 FIXTURE



PWA 71593 -C

Figure T9. PWA 71593 SET

1. INTRODUCTION.

- a. This work package contains instructions for repair of 10th, 11th, and 12th stage compressor stator assemblies.

2. STATOR SEGMENT ASSEMBLY - EARED ANTIROTATION LUG REPLACEMENT (LUG PN 4083727, 4083726, AND 4083725).

(See Figure 1.)

NOTE

- Eared antirotation lugs, PN 4083727, 4083726, and 4083725, are installed on typical stator segment PNs 4083880-01, -02, -03, and -04.
- One, two, or three lugs may be replaced as required per segment.
 - a. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.
 - b. Deleted.
 - c. Remove existing lug/weld by either of the following methods.
 - (1) Hand grind and machine as follows:
 - (a) Cut existing lug/segment with hand grinder. Use care not to grind on stator segment. Discard lug. See figure 1.
 - (b) Remove remaining lug/weld by machining. See figure 1.

- (2) Electrodischarge Machine (EDM) as follows:

- (a) Mask segment per SPOP 36. Tape segment using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax. See figure 1, View A. Refer to T.O. 2-1-111.
- (b) Remove existing lug/weld by EDM. Refer to T.O. 2-1-111. See figure 1, Views B, C, and D. Use the following tools to remove lugs:

Segment	Tool
10th Stage, -01	PWA 71516 fixture
10th Stage, -02	PWA 71538 fixture
10th Stage, -03 & -04	PWA 71539 fixture
11th Stage, -01	PWA 71540 fixture
11th Stage, -02	PWA 71541 fixture
11th Stage, -03 & -04	PWA 71542 fixture
12th Stage, -01 & -02	PWA 71543 fixture
12th Stage, -03 & -04	PWA 71544 fixture

- d. Remove masking if required.
- e. Polish by hand to remove EDM recast layer from weld area, if required.
- f. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.
- g. Locally fluorescent penetrant inspect stator segment in lug area per SPOP 70. No cracks permitted. Refer to T.O. 2-1-111.

- h. Secure replacement lug as follows:

Segment	Replacement Eared Lug	Stage
4083880-01, -02, -03, & -04	4083727	10th
	4083726	11th
	4083725	12th

- i. Locally clean weld area, stator segment, and replacement lug, per SPOP 208, Method A. Refer to T.O. 2-1-111.
- j. Weld eared lug to stator segment using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per PWA 16-333. Refer to T.O. 2-1-111. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. Use AMS 5837 welding wire. See figure 2, Views D and E. Use PWA 71593 retainer set as required to hold lug in place during welding.
- k. Locally fluorescent penetrant inspect weld per SPOP 70 to SFPS 38. Refer to T.O. 2-1-111.

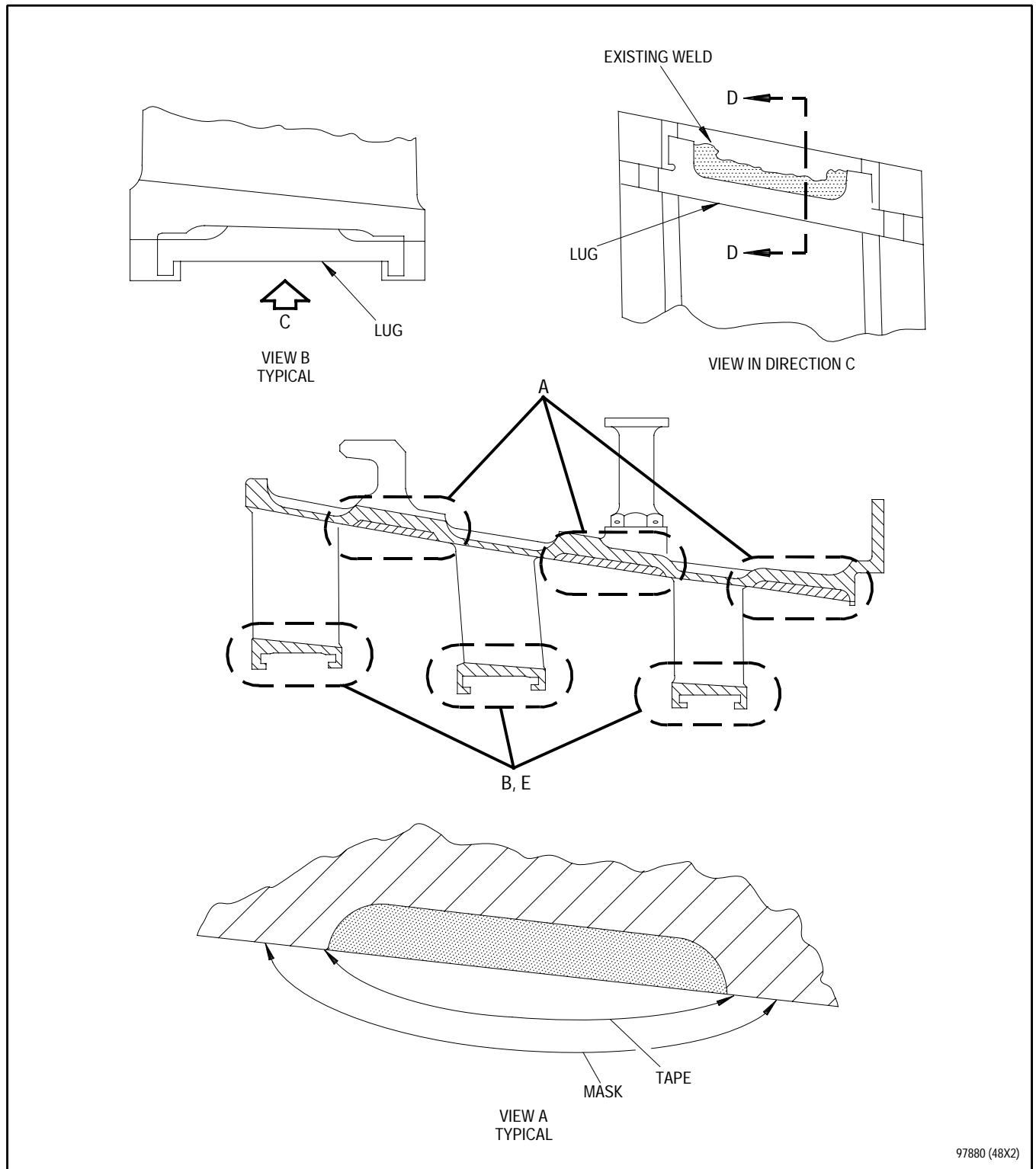


Figure 1. Tenth Through Twelfth Stage Stator Segments - Lug Replacement (Sheet 1 of 2)

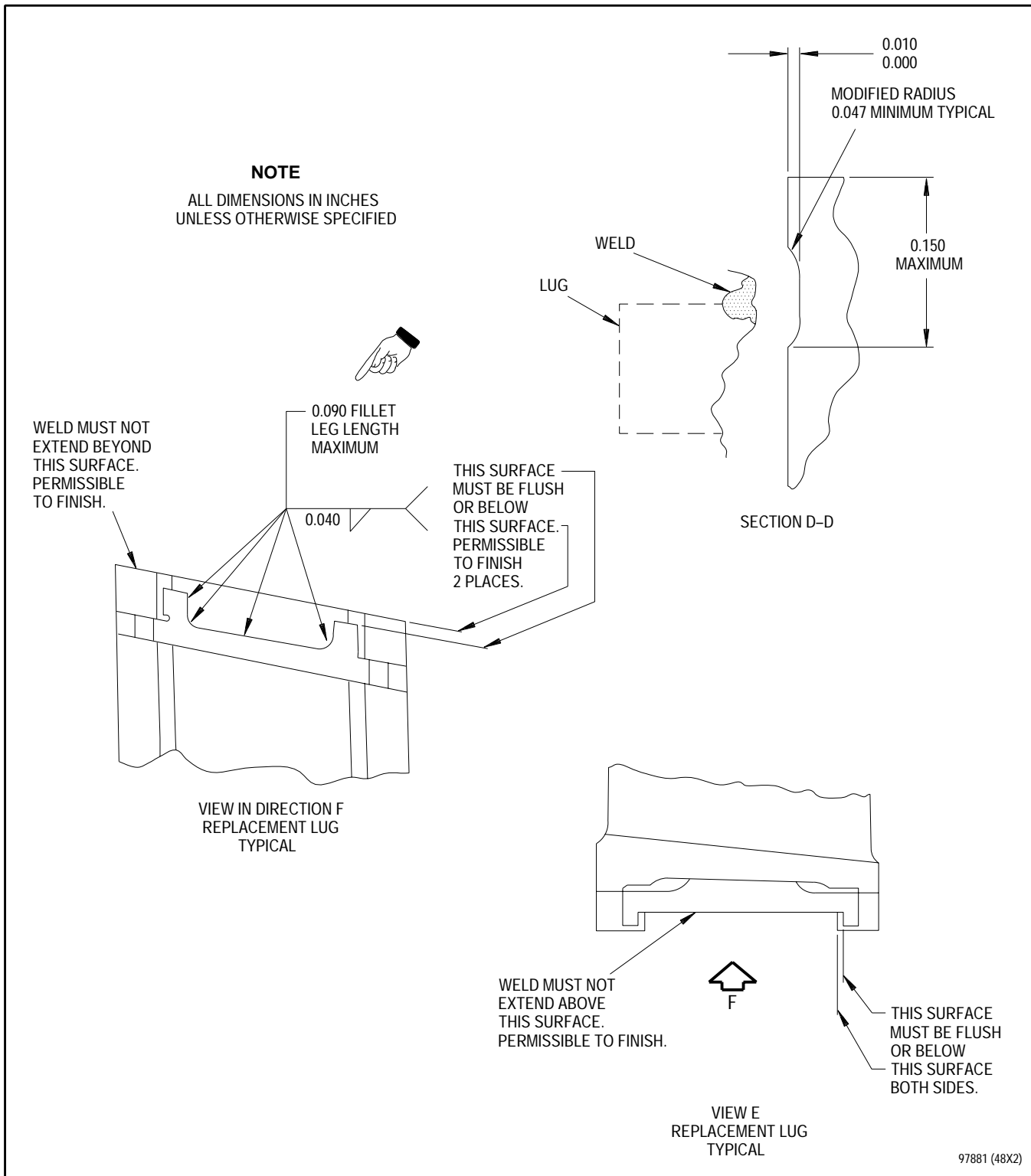


Figure 1. Tenth Through Twelfth Stage Stator Segments - Lug Replacement (Sheet 2 of 2)

3. STATOR SEGMENT ASSEMBLY - RECTANGULAR ANTIROTATION LUG REPLACEMENT.

(See Figure 2.)

NOTE

Rectangular antirotation lugs, are installed on typical stator segment PNs 4077880-01, -02, -03, and -04.

- a. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.

NOTE

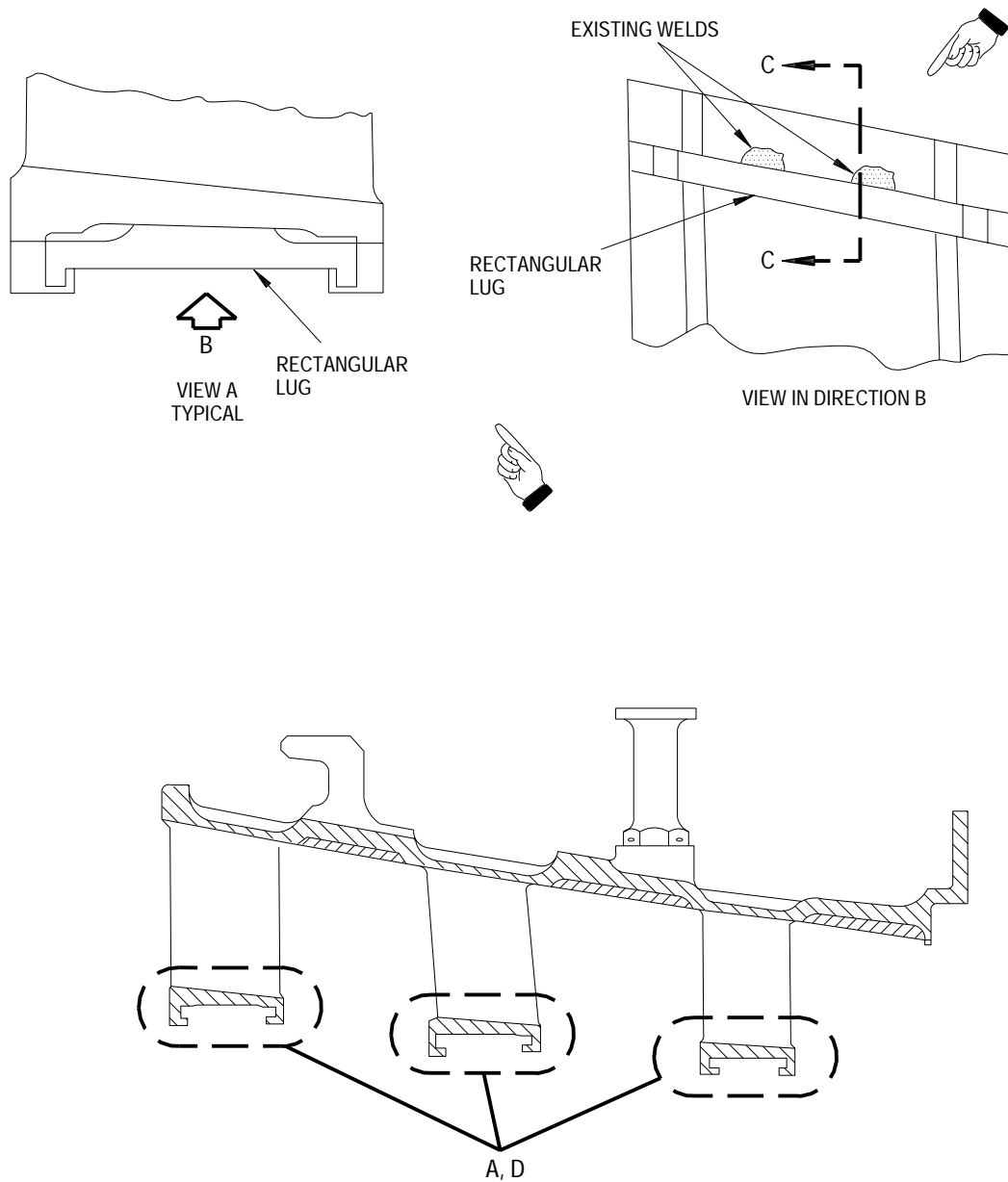
All three lugs must be replaced during this repair.

- b. Cut existing lug/segment welds with hand grinder. Use care not to grind on stator segment. All three lugs must be replaced during this repair. See figure 2, View B and Section C-C. Discard three lugs.
- c. Remove remaining lug/weld by machining. See figure 2, View B and Section C-C.
- d. Clean segments per SPOP 208, Method B. Refer to T.O. 2-1-111.
- e. Locally fluorescent penetrant inspect stator segments in lug area per SPOP 70. No cracks permitted. Refer to T.O. 2-1-111.
- f. Secure replacement lugs as follows:

Segment	Replacement Eared Lug	Stage
4077880-01, -02, -03, & -04	4083727	10th
	4083726	11th
	4083725	12th

- g. Locally clean weld areas, stator segments, and replacement lugs, per SPOP 208, Method A. Refer to T.O. 2-1-111.
- h. Weld eared lug to stator segment using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per PWA 16-333. Refer to T.O. 2-1-111. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. Use AMS 5837 welding wire. See figure 2, Views D and E. Use PWA 71593 retainer set as required to hold lugs in place during welding.
- i. Locally fluorescent penetrant inspect welds per SPOP 70 to SFPS 38. Refer to T.O. 2-1-111.
- j. Reidentify stator segments per following table. Mark each reidentified stator segment with new PN using vibration peen or electrochemical etch per SPOP 401. Refer to T.O. 2-1-111.

Existing Segment	Reidentified Segment
4077880-01	4083880-01
4077880-02	4083880-02
4077880-03	4083880-03
4077880-04	4083880-04



97882 (48X2)

Figure 2. Tenth Through Twelfth Stage Stator Segments - Lug Replacement (Sheet 1 of 2)

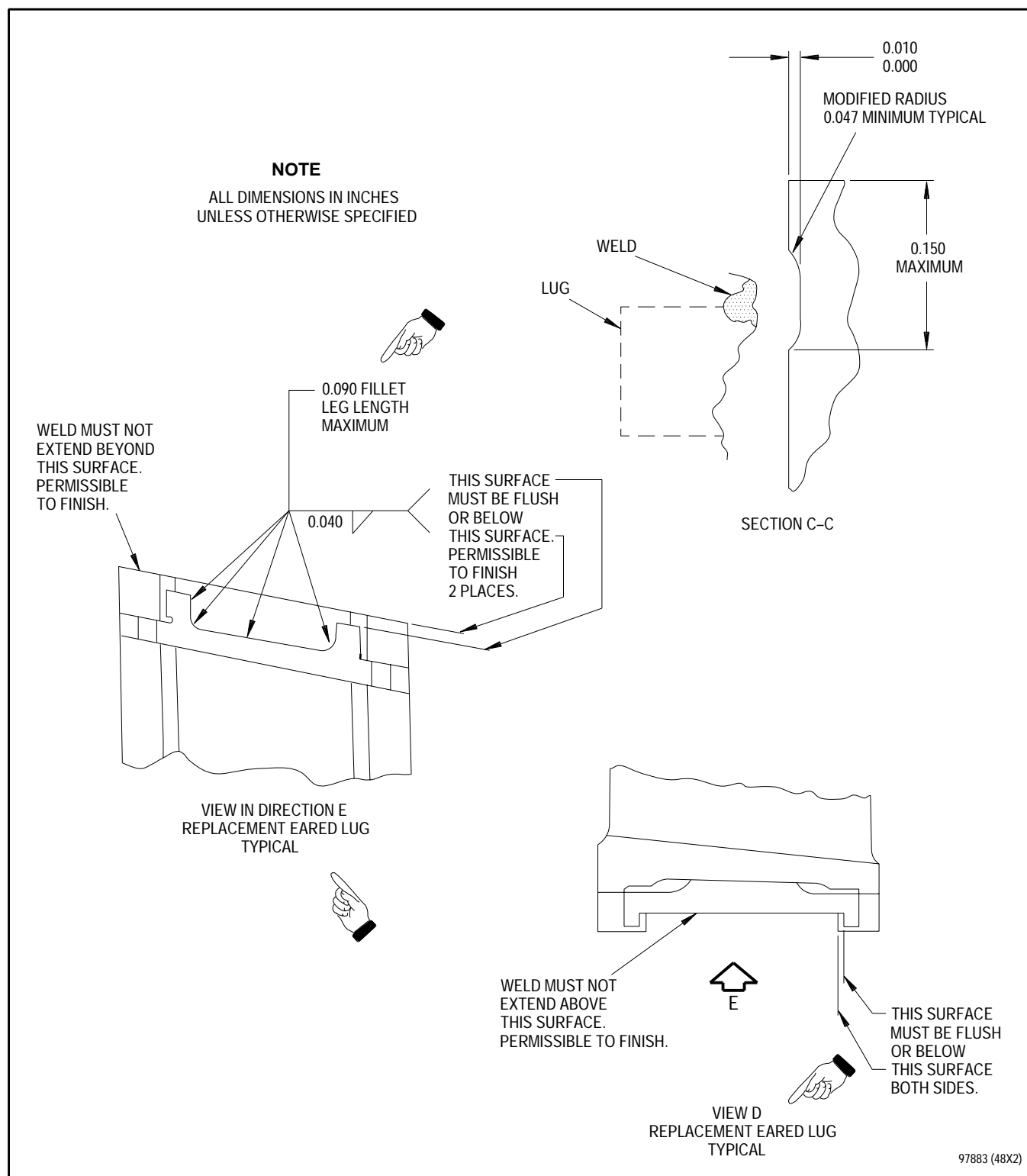


Figure 2. Tenth Through Twelfth Stage Stator Segments - Lug Replacement (Sheet 2 of 2)

**4. TENTH THROUGH TWELFTH STAGE STATOR
SEGMENT ASSEMBLY - MISSING LUGS OR
HALF-MOON ANTIROTATION LUG
REPLACEMENT (ALL ASSEMBLIES EXCEPT
PN 4077880 AND 4083880).**

(See figure 1 and Figures 3 and 4.)

NOTE

For repair of assemblies
PN 4077880 and 4083880, see
paragraph 2 or 3.

a. Deleted.

b. Replace antirotation lugs as
follows:

(1) Inspect stator segment
assembly to determine
incoming configuration. See
figure 3.

(a) If an eared antirotation
lug (View A) is
installed, replace with
another eared lug per
this paragraph.

(b) If installed antirotation
lug resembles rectangular
configuration (View B),
it is not necessary to
machine slot per step
b.(5). Install eared lug
per this paragraph.

(c) If installed antirotation
lug resembles half-moon
configuration (View C),
reoperate stator segment
per step b.(5) and
install eared lug per
this paragraph.

(d) If no lug is installed,
check for presence of
slot and inspect for
evidence of remnant of
weld material indicating
a lug had been installed
but is missing.

1 If no slot exists, do
not reoperate stator
segment per this
paragraph or install
any antirotation lug.

2 If slot is
rectangular with
remnant weld material
(View D), install
eared antirotation
lug per this
paragraph.

3 If slot is half-moon
configuration with
remnant weld material
(View E), reoperate
stator segment per
step b.(5) and
install eared lug per
this paragraph.

(2) Clean stator segment per
SPOP 208, Method B, or
SPOP 209. Refer to
T.O. 2-1-111.

- (3) Remove existing antirotation lug, if required, by cutting welds. See figure 4, Section B-B. Electrodischarge Metal Removal (EDM) may be used to remove eared lugs provided the following is accomplished: mask stator segment per SPOP 36 and figure 1, View A, and refer to T.O. 2-1-111; tape using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax; and polish weld area by hand to remove recast layer. Remove masking after EDM. See note 2. Discard removed lug. The following tools may be used to aid eared lug removal:

Stage	Tool	Dash No.
10th	PWA 71516	-01 parts
	PWA 71538	-02 parts
	PWA 71539	-03 and -04 parts
11th	PWA 71540	-01 parts
	PWA 71541	-02 parts
	PWA 71542	-03 and -04 parts
12th	PWA 71543	-01 and -02 parts
	PWA 71544	-03 and -04 parts

- (4) Remove remaining weld material from Areas AK. See figure 4, Views P (10th stage), R (11th stage), or S (12th stage) as appropriate. See note 2.

- (5) For half-moon slot configuration only, machine new antirotation slot per figure 4, Views AN, Z, and the following table. See notes 3 and 8.

Stage	Reference	Optional Tool
10th	Views P, T, W, and Section AD-AD	PWA 71516
11th	Views R, U, X, and Section AL-AL	PWA 71540
12th	Views S, V, Y, and Section AM-AM	PWA 71543

- (6) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (7) Fluorescent penetrant inspect machined areas of cast surface per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. No cracks allowed. Refer to T.O. 2-1-111.
- (8) Clean stator segment per SPOP 208, Method A, or SPOP 209, as required. Refer to T.O. 2-1-111.

- (9) Weld new eared antirotation lug, PN 4083727 (10th stage), PN 4083726 (11th stage), or PN 4083725 (12th stage), using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per figure 4 and following table. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. See note 4. Use PWA 71593 retainer set as required to hold lug in place during welding.

Stage	Reference
10th	View AC and Sections AA-AA and AB-AB
11th	View AE and Sections AK-AK and AH-AH
12th	View AF and Sections AG-AG and AJ-AJ

- (10) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (11) Fluorescent penetrant inspect weld per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.

c. Deleted.

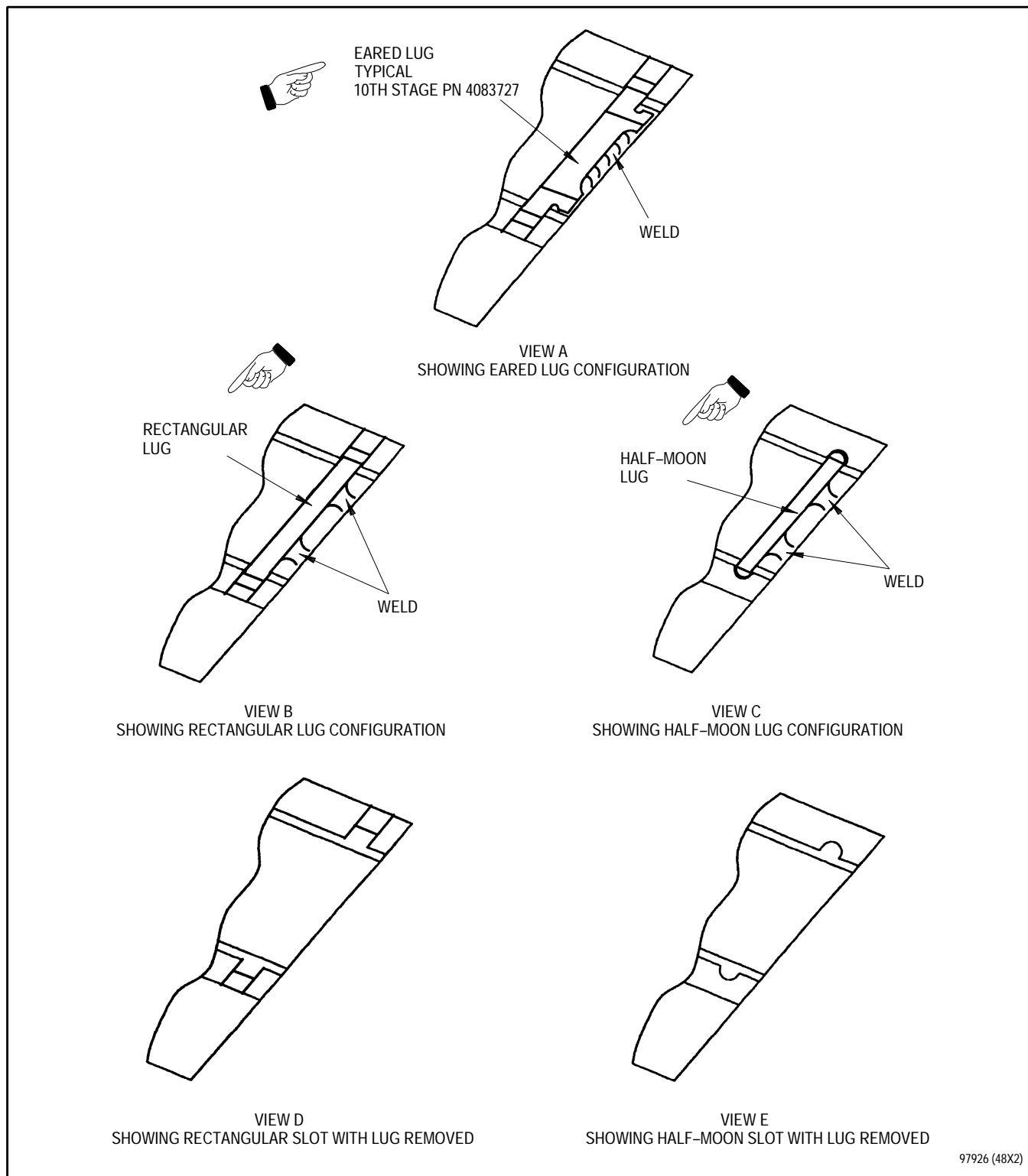


Figure 3. Tenth Through Twelfth Stage Stator Segment - Antirotation Lug Configurations

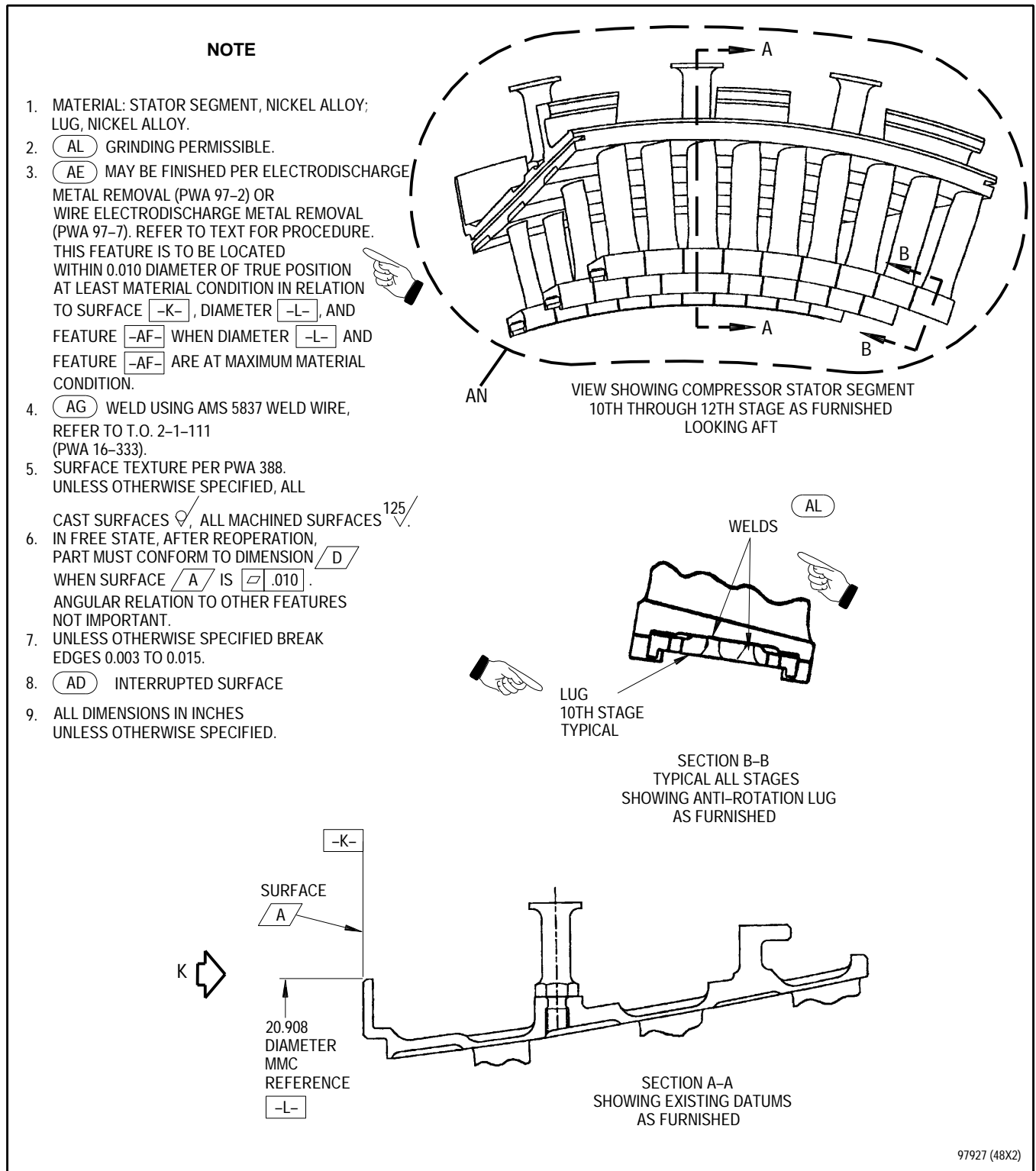


Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 1 of 7)

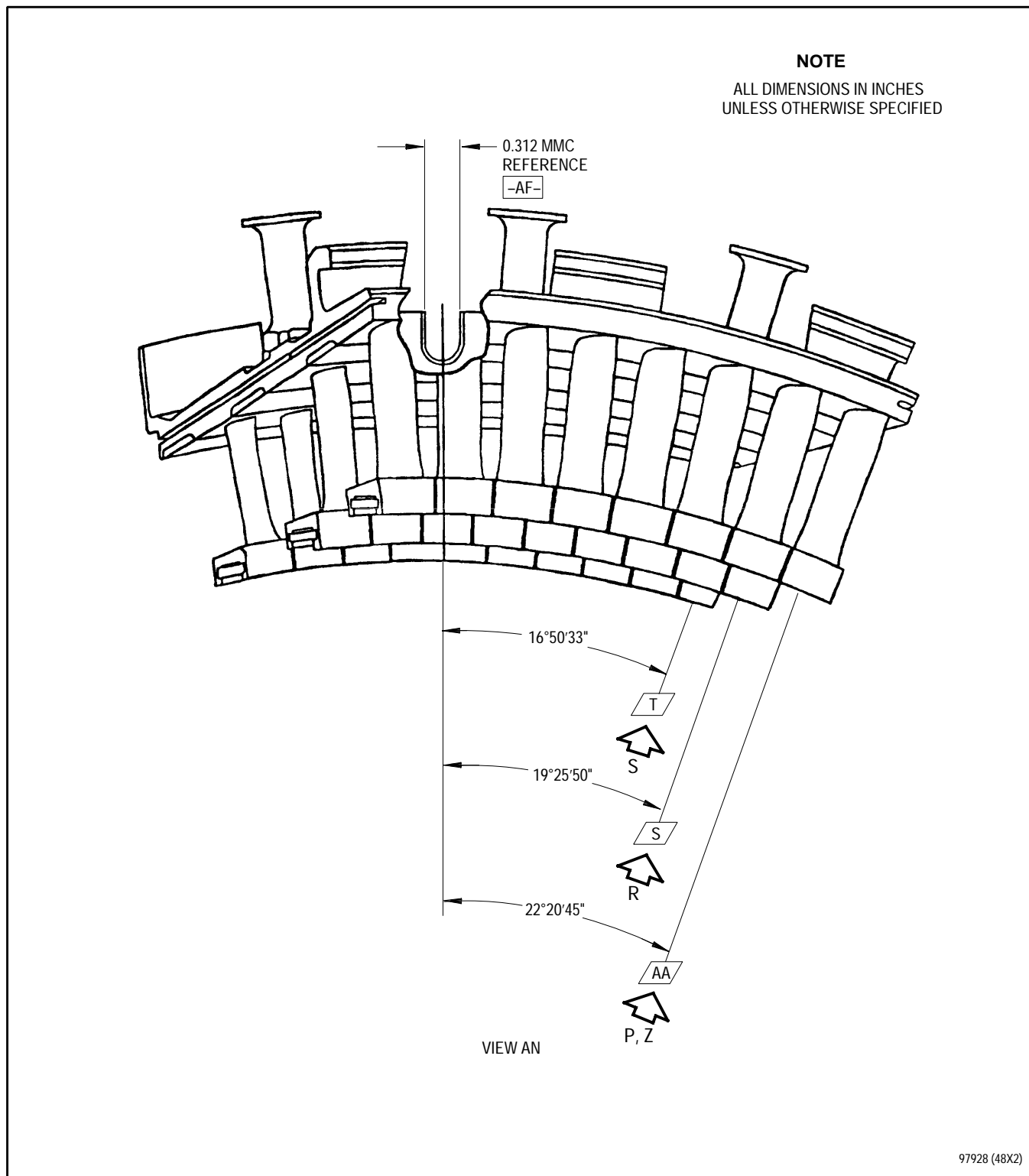


Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug
(Sheet 2 of 7)

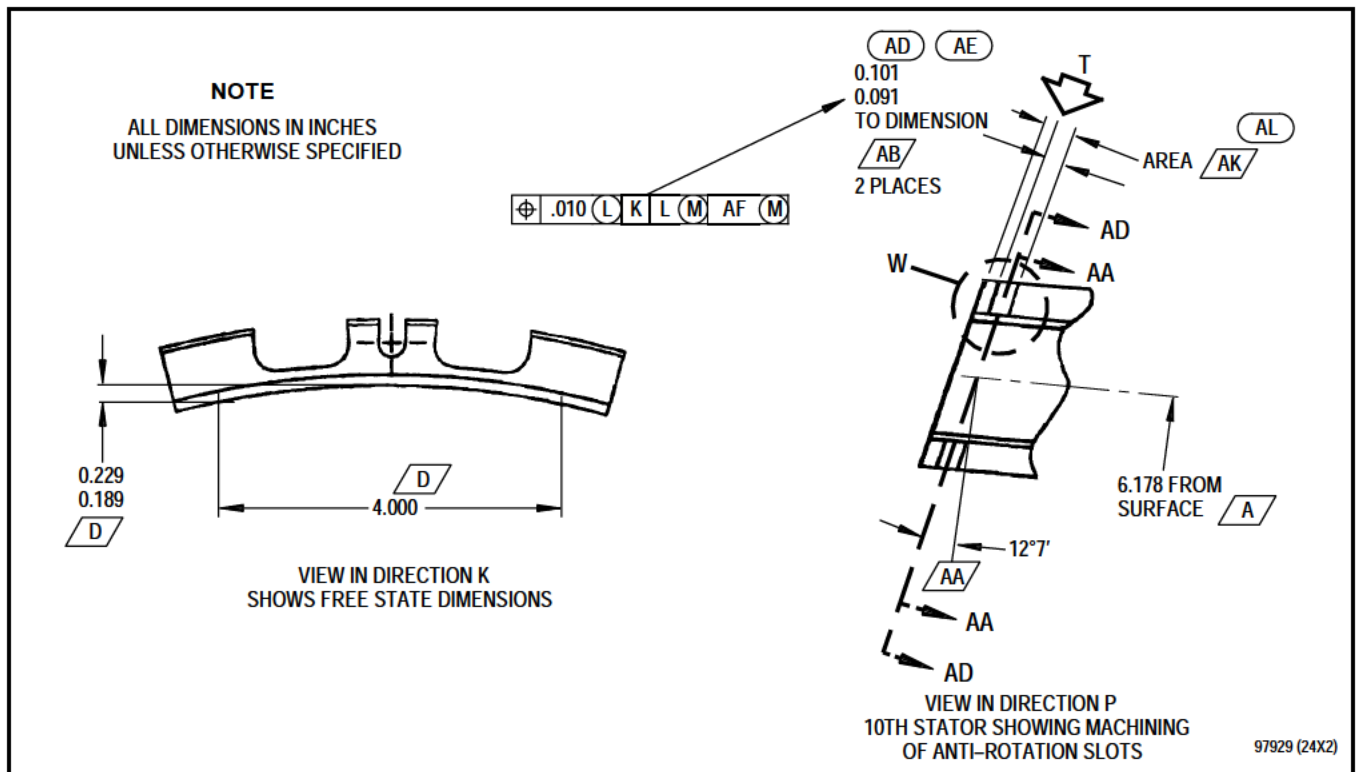


Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug
(Sheet 3 of 7)

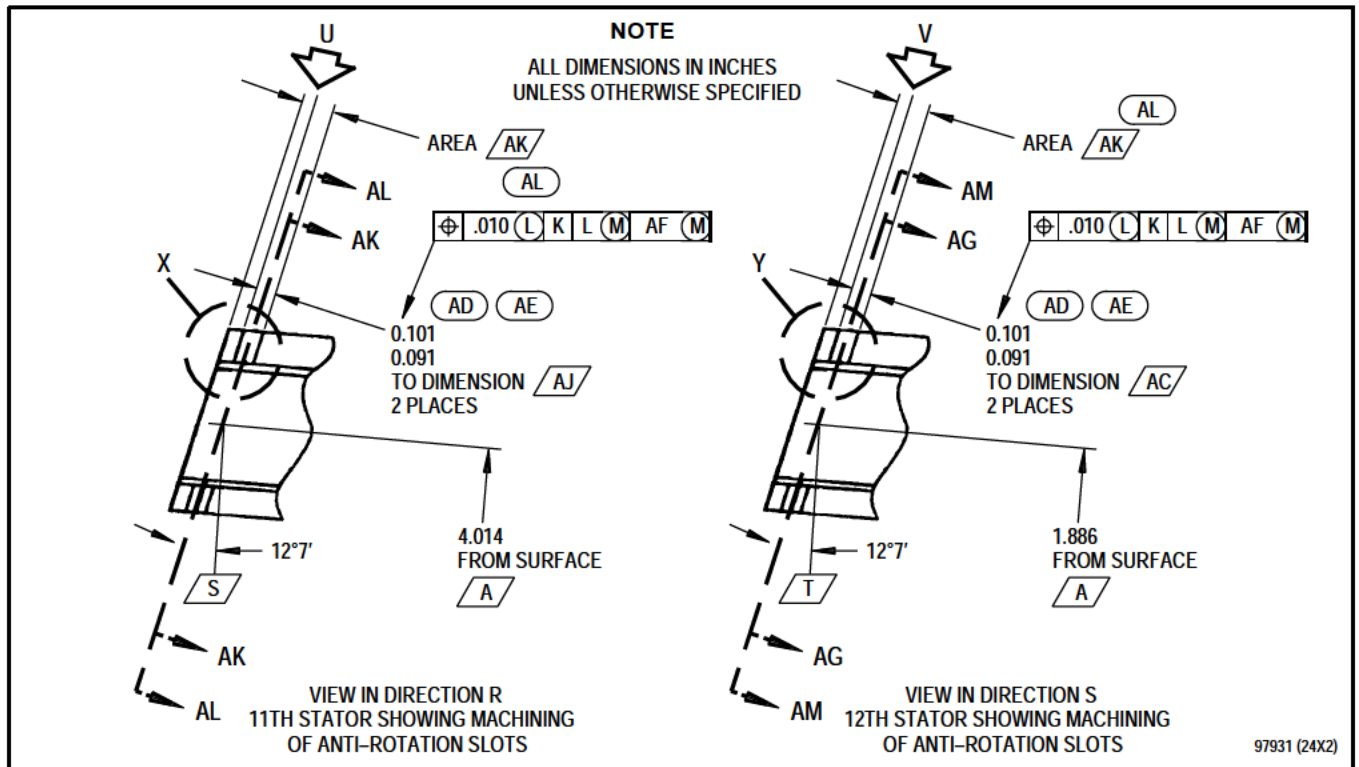
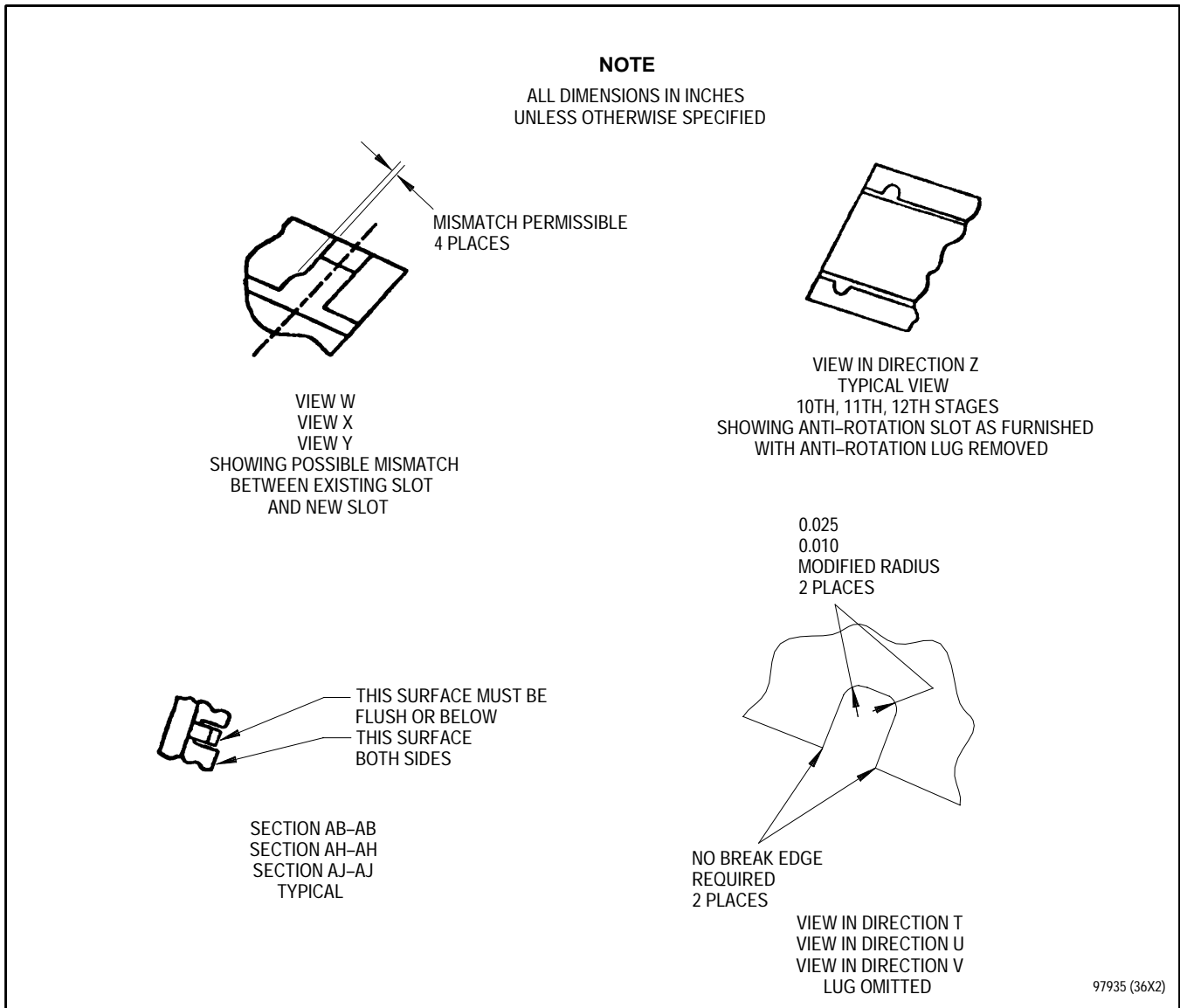
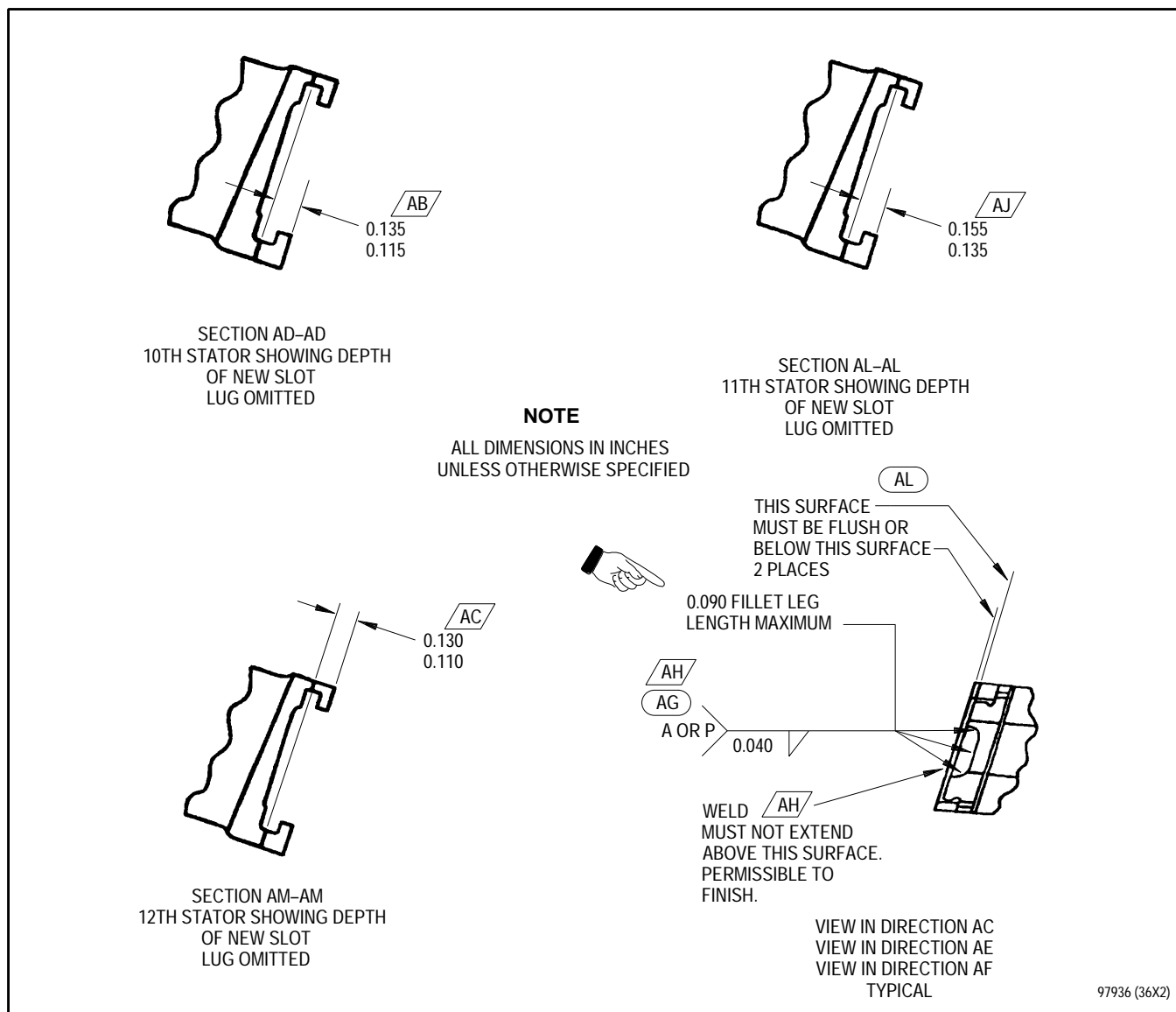


Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug
(Sheet 4 of 7)



**Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug
(Sheet 5 of 7)**



**Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug
(Sheet 6 of 7)**

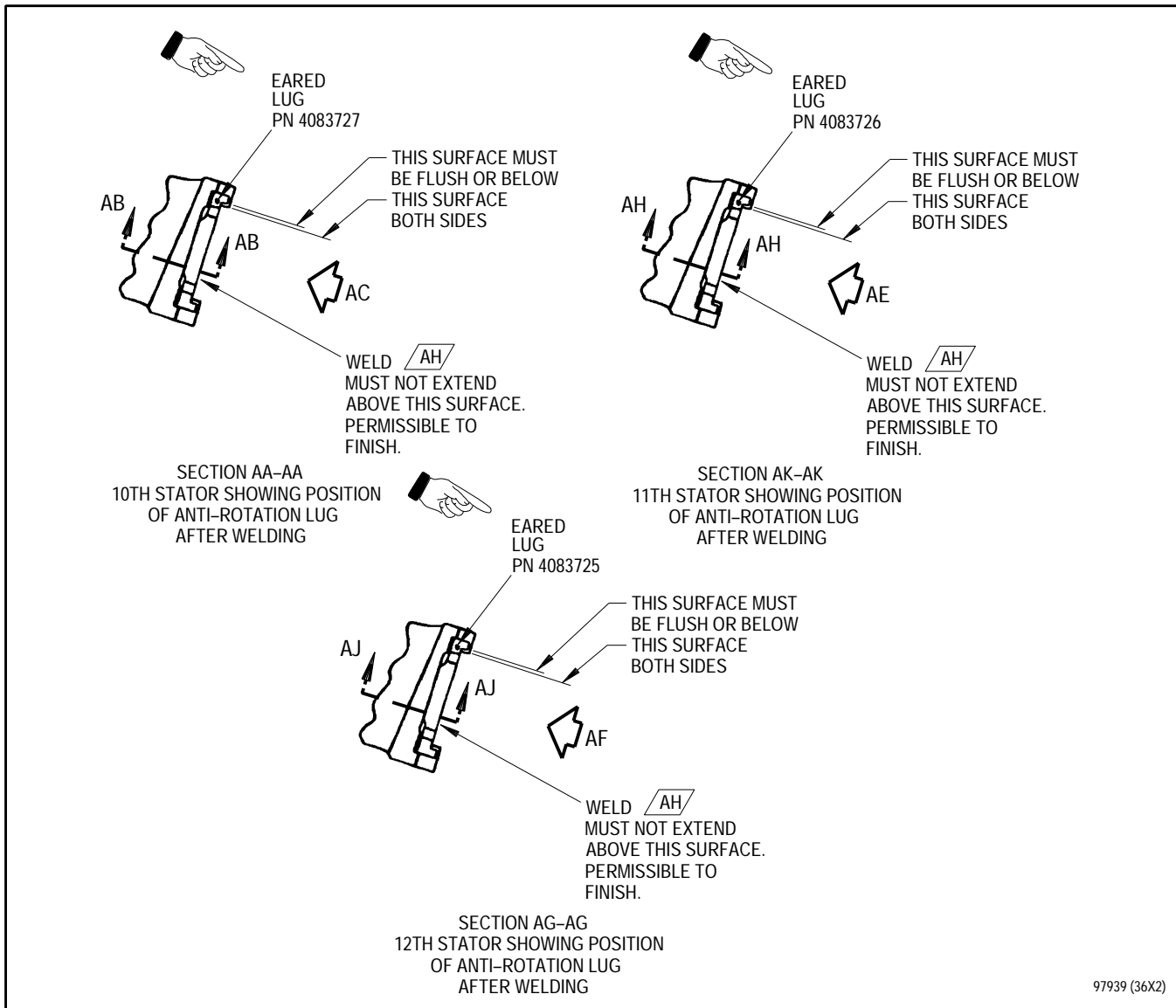


Figure 4. Tenth Through Twelfth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 7 of 7)

Figure 5. Deleted.

**5. TENTH THROUGH TWELFTH STAGE
COMPRESSOR STATOR SEGMENTS - REMOVAL
AND APPLICATION OF PWA 279 ABRADABLE.**

Failure to use an approved source for this repair may result in a nonserviceable part.

NOTE

This repair is a source demonstration repair. It is recommended reparable parts be sent to an approved source for repair. An approved source list and information on becoming a qualified source can be obtained by contacting the cognizant USAF F100 Engineering Source Authority at the address listed in T.O. 2J-F100-53-1, WP 600 00.

**6. TENTH THROUGH TWELFTH STAGE
COMPRESSOR STATOR SEGMENTS - REMOVAL
AND APPLICATION OF PWA 284 ABRADABLE.**

Failure to use an approved source for this repair may result in a nonserviceable part.

NOTE

This repair is a source demonstration repair. It is recommended reparable parts be sent to an approved source for repair. An approved source list and information on becoming a qualified source can be obtained by contacting the cognizant USAF F100 Engineering Source Authority at the address listed in T.O. 2J-F100-53-1, WP 600 00.

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WORK PACKAGE

TECHNICAL PROCEDURES

**SHROUD, COMPRESSOR STATOR,
SEVENTH THROUGH NINTH STAGE, ASSEMBLY OF -**

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 11	29	12 Blank	29		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Shroud, Compressor Stator, Seventh Through Twelfth Stage	
- Inspection - - - - -	WP 354 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BELT, GRINDING	40 TO 50 GRIT
BRAZING FILLER METAL	AMS 4777 ALLOY POWDER
BRUSH, WIRE	AUSTENITIC STAINLESS STEEL
GLOVES, COTTON, LINT-FREE	-
GRIT, SILICON CARBIDE	60 TO 90 MESH
LACQUER, ACRYLIC AEROSOL	TT-L-50
PAPER, KRAFT, 40 POUND	PMC 4127 OR EQUIVALENT, LIGHT DUTY KRAFT
STONE, ABRASIVE	-

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 7th through 9th stage compressor stator shroud assemblies.

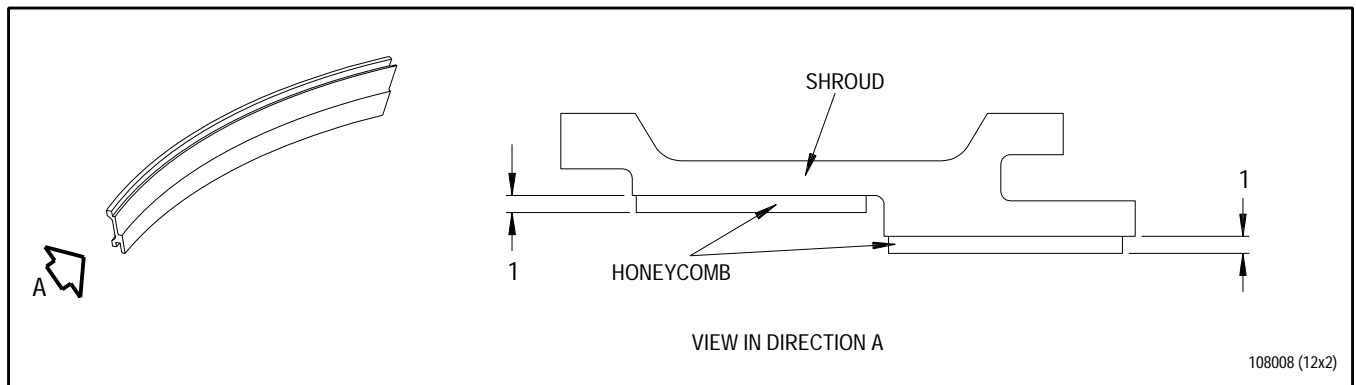


Failure to grind to proper dimensions may cause part to be scrapped.

**2. SEVENTH THROUGH NINTH STAGE
COMPRESSOR STATOR SHROUD ASSEMBLIES
- REPLACEMENT OF HONEYCOMB.**

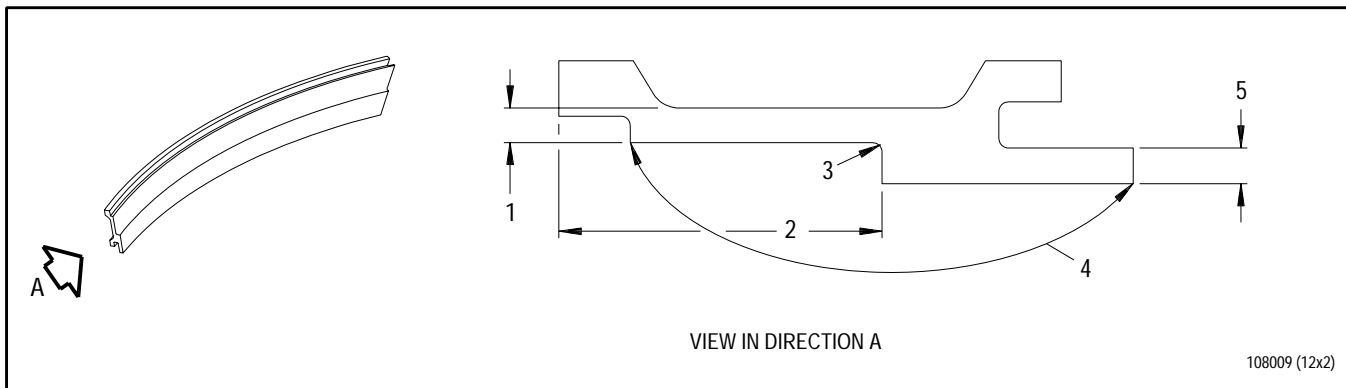
(See Figures 1 through 6 and Tables 1 and 2.)

- a. Visually inspect shroud for gross or nonreparable damage per WP 354 00. If no gross or nonreparable damage is present, continue repair procedure.
- b. Remove honeycomb from shroud as follows:
- (1) Rough grind honeycomb to within 0.010 to 0.025 inch above shroud surface, using high speed belt sander, or equivalent, with 40 to 50 grit belt. Use care not to remove parent metal. See figure 1.
 - (2) Finish grind honeycomb and braze to shroud surface, using high speed belt sander, or equivalent, with 40 to 50 grit belt. Do not remove parent material beyond dimensions(1 and 5, figure 2).
 - (a) Bench grind any residual honeycomb at radius(3), using cutoff wheel.
 - (b) Machine to dimension(2) if parent material was removed in radius(3) during finish grinding. Maintain full radius.
- c. Abrasive grit blast shroud faces(4) where honeycomb attaches to obtain uniform, clean surface.
- (1) Use 60 to 90 silicon carbide grit.



1. 0.010 to 0.025 inch

Figure 1. Seventh through Ninth Stage Compressor Stator Shroud Assemblies - Rough Grind



7th Stage	8th Stage	9th Stage
1. 0.051 inch minimum	0.051 inch minimum	0.051 inch minimum
2. 0.576 inch maximum	0.500 inch maximum	0.505 inch maximum
3. 0.005 to 0.020 inch radius	0.005 to 0.020 inch radius	0.005 to 0.020 inch radius
4. Grit blast area	Grit blast area	Grit blast area
5. 0.044 inch minimum	0.026 inch minimum	0.025 inch minimum

Figure 2. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - Finish Grind and Grit Blast



Failure to regulate maximum air pressure may cause part to be scrapped.

- (2) Use 30 to 60 psig air pressure.
- (3) Position nozzle 6 to 8 inches from part.
- (4) Direct blast to sweep across surface, not perpendicular to it. Do not dwell in one spot.
- d. Remove any residual grit from shroud using shop air. If required, remove grit in end slots using shim stock.
- e. Visually inspect shroud to ensure no abrasives are trapped in cavities.
- f. Visually inspect shroud for cracks. No cracks allowed.
- g. Dimensionally inspect shroud per figure 3.
- h. If dimensions are acceptable, proceed to step k.
- i. If dimensions are unacceptable, cold form shroud to obtain acceptable dimensions.
- j. Visually inspect shroud for cracks. No cracks allowed.
- k. Blend nicks and scratches per paragraph 3.
- l. Verify shroud thickness(1 and 5, figure 2) are within acceptable dimensions.
- m. Clean shroud per SPOP 209, Method A. Refer to T.O. 2-1-111.
- n. Fluorescent penetrant inspect shroud per SPOP 82. Refer to T.O. 2-1-111. No cracks allowed.
- o. Clean shroud per SPOP 209, Method A. Refer to T.O. 2-1-111.
- p. Wrap shroud in clean PMC 4127 brown paper, or equivalent, after each operation when shroud is to be transported, stored, or will not be immediately set up for the next operation.

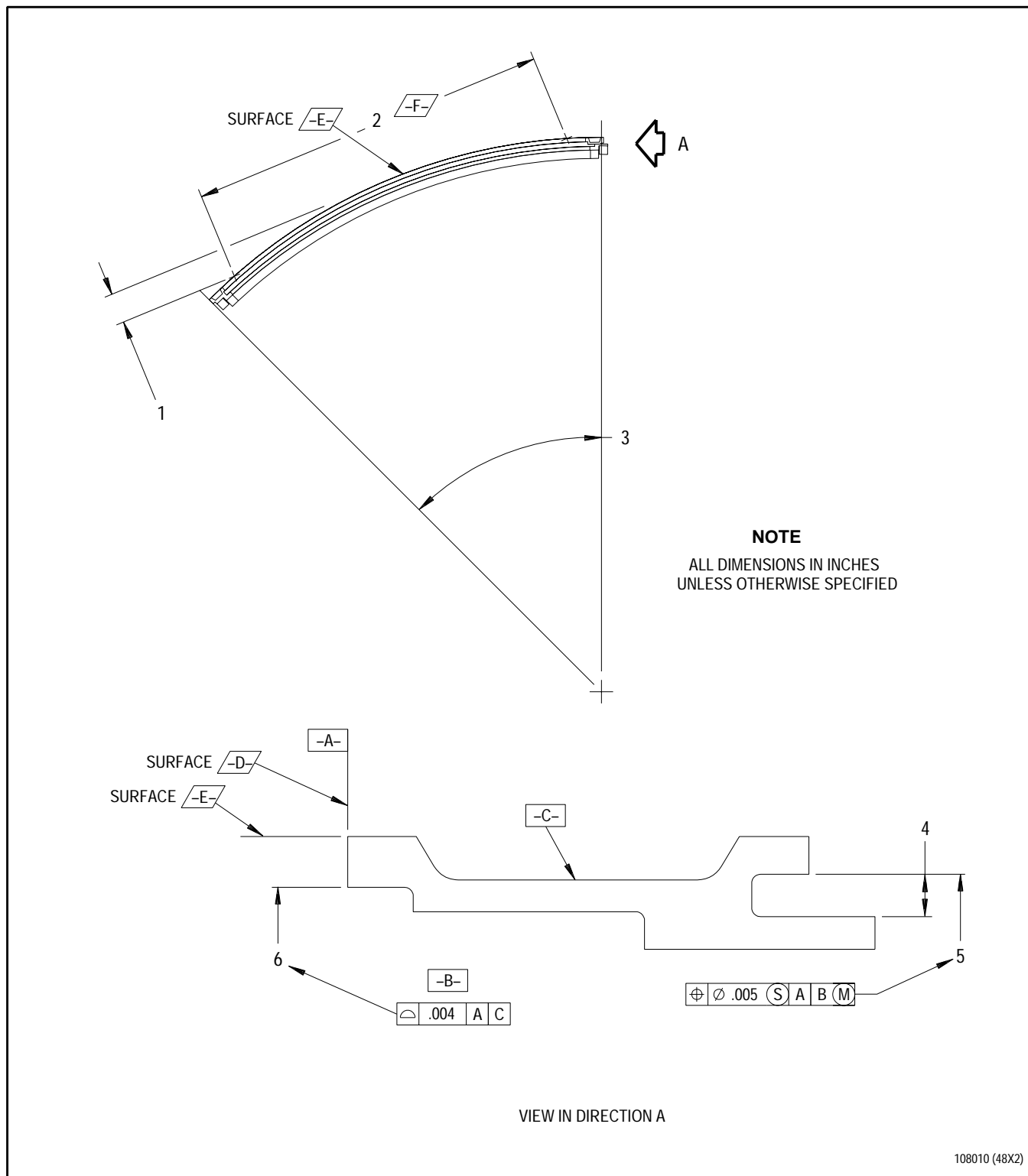



Figure 3. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - Contour (Form) Dimensions

Legend for figure 3

7th Stage	8th Stage	9th Stage
1. PN 4079207-01: 0.466 to 0.510 inch PN 4077287-01: 0.830 to 0.930 inch	PN 4079208-01: 0.311 to 0.377 inch PN 4077288-01: 0.835 to 0.935 inch PN 4079214-01: 0.311 to 0.377 inch	PN 4079209-01: 0.335 to 0.371 inch
2. PN 4079207-01: 5.990 inches PN 4077287-01: 7.960 inches	PN 4079208-01: 5.000 inches PN 4077288-01: 7.900 inches PN 4079214-01: 5.000 inches	PN 4079209-01: 5.000 inches
3. PN 4079207-01: 45° PN 4077287-01: 60°	PN 4079208-01: 39°8' PN 4077288-01: 60° PN 4079214-01: 35°13'	PN 4079209-01: 36°
4. 0.075 to 0.085 inch	0.075 to 0.085 inch	0.075 to 0.085 inch
5. 9.364 to 9.368 inches radius	9.175 to 9.179 inches radius	8.940 to 8.944 inches radius
6. 9.334 to 9.348 inches radius	9.148 to 9.152 inches radius	8.892 to 8.896 inches radius
q. Wire brush weld zones to clean shroud prior to tack welding honeycomb, using clean austenitic stainless steel wire brush.		(2) Use copper braid or shim on honeycomb surface to prevent burning or arcing. (3) Maximum braze gap shall be 0.005 inch.
		
Failure to ensure cleanliness during tack welding, braze alloy application, and brazing operations may cause unsatisfactory parts assembly.		Failure to handle tack welded shroud with care may cause tack welds to break and result in unsatisfactory parts assembly.
r. Position and tack weld honeycomb(4, figure 4) to shroud. Refer to T.O. 2-1-111. (1) Ensure cleanliness. Use clean lint-free cotton gloves.		s. Verify honeycomb is held firmly in place by tack welds. Gap of honeycomb cell to shroud shall be no greater than 0.005 inch. Handle tack welded shroud assembly with care.

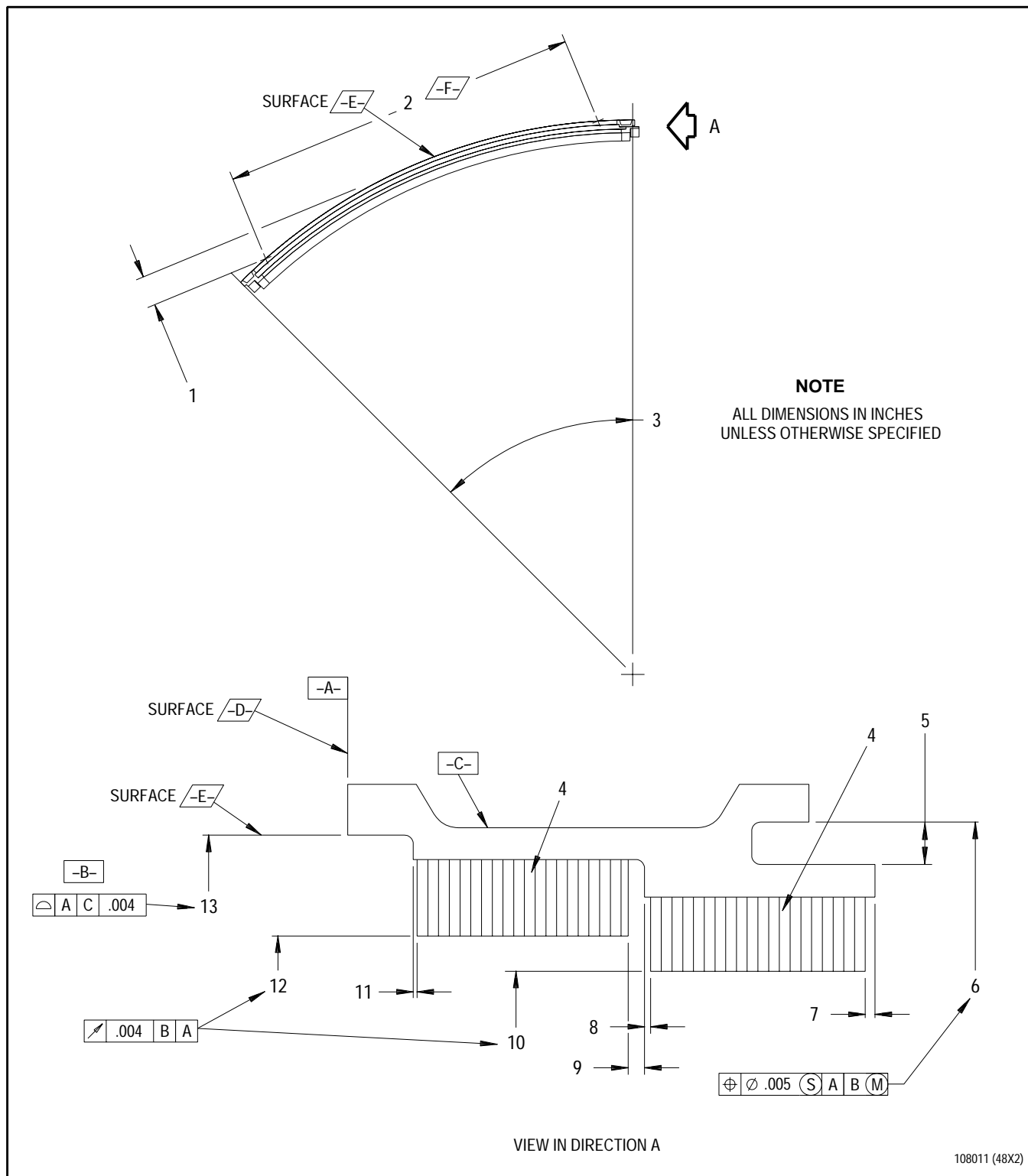


Figure 4. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - Finish Dimensions

Legend for figure 4

NOTE

Part shall conform to Dimension -F- when Surface -D- is flat within 0.010 inch.

7th Stage	8th Stage	9th Stage
1. PN 4079207-01: 0.466 to 0.510 inch PN 4077287-01: 0.830 to 0.930 inch	PN 4079208-01: 0.311 to 0.377 inch PN 4077288-01: 0.835 to 0.935 inch PN 4079214-01: 0.311 to 0.377 inch	PN 4079209-01: 0.335 to 0.371 inch
2. PN 4079207-01: 5.990 inches PN 4077287-01: 7.960 inches	PN 4079208-01: 5.000 inches PN 4077288-01: 7.900 inches PN 4079214-01: 5.000 inches	PN 4079209-01: 5.000 inches
3. PN 4079207-01: 45° PN 4077287-01: 60°	PN 4079208-01: 39°8' PN 4077288-01: 60° PN 4079214-01: 35°13'	PN 4079209-01: 36°
4. Honeycomb	Honeycomb	Honeycomb
5. 0.075 to 0.085 inch	0.075 to 0.085 inch	0.075 to 0.085 inch
6. 9.364 to 9.368 inches radius	9.175 to 9.179 inches radius	8.940 to 8.944 inches radius
7. 0.000 to 0.040 inch	0.000 to 0.040 inch	0.000 to 0.040 inch
8. 0.000 to 0.020 inch	0.000 to 0.020 inch	0.000 to 0.020 inch
9. 0.020 to 0.060 inch	0.020 to 0.060 inch	0.020 to 0.060 inch
10. 9.086 TO 9.088 inches radius	8.9755 to 8.9775 inches radius	8.737 to 8.739 inches radius
11. 0.000 to 0.020 inch	0.000 to 0.020 inch	0.000 to 0.020 inch
12. 9.1525 to 9.1545 inches radius	9.022 to 9.024 inches radius	8.7965 to 8.7985 inches radius
13. 9.344 to 9.348 inches radius	9.148 to 9.152 inches radius	8.892 to 8.896 inches radius

t. Apply AMS 4777 braze alloy powder to honeycomb as follows:

- (1) Ensure cleanliness. Use clean lint-free cotton gloves.
- (2) Apply braze alloy powder per table 1.

Table 1. Braze Alloy Powder Application

Part Number	Alloy (Grams)
4079207-01	5.5 to 9.5
4077287-01	8.0 to 12.0
4079208-01	3.6 to 7.6
4079214-01	3.1 to 7.1
4077288-01	6.6 to 10.6
4079209-01	2.5 to 6.5

- (3) Ensure braze alloy powder coverage and uniformity of entire honeycomb area.
- (4) Verify all adjacent surfaces are free of braze alloy powder.

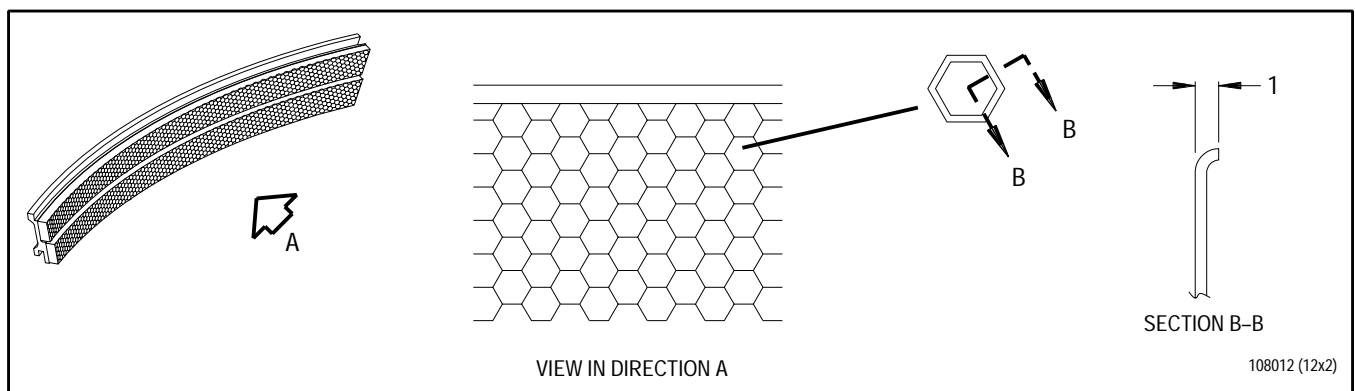
(5) Apply light coat of TT-L-50 acrylic aerosol lacquer spray, or equivalent, to alloyed area.

(6) Cover or wrap completed part in clean PMC 4127 brown paper, or equivalent, until braze operation.

u. Braze honeycomb at 5×10^{-4} torr (0.5 micron of mercury) atmosphere or better, 1900° to 1950°F (1038° to 1066°C), for 3 to 5 minutes. Ensure cleanliness. Use clean lint-free cotton gloves. Refer to T.O. 2-1-111.

v. Visually inspect and leak test honeycomb cells. Refer to T.O. 2-1-111, SVIS 37. Inspect braze coverage and honeycomb. Refer to T.O. 2-1-111, SVIS 114. See figure 5.

w. If braze coverage and honeycomb are acceptable, proceed to step ab.



1. 0.010 inch maximum layover/burr, including ribbon thickness. Loose material not permitted.

Figure 5. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - Honeycomb Acceptance Limits

- x. If braze coverage or honeycomb are unacceptable, reapply PMC 4777 braze alloy powder as follows:
- (1) Ensure cleanliness. Use clean lint-free cotton gloves.
 - (2) Apply braze alloy powder per table 2.

Table 2. Rebraze Alloy Powder Application

Part Number	Alloy (Grams)
4079207-01	0.5 to 7.5
4077287-01	0.5 to 9.3
4079208-01	0.5 to 5.6
4079214-01	0.5 to 4.6
4077288-01	0.5 to 7.8
4079209-01	0.5 to 4.5

- (3) Ensure braze alloy powder coverage and uniformity of honeycomb where realloyed.
 - (4) Verify all adjacent surfaces are free of braze alloy powder.
 - (5) Apply light coat of TT-L-50 acrylic aerosol lacquer spray, or equivalent, to realloyed area.
 - (6) Cover or wrap completed part in clean PMC 4127 brown paper, or equivalent, until braze operation.
- y. Rebraze honeycomb at 5×10^{-4} torr (0.5 micron of mercury) atmosphere or better, 1900° to 1950°F (1038° to 1066°C), for 3 to 5 minutes. Ensure cleanliness. Use clean lint-free cotton gloves. Refer to T.O. 2-1-111.

- z. Visually inspect and leak test honeycomb cells. Refer to T.O. 2-1-111, SVIS 37. Inspect braze coverage and honeycomb. Refer to T.O. 2-1-111, SVIS 114. See figure 5.

NOTE

Two rebraze cycles permitted to achieve braze integrity.

- aa. If required, rebraze per steps x through z., one time only.
- ab. Grind honeycomb within 0.002 inch to flush with shroud ends, using belt or disk sander. See figure 6.
- (1) Do not remove shroud material.
 - (2) Deburr sharp edges.
 - (3) Remove loose honeycomb if required.

- ac. Dimensionally inspect shroud contour per figure 4.
- ad. If dimensions are unacceptable, repeat steps b. through ac.

NOTE

Electrochemical grind is preferred method.

- ae. Grind honeycomb faces to finish dimensions(10 and 12).
- af. Clean shroud assembly per SPOP 209, Method C. Refer to T.O. 2-1-111.
- ag. Visually inspect braze coverage and honeycomb. Refer to T.O. 2-1-111, SVIS 114. See figure 5.

3. SEVENTH THROUGH NINTH STAGE COMPRESSOR STATOR SHROUD ASSEMBLIES - BLEND REPAIR.

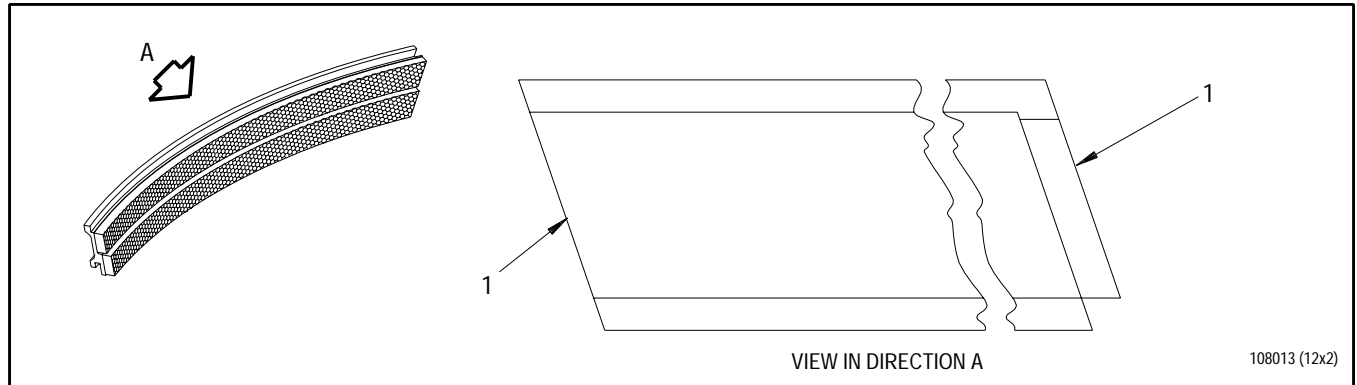
(See Figure 7.)

- a. Blend nicks or scratches in area(1, figure 7), using fine stone or file.

(1) Blend width to depth ratio shall be 15 to 1 or greater.

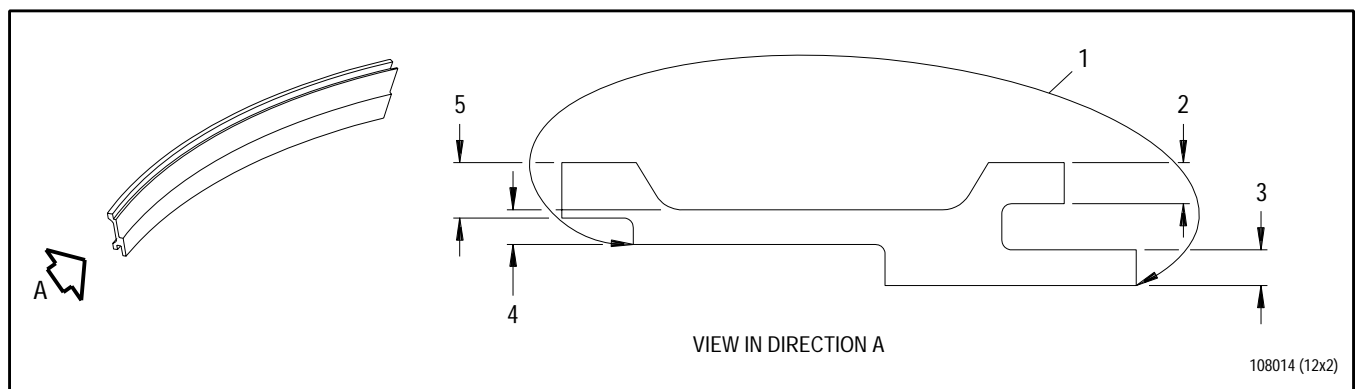
(2) Blended surface shall be smooth as, or smoother than unblended adjacent surface.

(3) Shroud thickness shall not be below minimum dimensions(2, 3, 4, and 5).



1. Grind honeycomb within 0.002 inch to flush with this surface.

Figure 6. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - End Grind



7th Stage	8th Stage	9th Stage
1. Blend area	Blend area	Blend area
2. 0.071 inch minimum	0.072 inch minimum	0.071 inch minimum
3. 0.044 inch minimum	0.026 inch minimum	0.025 inch minimum
4. 0.051 inch minimum	0.051 inch minimum	0.051 inch minimum
5. 0.091 inch minimum	0.111 inch minimum	0.131 inch minimum

Figure 7. Seventh Through Ninth Stage Compressor Stator Shroud Assemblies - Blend Repair

WORK PACKAGE**TECHNICAL PROCEDURES****STATOR SEGMENT, COMPRESSOR,
SEVENTH THROUGH NINTH STAGE ASSEMBLY****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 42

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	29	15 - 17	29	29 - 30	25
4	25	18 - 19	25	31 - 33	29
4A Added	29	20	29	34 Blank	29
4B Blank Added	29	21 - 22 Deleted	29	35 - 36 Deleted	29
5	29	23 - 25	29	37 - 39	29
6 - 7	25	26 Blank	29	40 - 41	25
8 - 13	29	27 - 28	29	42 - 43	29
14 Blank	29			44 Blank	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Qualified Repair Source List (QRSL) - - - - -	WP 600 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
TAPE, MASKING, VARIOUS	PMC 4000, 4001, 4134, 4138, 4139, OR 4188
WIRE, WELDING	AMS 5837

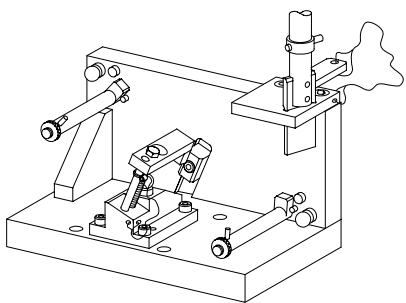
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

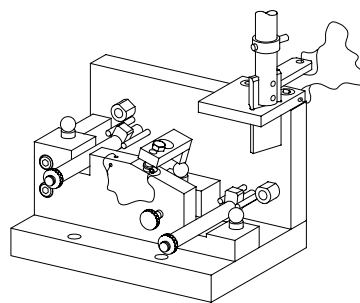
Paragraph	Function - Tool Nomenclature	Tool Number
2	SEVENTH THROUGH NINTH STAGE STATOR SEGMENT ASSEMBLY - EARED ANTIROTATION LUG REPLACEMENT (LUG PN 4083730, 4083729, AND 4083728)	
	FIXTURE, EDM, 7TH STAGE COMPRESSOR STATOR SEGMENT -	PWA 70691
	FIXTURE, EDM, 8TH STAGE COMPRESSOR STATOR SEGMENT -	PWA 70692
	FIXTURE, MACHINE, COMPRESSOR STATOR SEGMENT, 9TH STAGE ASSY OF - - - - -	PWA 71592
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593
3	SEVENTH THROUGH NINTH STAGE STATOR SEGMENT ASSEMBLY - RECTANGULAR ANTIROTATION LUG REPLACEMENT	
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593
4	SEVENTH STAGE STATOR SEGMENT ASSEMBLY - MISSING LUGS OR HALF-MOON ANTIROTATION LUG REPLACEMENT (ALL ASSEMBLIES EXCEPT PN 4077877 AND 4083877)	
	FIXTURE, EDM, 7TH STAGE COMPRESSOR STATOR SEGMENT -	PWA 70691
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593
5	EIGHTH STAGE STATOR SEGMENT ASSEMBLY - MISSING LUGS OR HALF-MOON ANTIROTATION LUG REPLACEMENT (ALL ASSEMBLIES EXCEPT PN 4077878 AND 4083978)	
	FIXTURE, EDM, 8TH STAGE COMPRESSOR STATOR SEGMENT -	PWA 70692
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593
6	NINTH STAGE STATOR SEGMENT ASSEMBLY - MISSING LUGS OR HALF-MOON ANTIROTATION LUG REPLACEMENT (ALL ASSEMBLIES EXCEPT PN 4077879 AND 4083979)	
	FIXTURE, MACHINE, COMPRESSOR STATOR SEGMENT, 9TH STAGE ASSY OF - - - - -	PWA 71592
	SET, RETAINER, COMPRESSOR STATOR SEGMENTS 7TH, 8TH, 9TH AND 10TH, 12TH - - - - -	PWA 71593

ILLUSTRATED SUPPORT EQUIPMENT



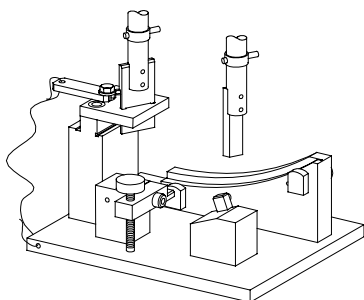
PWA 70691 -C

Figure T1. PWA 70691 FIXTURE



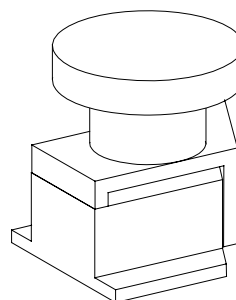
PWA 70692 -C

Figure T2. PWA 70692 FIXTURE



PWA 71592 -C

Figure T3. PWA 71592 FIXTURE



PWA 71593 -C

Figure T4. PWA 71593 SET

1. INTRODUCTION.

- a. This work package contains instructions for repair of 7th, 8th, and 9th stage compressor stator assemblies.

2. SEVENTH THROUGH NINTH STAGE STATOR SEGMENT ASSEMBLY - EARED ANTIROTATION LUG REPLACEMENT (LUG PN 4083730, 4083729, AND 4083728).

(See Figures 1 and 2.)

NOTE

Eared antirotation lugs, PN 4083730, 4083729, and 4083728, are installed on typical stator segment PNs 4083877-01, -02, 4083978-01, -02, -03, and 4083979-01.

- a. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.
- b. Deleted.
- c. Remove existing lug/weld by either of the following methods:

- (1) Hand grind and machine as follows:



Failure to use care during grinding can cause damage to stator segment.

- (a) Cut existing lug/segment with hand grinder. Use care not to grind on stator segment. Discard lug. See figure 2.
- (b) Remove remaining lug/weld by machining. See figure 2.

- (2) Electrodischarge Machine (EDM) as follows:

- (a) Mask segment per SPOP 36. Tape segment using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax. See figure 1. Refer to T.O. 2-1-111.

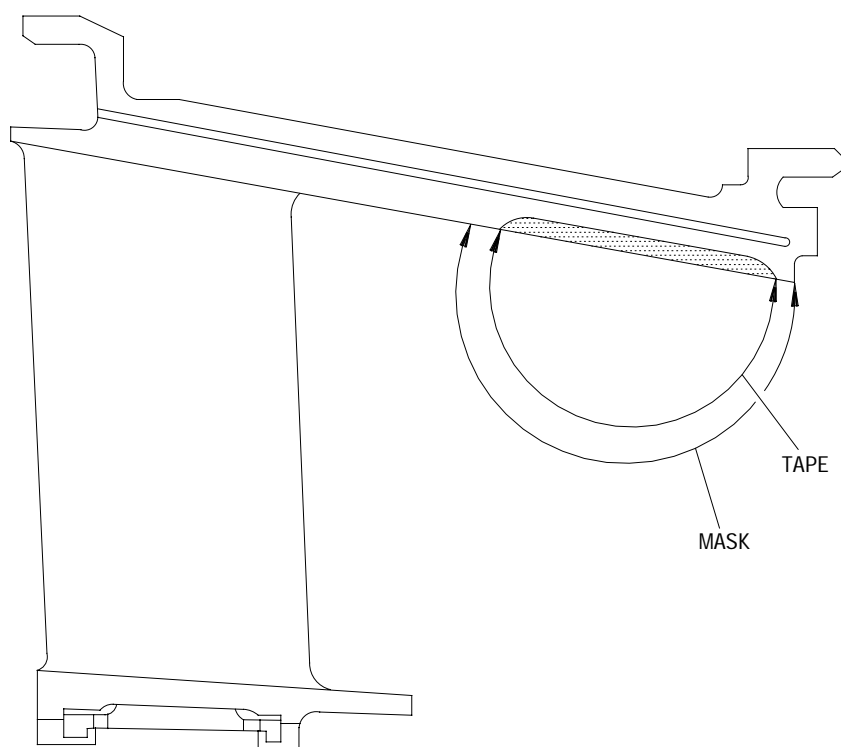
- (b) Remove existing lug/weld by EDM. Refer to T.O. 2-1-111. See figure 2, View A and Sections B-B and C-C. Use PWA 70691 fixture, PWA 70692 fixture, and PWA 71592 fixture to remove lugs on 7th, 8th, and 9th stage segments respectively.

- d. Remove masking if required.
- e. Polish by hand to remove EDM recast layer from weld area, if required.
- f. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.
- g. Locally fluorescent penetrant inspect stator segment in lug area per SPOP 70. No cracks permitted. Refer to T.O. 2-1-111.

- h. Secure replacement lug as follows:

Segment (Typical PN)	Replacement Eared Lug	Stage
4083877-01, -02	4083730	7th
4083978-01, -02, -03	4083729	8th
4083979-01	4083728	9th

- i. Locally clean weld area, stator segment, and replacement lug, per SPOP 208, Method A. Refer to T.O. 2-1-111.
- j. Weld eared lug to stator segment using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per PWA 16-333. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. Refer to T.O. 2-1-111. Use AMS 5837 welding wire. See figure 2, Views D and E. Use PWA 71593 retainer set as required to hold lug in place during welding.
- k. Locally fluorescent penetrant inspect weld per SPOP 70 to SFPS 38. Refer to T.O. 2-1-111.



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Figure 1. Typical Vane Segment - Masking

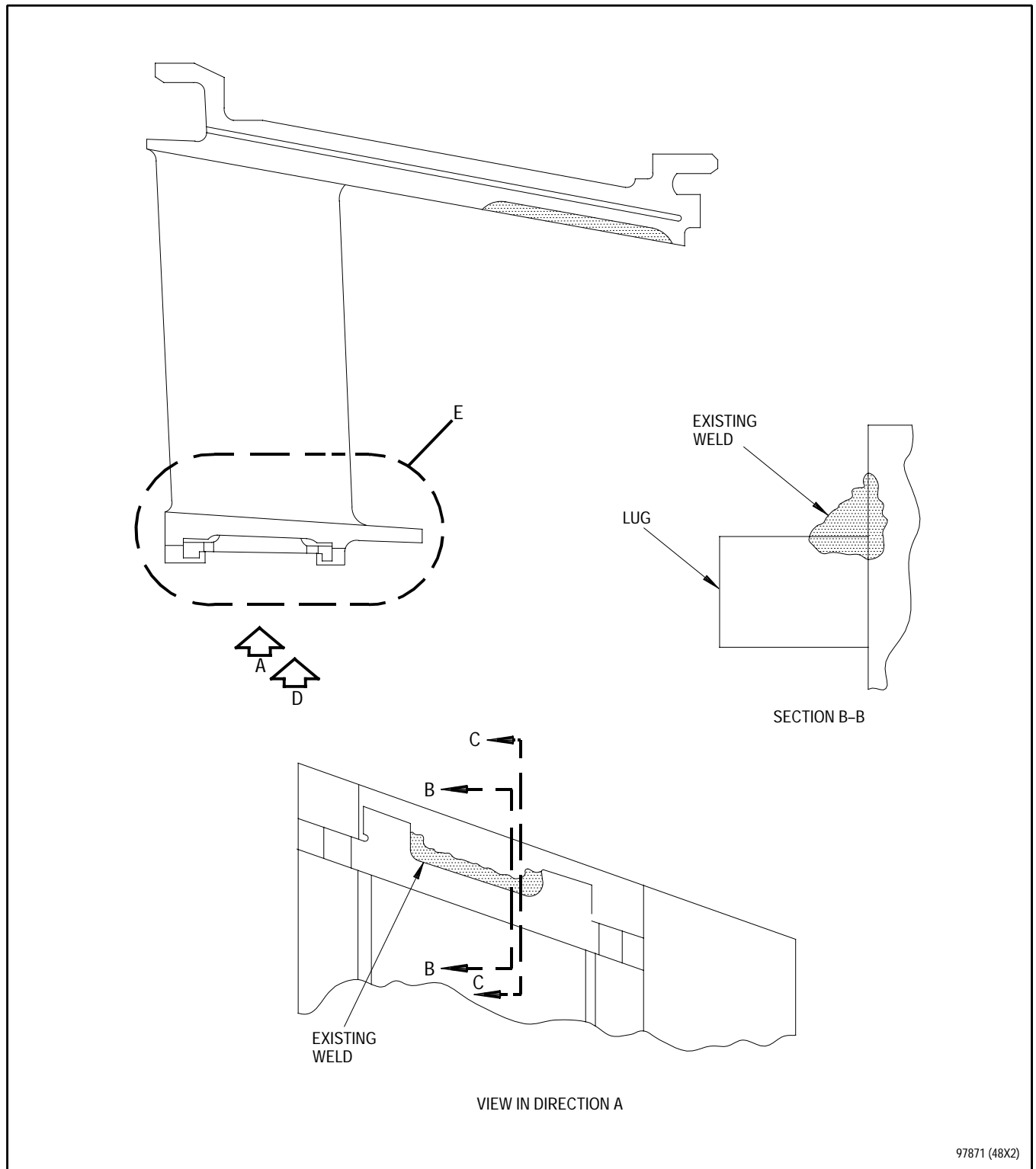
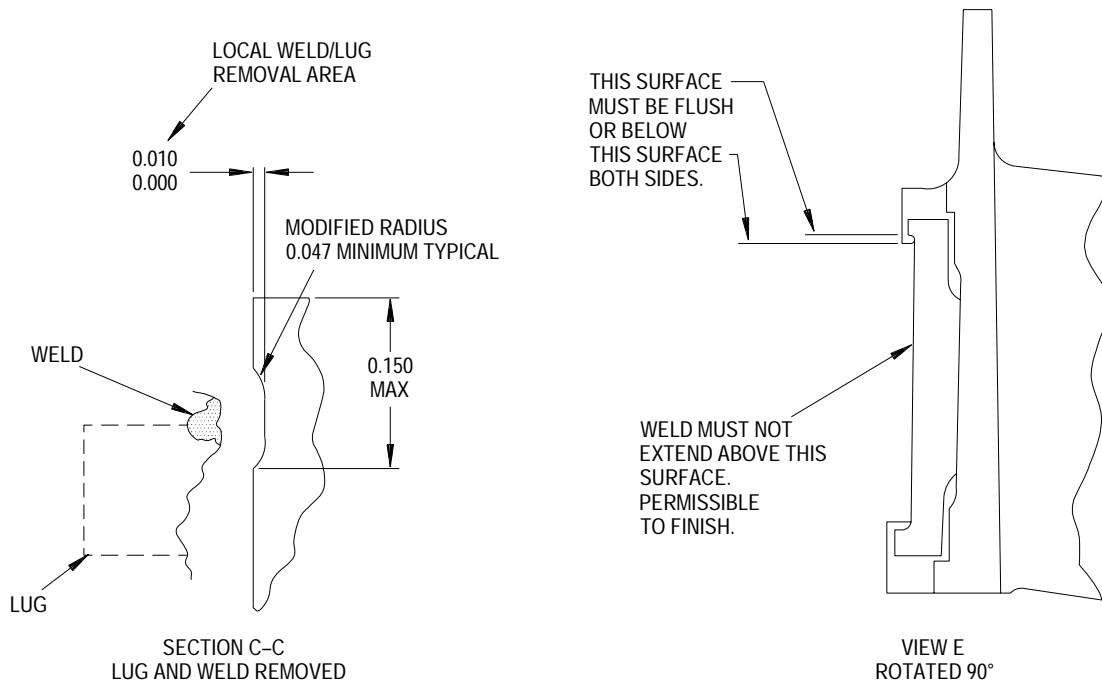
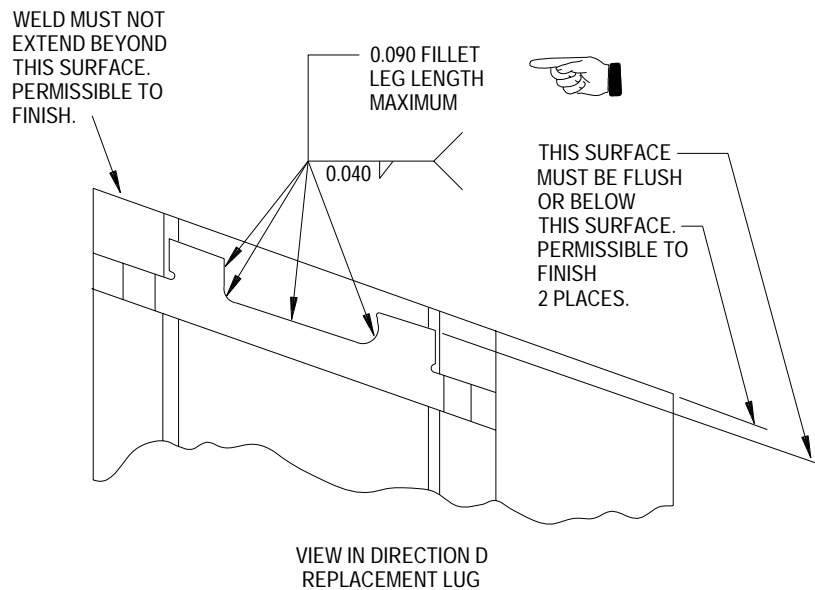


Figure 2. Typical Vane Segment - Lug Replacement (Sheet 1 of 2)



NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



97873 (48X2)

Figure 2. Typical Vane Segment - Lug Replacement (Sheet 2 of 2)

3. SEVENTH THROUGH NINTH STAGE STATOR SEGMENT ASSEMBLY - RECTANGULAR ANTIROTATION LUG REPLACEMENT.

(See Figure 3.)

NOTE

Rectangular antirotation lugs are installed on typical stator segment PNs 4077877-01, -02, 4077878-01, -02, -03, and 4077879-01.

- a. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.



Failure to use care during grinding can cause damage to stator segment.

- b. Cut existing lug/segment welds with hand grinder. Use care not to grind on stator segment. Discard lug.
- c. Remove remaining lug/weld by machining. See figure 3.
- d. Clean segment per SPOP 208, Method B. Refer to T.O. 2-1-111.
- e. Locally fluorescent penetrant inspect stator segment in lug area per SPOP 70. No cracks permitted. Refer to T.O. 2-1-111.
- f. Secure replacement lug as follows:

Segment (Typical PN)	Replacement Eared Lug	Stage
4077877-01, -02	4083730	7th
4077878-01, -02, -03	4083729	8th
4077879-01	4083728	9th

- g. Locally clean weld area, stator segment, and replacement lug, per SPOP 208, Method A. Refer to T.O. 2-1-111.

- h. Weld eared lug to stator segment using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per PWA 16-333. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. Refer to T.O. 2-1-111. Use AMS 5837 welding wire. See figure 3, Views D and E. Use PWA 71593 retainer set as required to hold lug in place during welding.
- i. Locally fluorescent penetrant inspect weld per SPOP 70 to SFPS 38. No cracks permitted. Refer to T.O. 2-1-111.
- j. Reidentify stator segment per following table. Mark each reidentified stator segment with new PN using vibration peen or electrochemical etch per SPOP 401. Refer to T.O. 2-1-111.

Existing Segment	Reidentified Segment
4077877-01	4083877-01
4077877-02	4083877-02
4077878-01	4083978-01
4077878-02	4083978-02
4077878-03	4083978-03
4077879-01	4083979-01

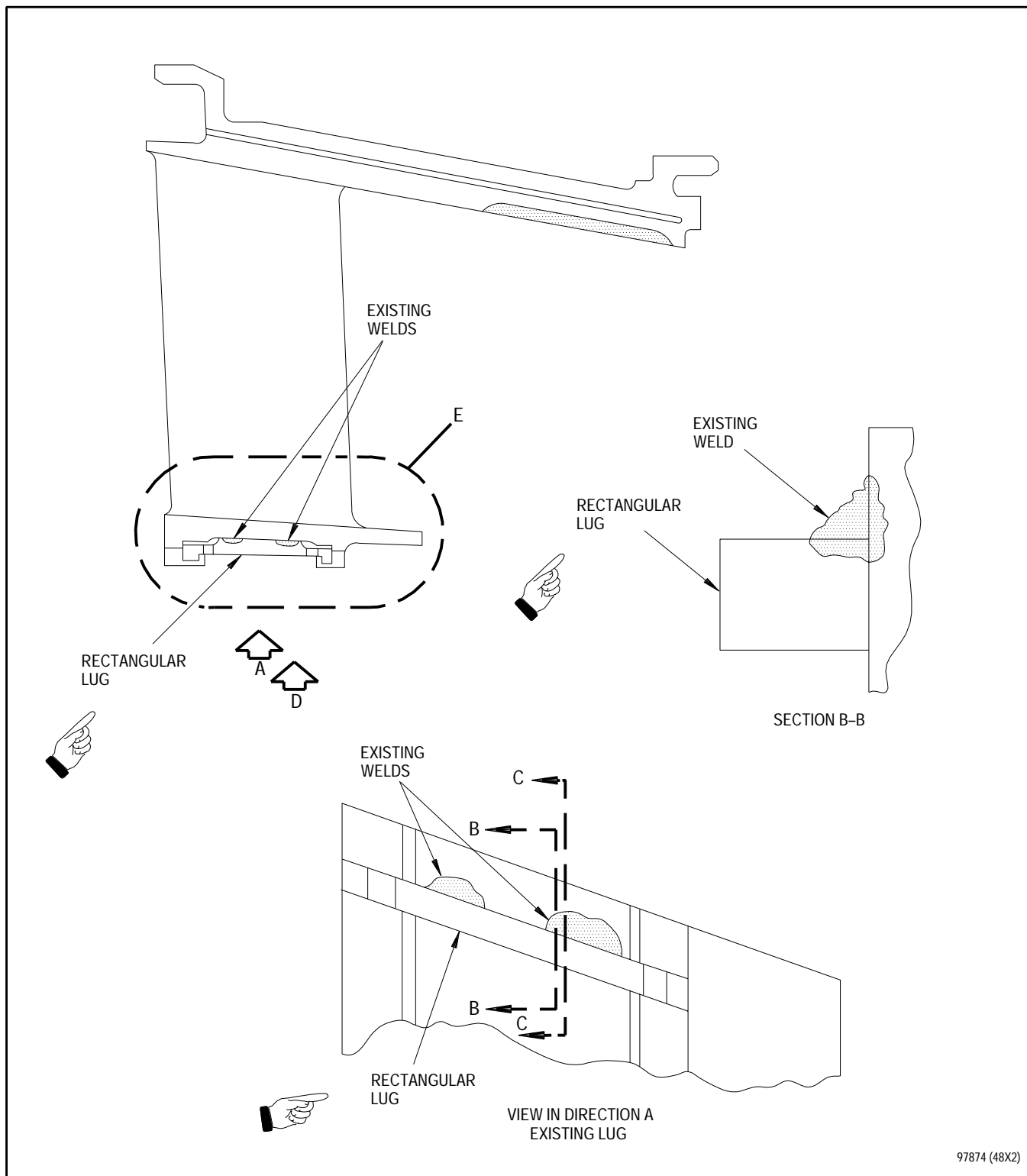


Figure 3. Typical Vane Segment - Lug Replacement (Sheet 1 of 2)

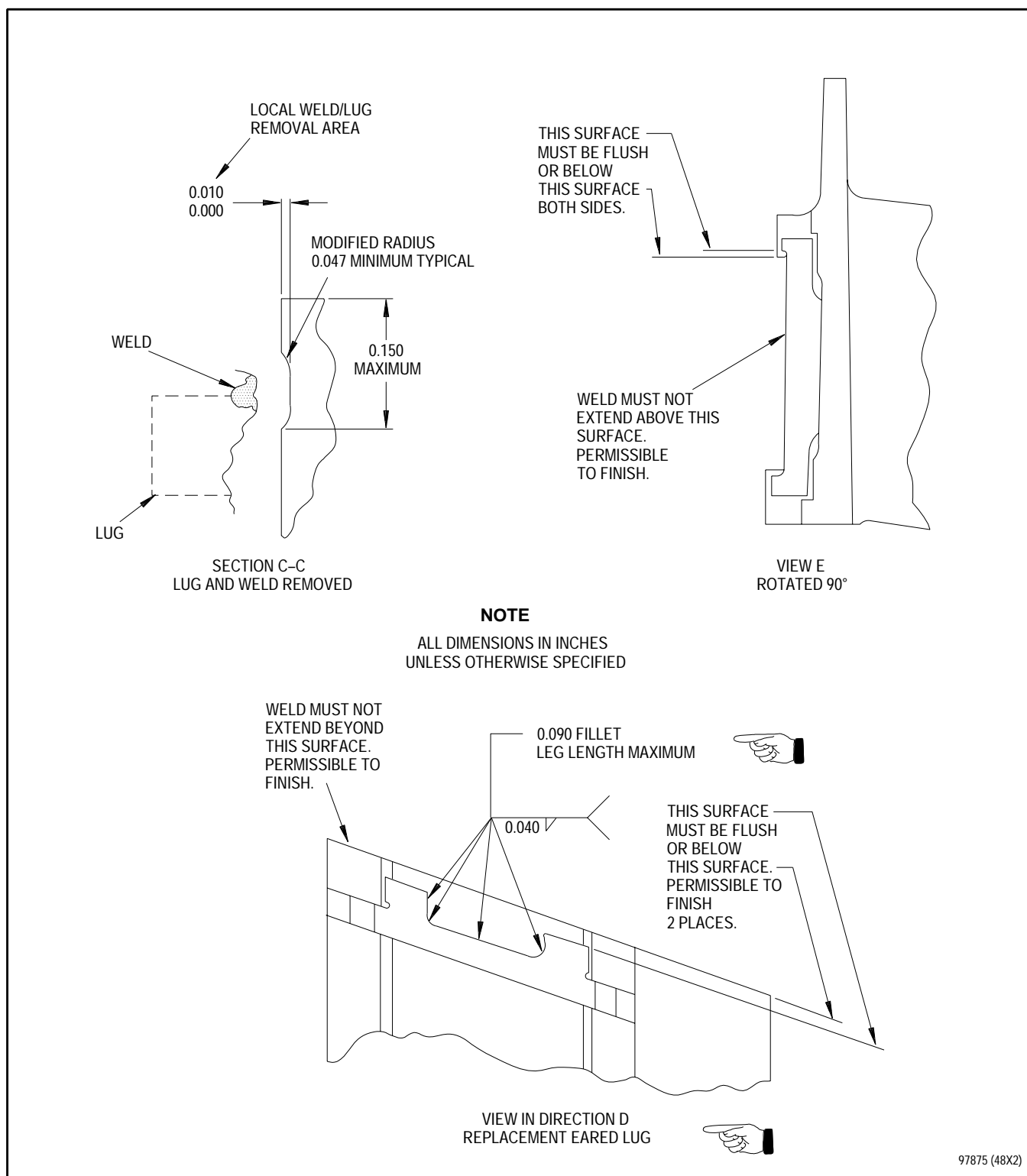


Figure 3. Typical Vane Segment - Lug Replacement (Sheet 2 of 2)

**4. SEVENTH STAGE STATOR SEGMENT
ASSEMBLY - MISSING LUGS OR HALF-MOON
ANTIROTATION LUG REPLACEMENT (ALL
ASSEMBLIES EXCEPT PN 4077877 AND
4083877).**

(See figure 1 and Figures 4 and 5.)

NOTE

For repair of assemblies
PN 4077877 and 4083877, see
paragraph 2 or 3.

a. Deleted.

b. Replace antirotation lugs as
follows:

(1) Inspect stator segment
assembly to determine
incoming configuration. See
figure 4.

(a) If an eared antirotation
lug (View A) is
installed, replace with
another eared lug per
this paragraph.

(b) If installed antirotation
lug resembles rectangular
configuration (View B),
it is not necessary to
machine slot per step
b.(5). Install eared lug
per this paragraph.

(c) If installed antirotation
lug resembles half-moon
configuration (View C),
reoperate stator segment
per step b.(5) and
install eared lug per
this paragraph.

(d) If no lug is installed,
check for presence of
slot and inspect for
evidence of remnant of
weld material indicating
a lug had been installed
but is missing.

1 If no slot exists, do
not reoperate stator
segment per this
paragraph or install
any antirotation lug.

2 If slot is
rectangular with
remnant weld material
(View D), install
eared antirotation
lug per this
paragraph.

3 If slot is half-moon
configuration with
remnant weld material
(View E), reoperate
stator segment per
step b.(5) and
install eared lug per
this paragraph.

(2) Clean stator segment per
SPOP 208, Method B, or
SPOP 209. Refer to
T.O. 2-1-111.

- (3) Remove existing antirotation lug, if required, by cutting welds. See figure 5, Section B-B. Electrodischarge Metal Removal (EDM) may be used to remove eared lugs provided the following is accomplished: mask stator segment per SPOP 36 and figure 1, and refer to T.O. 2-1-111; tape using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax; and polish weld area by hand to remove recast layer. Remove masking after EDM. PWA 70691 fixture may be used to aid eared lug removal. See note 2. Discard removed lug.
- (4) Remove remaining weld material from Area P. See figure 5, View K, and note 2.
- (5) For half-moon slot configuration only, machine new antirotation slot per figure 5, Views D, K, M, R, S, and Section L-L. PWA 70691 fixture may be used when machining slot. See note 3.
- (6) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (7) Fluorescent penetrant inspect machined areas of cast surface per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. No cracks allowed. Refer to T.O. 2-1-111.
- (8) Clean stator segment per SPOP 208, Method A, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (9) Weld new eared antirotation lug, PN 4083730, using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per figure 5, Sections N-N, P-P, and View AA. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. See note 4. Use PWA 71593 retainer set as required to hold lug in place during welding.
- (10) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (11) Fluorescent penetrant inspect weld per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- c. Deleted.

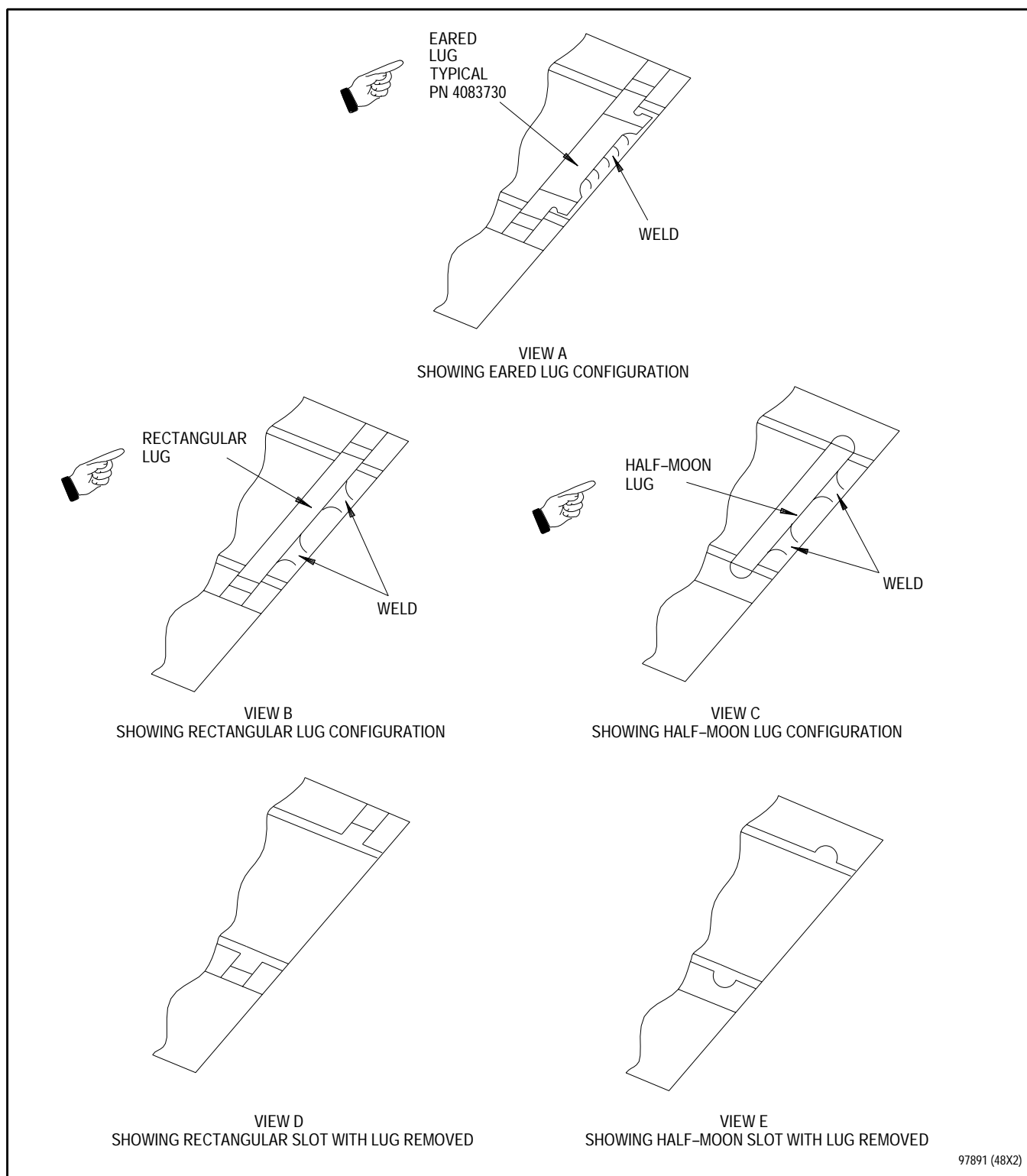
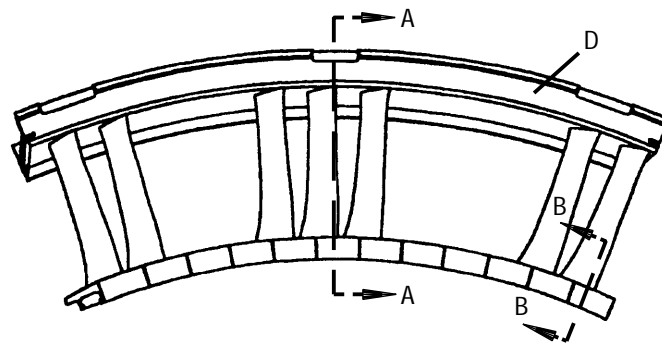


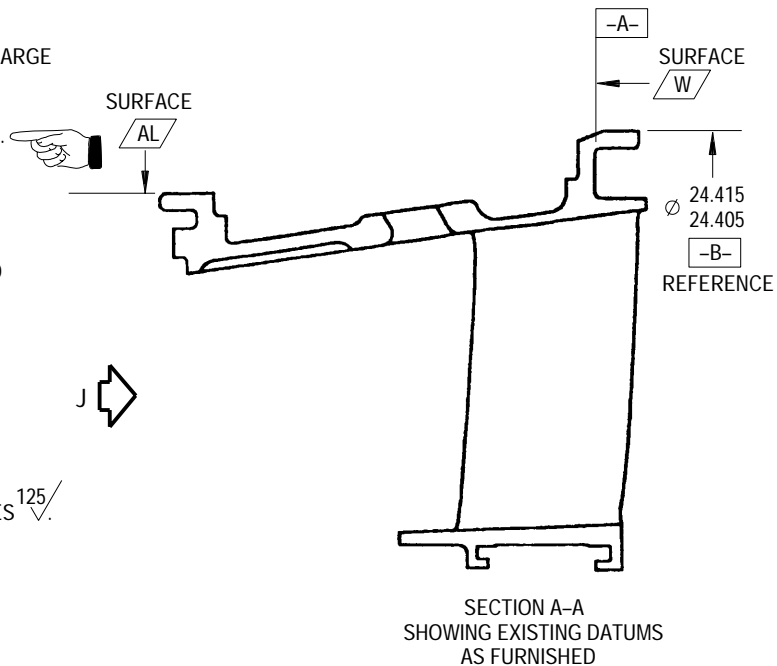
Figure 4. Seventh Stage Stator Segment - Antirotation Lug Configurations



VIEW SHOWING COMPRESSOR STATOR SEGMENT
7TH STAGE, ASSEMBLY OF, AS FURNISHED
LOOKING AFT

NOTE

1. MATERIAL: STATOR SEGMENT, NICKEL ALLOY;
LUG, NICKEL ALLOY.
2. (G) GRINDING PERMISSIBLE.
3. (J) MAY BE FINISHED PER ELECTRODISCHARGE
METAL REMOVAL (PWA 97-2) OR
WIRE ELECTRODISCHARGE METAL REMOVAL
(PWA 97-7). REFER TO TEXT FOR PROCEDURE.
THIS FEATURE IS TO BE LOCATED
WITHIN 0.010 DIAMETER OF TRUE POSITION
AT LEAST MATERIAL CONDITION IN RELATION
TO SURFACE -A-, DIAMETER -B-, AND
FEATURE -C- WHEN DIAMETER -B- AND
FEATURE -C- ARE AT MAXIMUM MATERIAL
CONDITION.
4. (H) WELD USING AMS 5837 WELD WIRE,
REFER TO T.O. 2-1-111.
(PWA 16-333).
5. SURFACE TEXTURE PER PWA 388.
UNLESS OTHERWISE SPECIFIED ALL
CAST SURFACES $\sqrt{\text{ }}$, ALL MACHINED SURFACES $\sqrt{125}$.
6. IN FREE STATE, AFTER REOPERATION,
PART MUST CONFORM TO DIMENSION \sqrt{T}
WHEN SURFACE \sqrt{W} IS $\sqrt{\square .010}$.
ANGULAR RELATION TO OTHER FEATURES
NOT IMPORTANT.
7. UNLESS OTHERWISE SPECIFIED, BREAK
EDGES 0.003 TO 0.015.
8. UNLESS OTHERWISE SPECIFIED ALL
DIMENSIONS IN INCHES.



97892 (48X2)

Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 1 of 6)

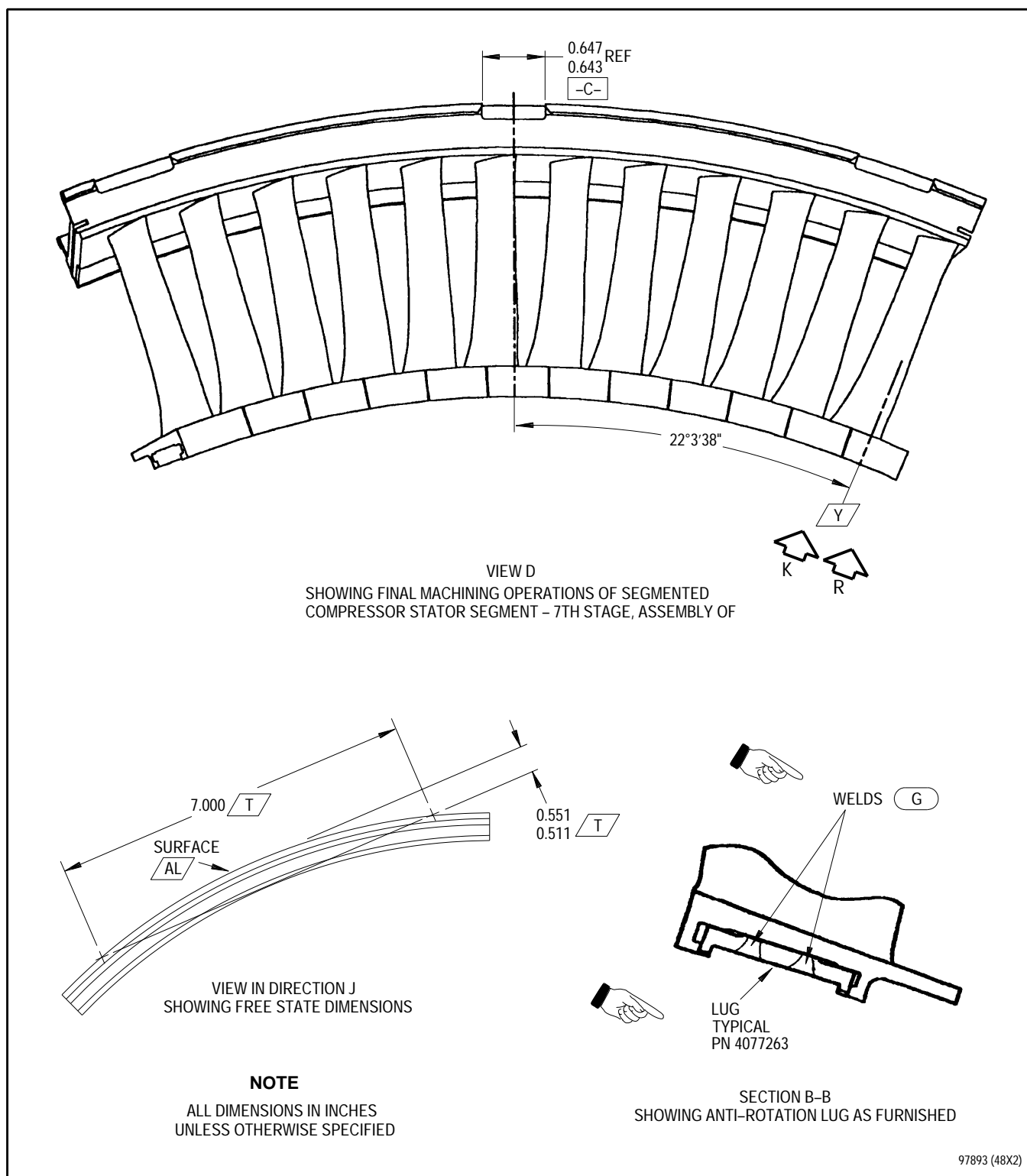


Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 2 of 6)

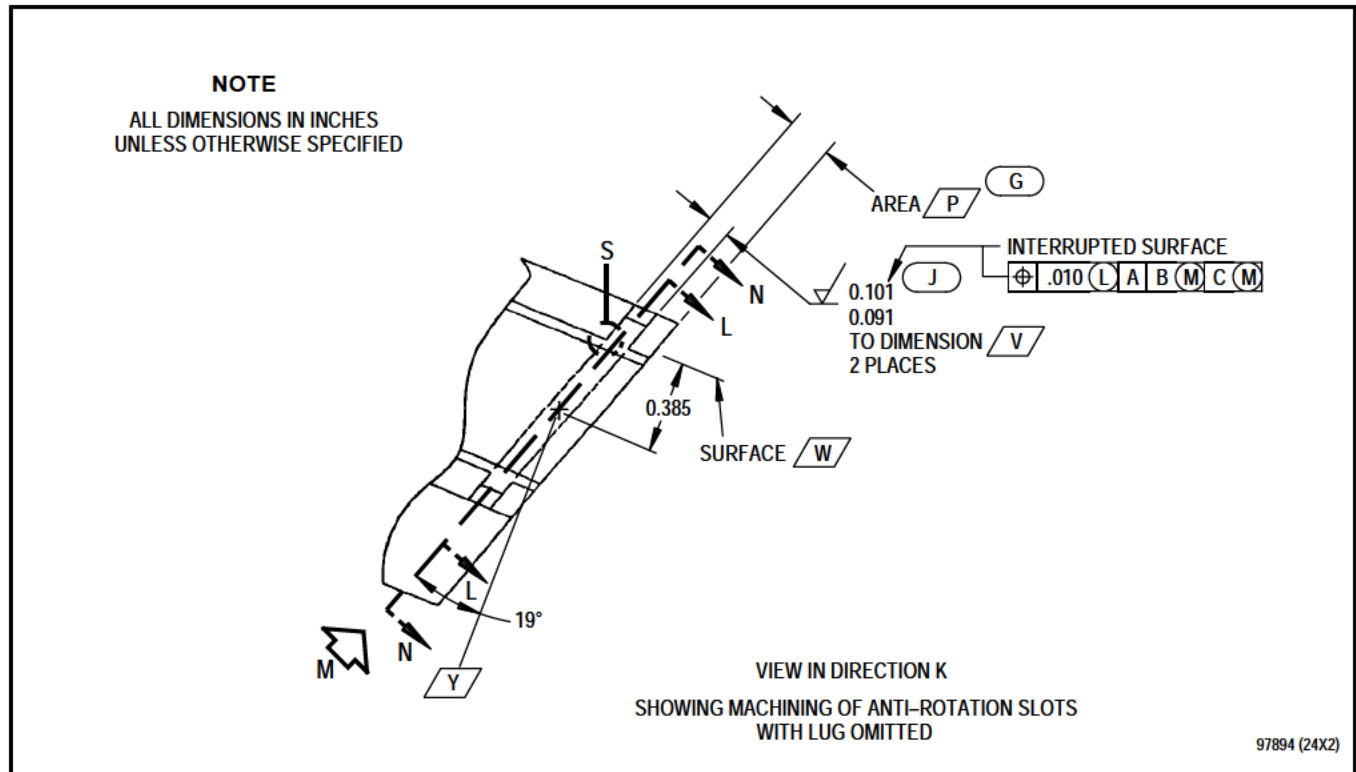


Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 3 of 6)

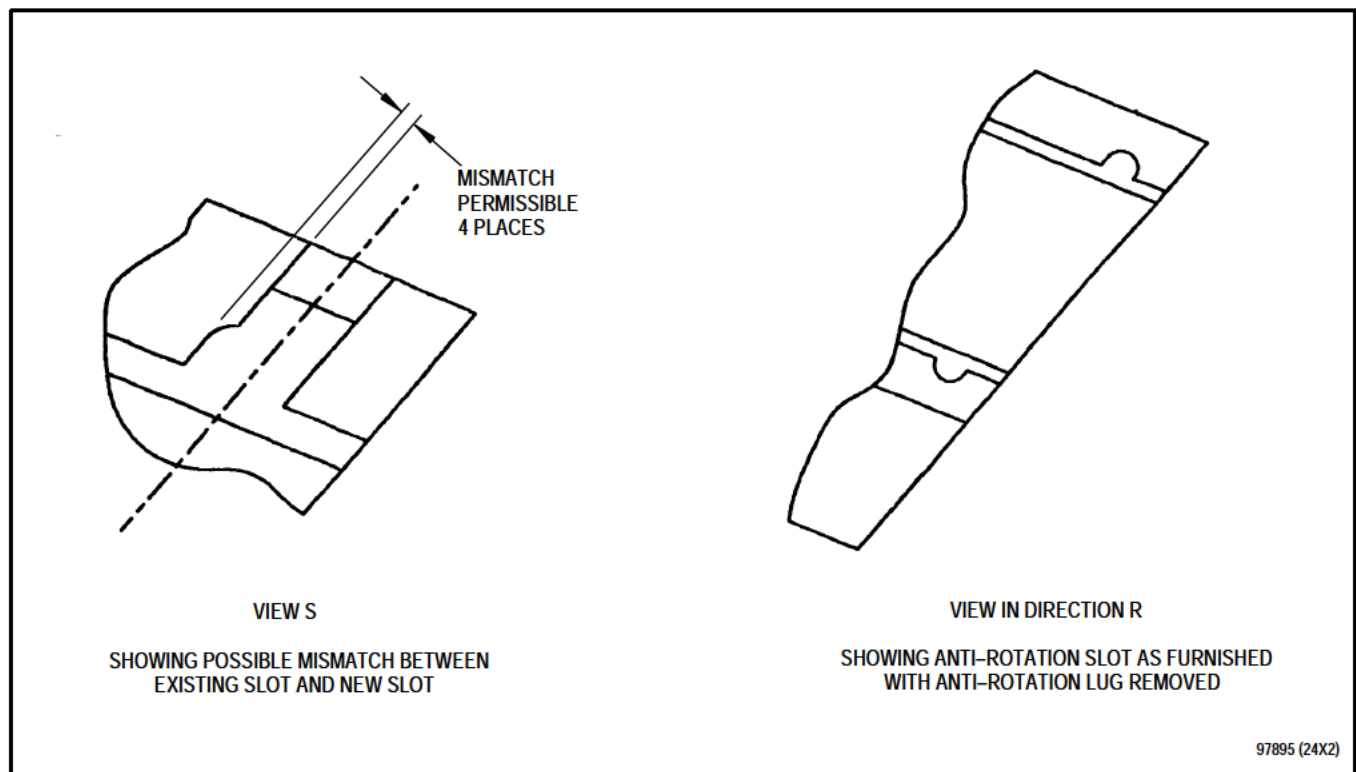


Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 4 of 6)

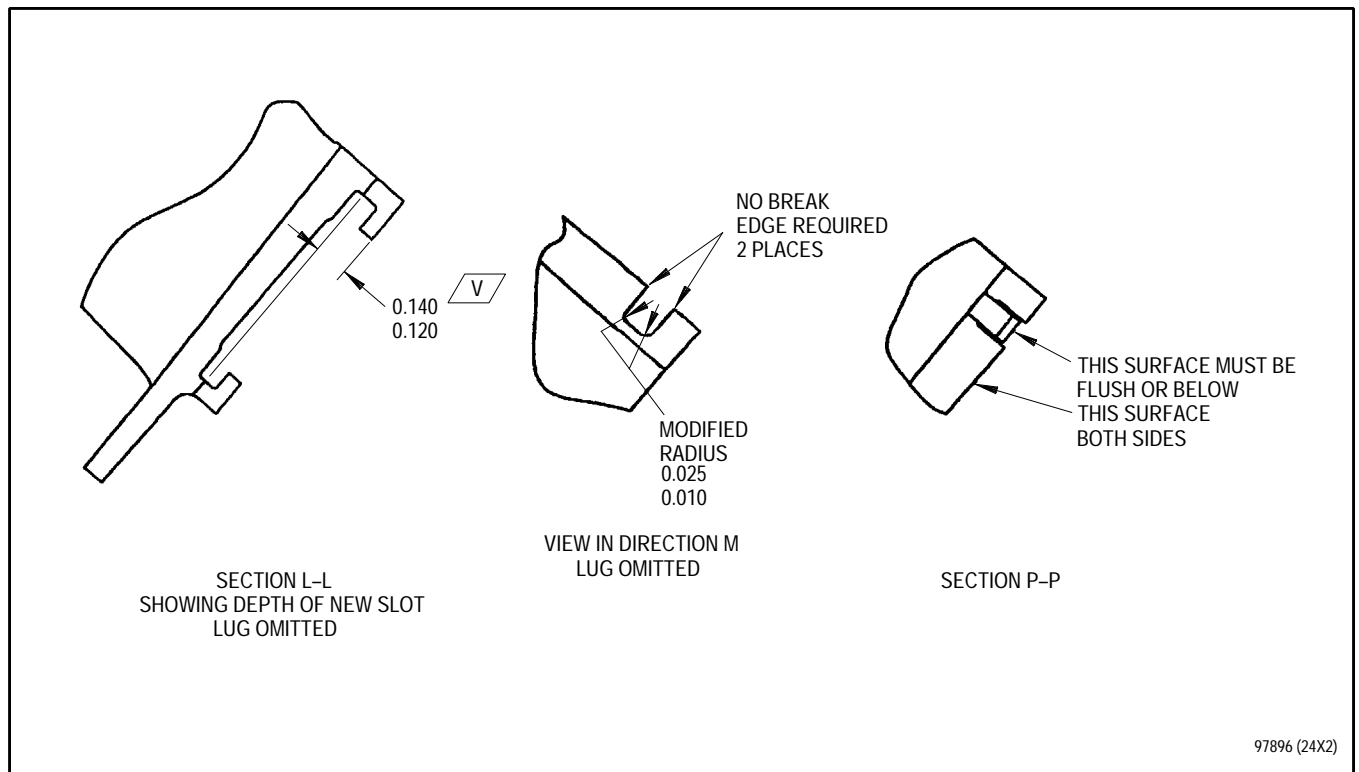
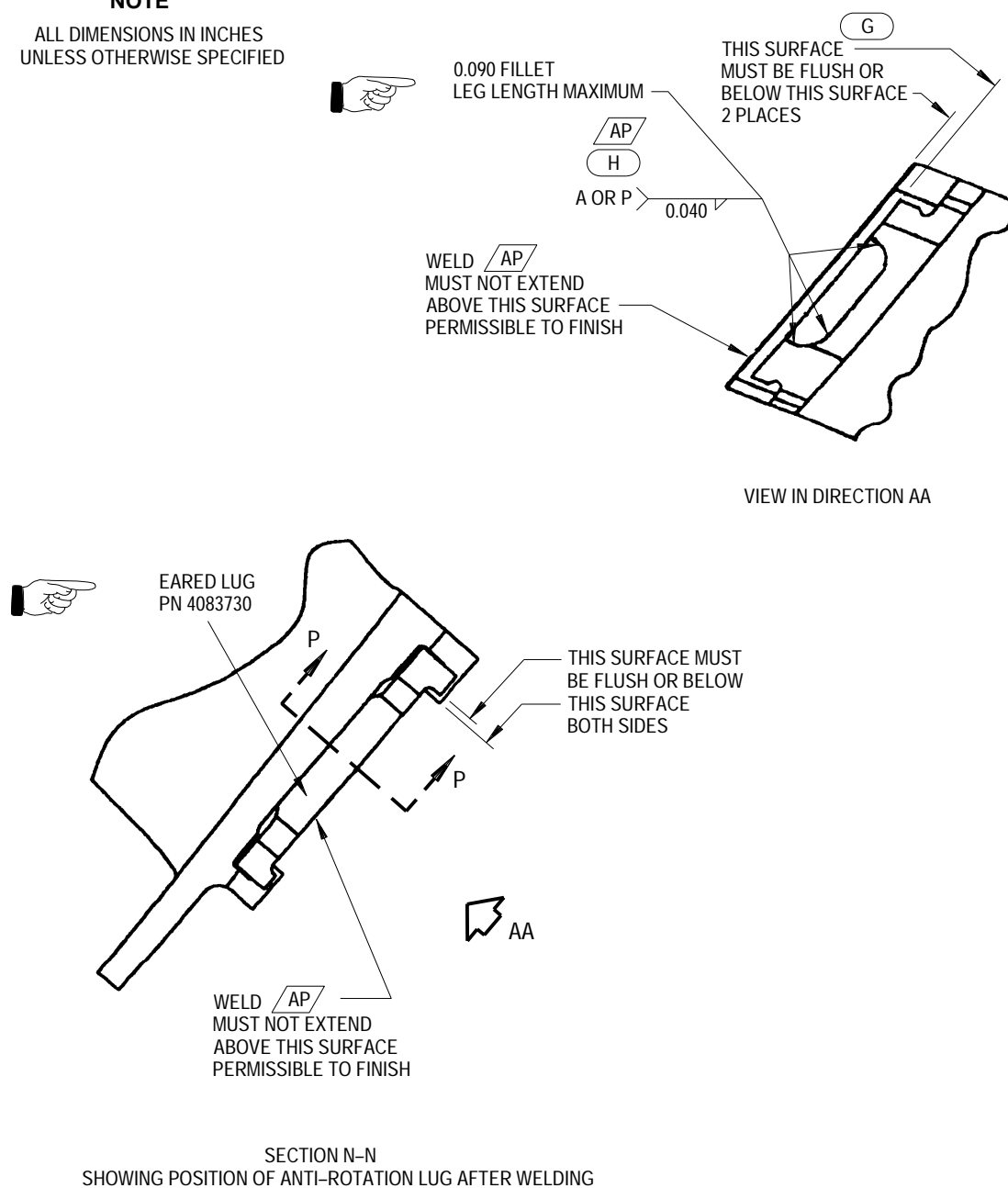


Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 5 of 6)

NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



97897 (48X2)

Figure 5. Seventh Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 6 of 6)

Pages 21 and 22 deleted.

Figure 6. Deleted.

**5. EIGHTH STAGE STATOR SEGMENT
ASSEMBLY - MISSING LUGS OR HALF-MOON
ANTIROTATION LUG REPLACEMENT (ALL
ASSEMBLIES EXCEPT PN 4077878 AND
4083978).**

(See figure 1 and Figures 7 and 8.)

NOTE

For repair of assemblies
PN 4077878 and 4083978, see
paragraph 2 or 3.

a. Deleted.

b. Replace antirotation lugs as
follows:

(1) Inspect stator segment
assembly to determine
incoming configuration. See
figure 7.

(a) If an eared antirotation
lug (View A) is
installed, replace with
another eared lug per
this paragraph.

(b) If installed antirotation
lug resembles rectangular
configuration (View B),
it is not necessary to
machine slot per step
b.(5). Install eared lug
per this paragraph.

(c) If installed antirotation
lug resembles half-moon
configuration (View C),
reoperate stator segment
per step b.(5) and
install eared lug per
this paragraph.

(d) If no lug is installed,
check for presence of
slot and inspect for
evidence of remnant of
weld material indicating
a lug had been installed
but is missing.

1 If no slot exists, do
not reoperate stator
segment per this
paragraph or install
any antirotation lug.

2 If slot is
rectangular with
remnant weld material
(View D), install
eared antirotation
lug per this
paragraph.

3 If slot is half-moon
configuration with
remnant weld material
(View E), reoperate
stator segment per
step b.(5) and
install eared lug per
this paragraph.

(2) Clean stator segment per
SPOP 208, Method B, or
SPOP 209. Refer to
T.O. 2-1-111.

- (3) Remove existing antirotation lug, if required, by cutting welds. See figure 8, Section B-B.
Electrodischarge Metal Removal (EDM) may be used to remove eared lugs provided the following is accomplished: mask stator segment per SPOP 36 and figure 1, and refer to T.O. 2-1-111; tape using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax; and polish weld area by hand to remove recast layer. Remove masking after EDM. PWA 70692 fixture may be used to aid eared lug removal. See note 2. Discard removed lug.
- (4) Remove remaining weld material from Area Z. See figure 8, View M, and note 2.
- (5) For half-moon slot configuration only, machine new antirotation slot per figure 8, Views D, L, M, R, S, and Section N-N. PWA 70692 fixture may be used when machining slot. See note 3.
- (6) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (7) Fluorescent penetrant inspect machined areas of cast surface per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. No cracks allowed. Refer to T.O. 2-1-111.
- (8) Clean stator segment per SPOP 208, Method A, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (9) Weld new eared antirotation lug, PN 4083729, using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per figure 8, Sections P-P, T-T, and View Z. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. See note 4. Use PWA 71593 retainer set as required to hold lug in place during welding.
- (10) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (11) Fluorescent penetrant inspect weld per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.

c. Deleted.

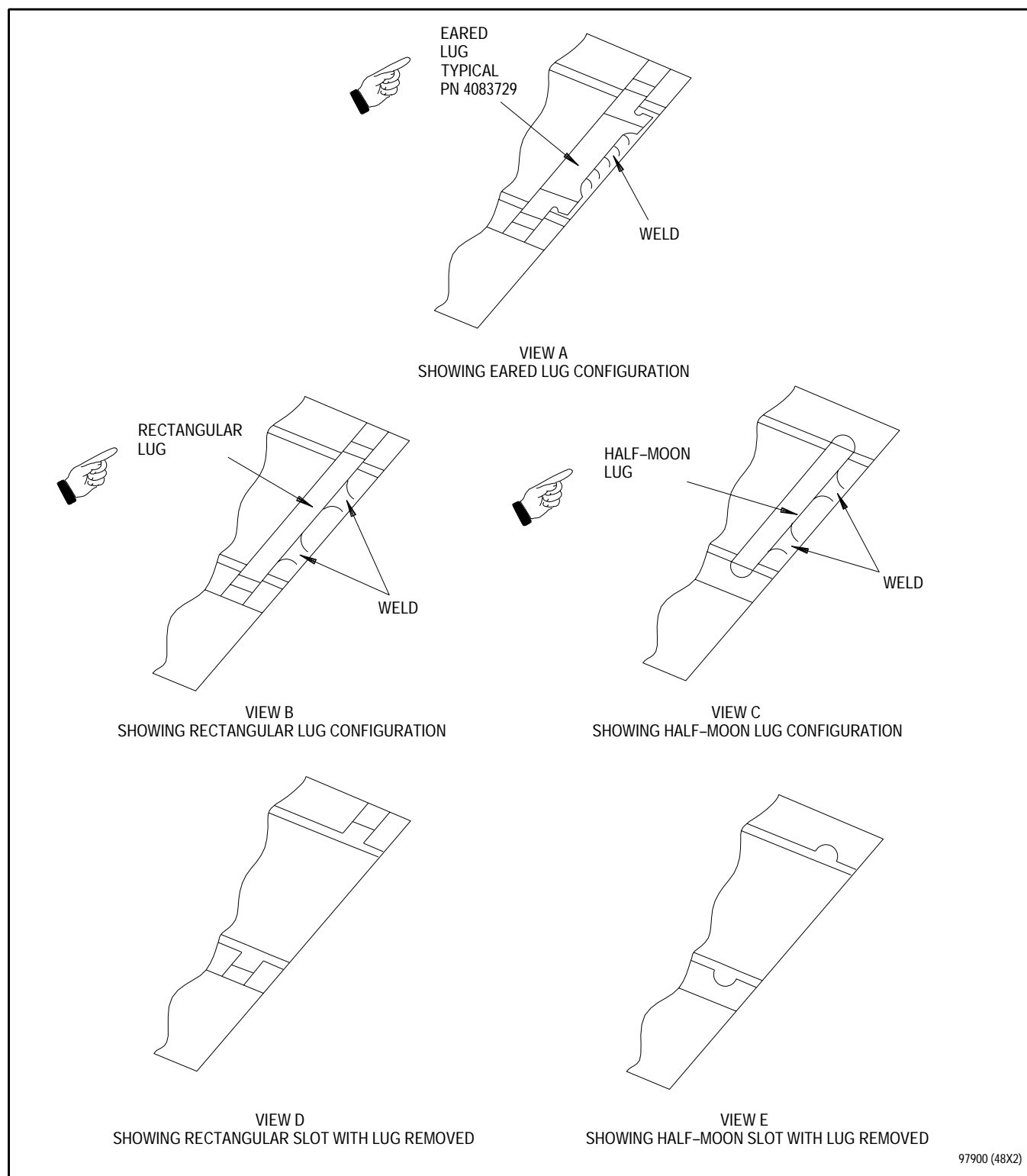
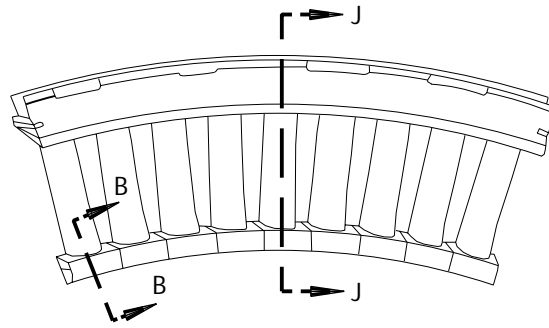


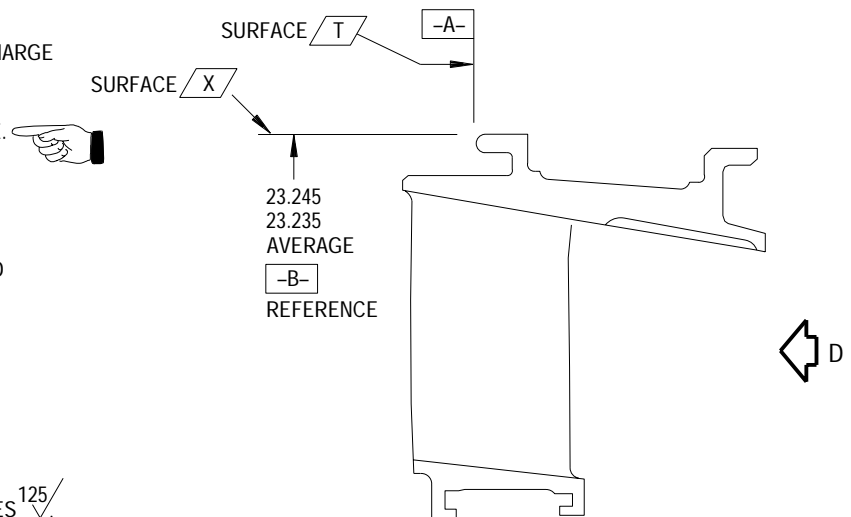
Figure 7. Eighth Stage Stator Segment - Antirotation Lug Configurations



VIEW SHOWING COMPRESSOR STATOR SHORT ARC LENGTH
SEGMENT - 8TH STAGE, ASSEMBLY OF, AS FURNISHED
LOOKING FORWARD

NOTES

1. MATERIAL: STATOR SEGMENT, NICKEL ALLOY;
LUG, NICKEL ALLOY.
2. (J) GRINDING PERMISSIBLE.
3. (L) MAY BE FINISHED PER ELECTRODISCHARGE
METAL REMOVAL (PWA 97-2) OR
WIRE ELECTRODISCHARGE METAL REMOVAL
(PWA 97-7). REFER TO TEXT FOR PROCEDURE.
THIS FEATURE IS TO BE LOCATED
WITHIN 0.005 OF TRUE POSITION
AT LEAST MATERIAL CONDITION IN RELATION
TO SURFACE -A-, DIAMETER -B-, AND
FEATURE -C- WHEN DIAMETER -B- AND
FEATURE -C- ARE AT MAXIMUM MATERIAL
CONDITION.
4. (K) WELD USING AMS 5837 WELD WIRE,
REFER TO T.O. 2-1-111
(PWA 16-333).
5. SURFACE TEXTURE PER PWA 388.
UNLESS OTHERWISE SPECIFIED, ALL
CAST SURFACES $\sqrt{125}$, ALL MACHINED SURFACES $\sqrt{125}$.
6. IN FREE STATE, AFTER REOPERATION,
PART MUST CONFORM TO DIMENSION U
WHEN SURFACE T IS .010.
ANGULAR RELATION TO OTHER FEATURES
NOT IMPORTANT.
7. UNLESS OTHERWISE SPECIFIED BREAK
EDGES 0.003 TO 0.015.
8. ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED.



SECTION J-J
SHOWING EXISTING DATUMS
AS FURNISHED

97901 (48X2)

Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 1 of 6)

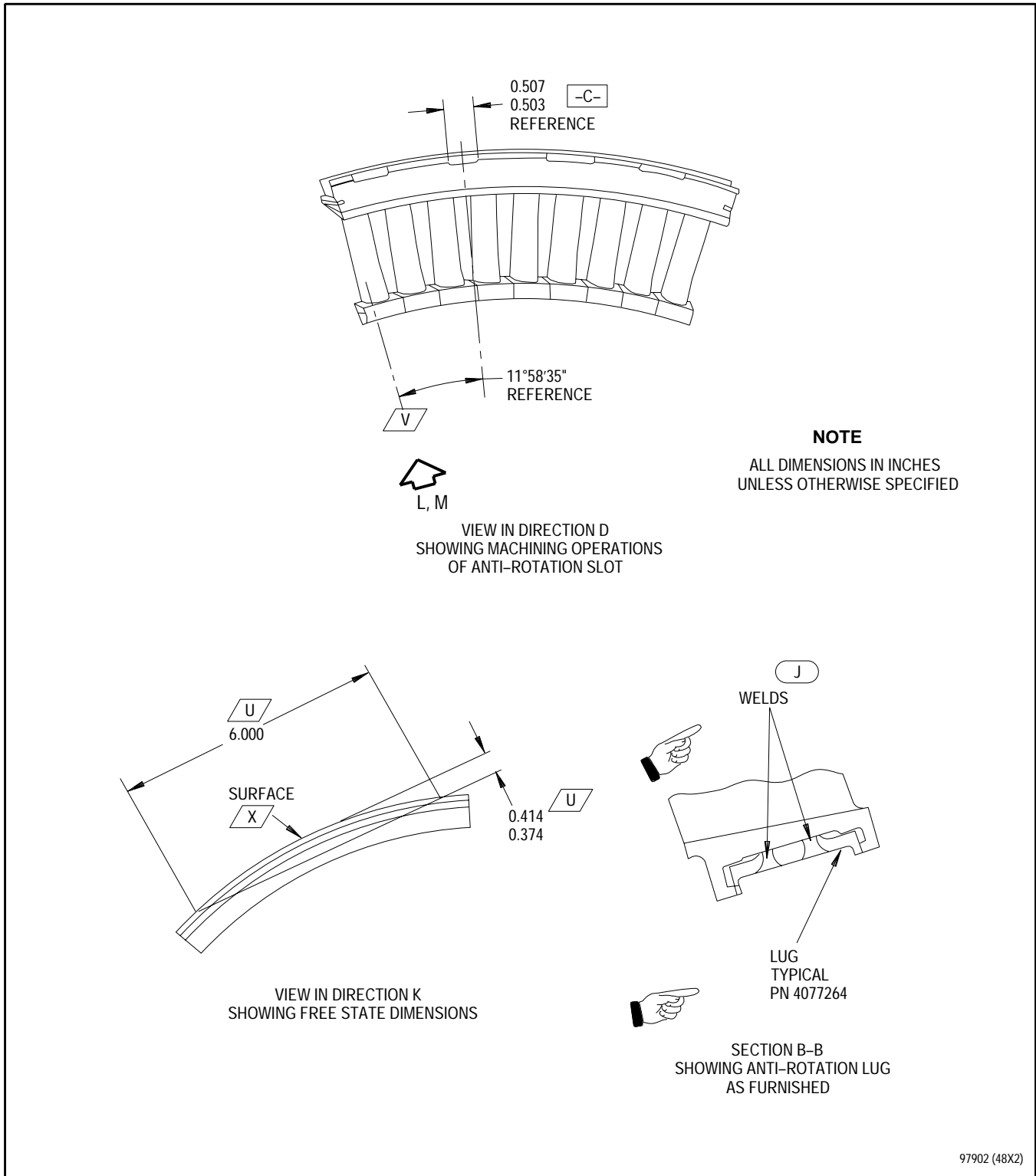


Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 2 of 6)

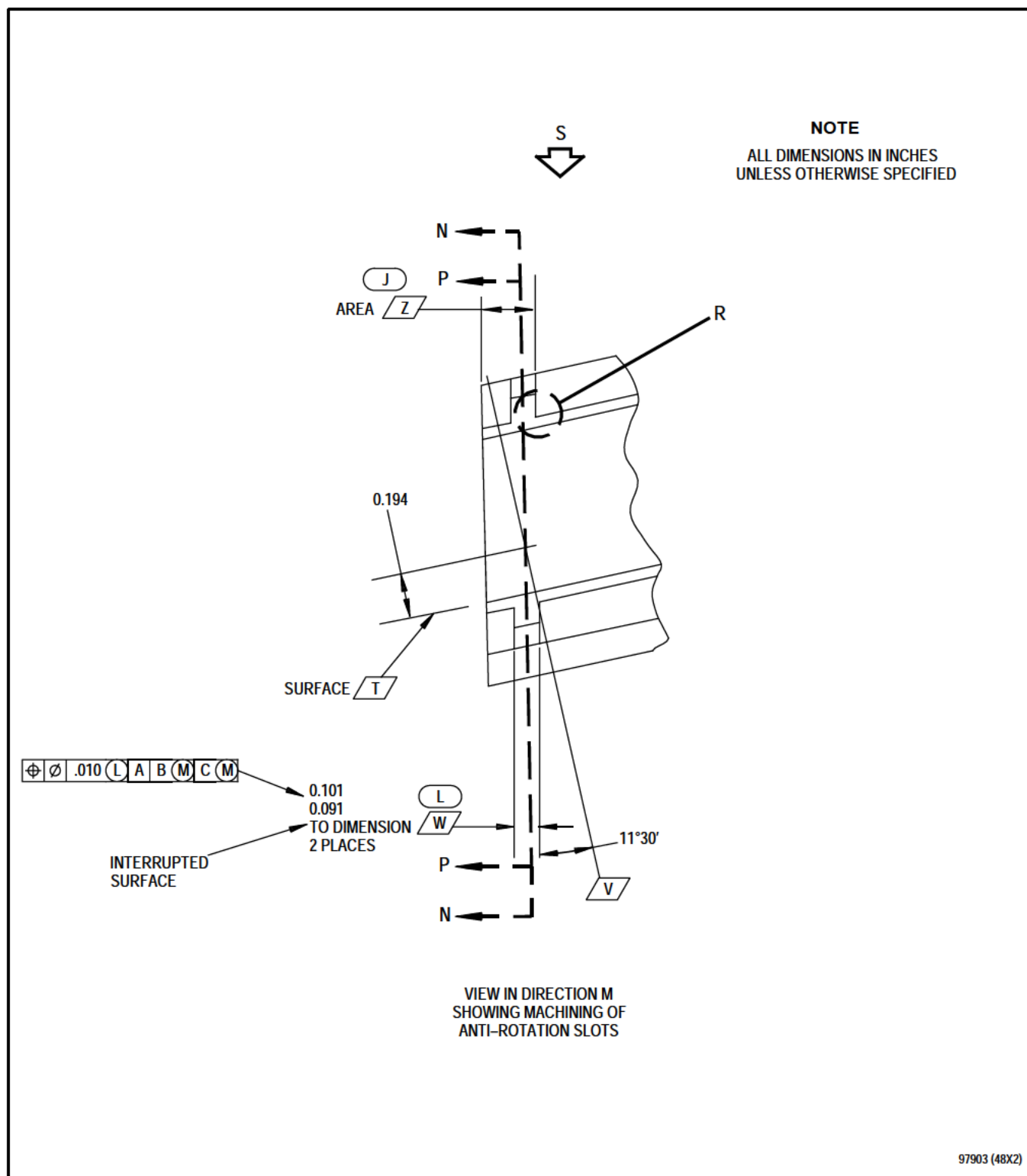


Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 3 of 6)

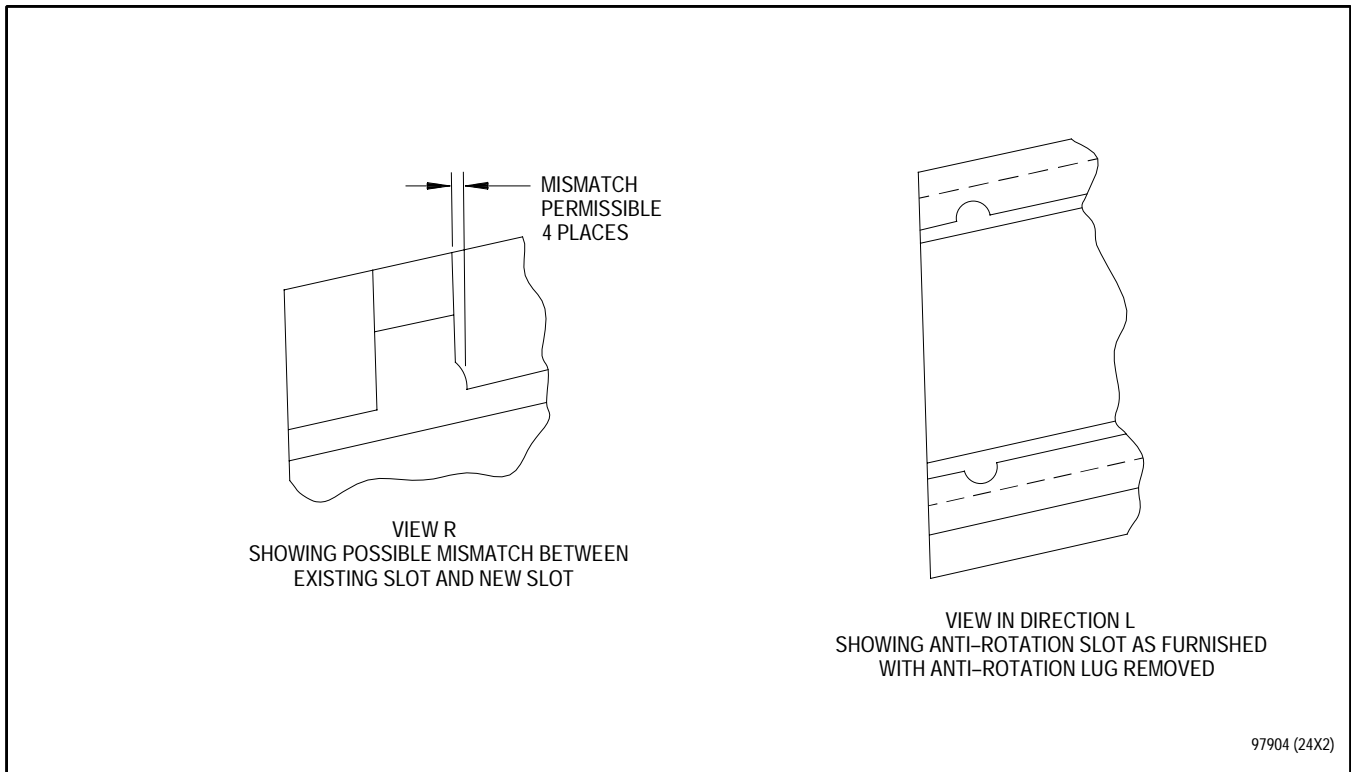


Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 4 of 6)

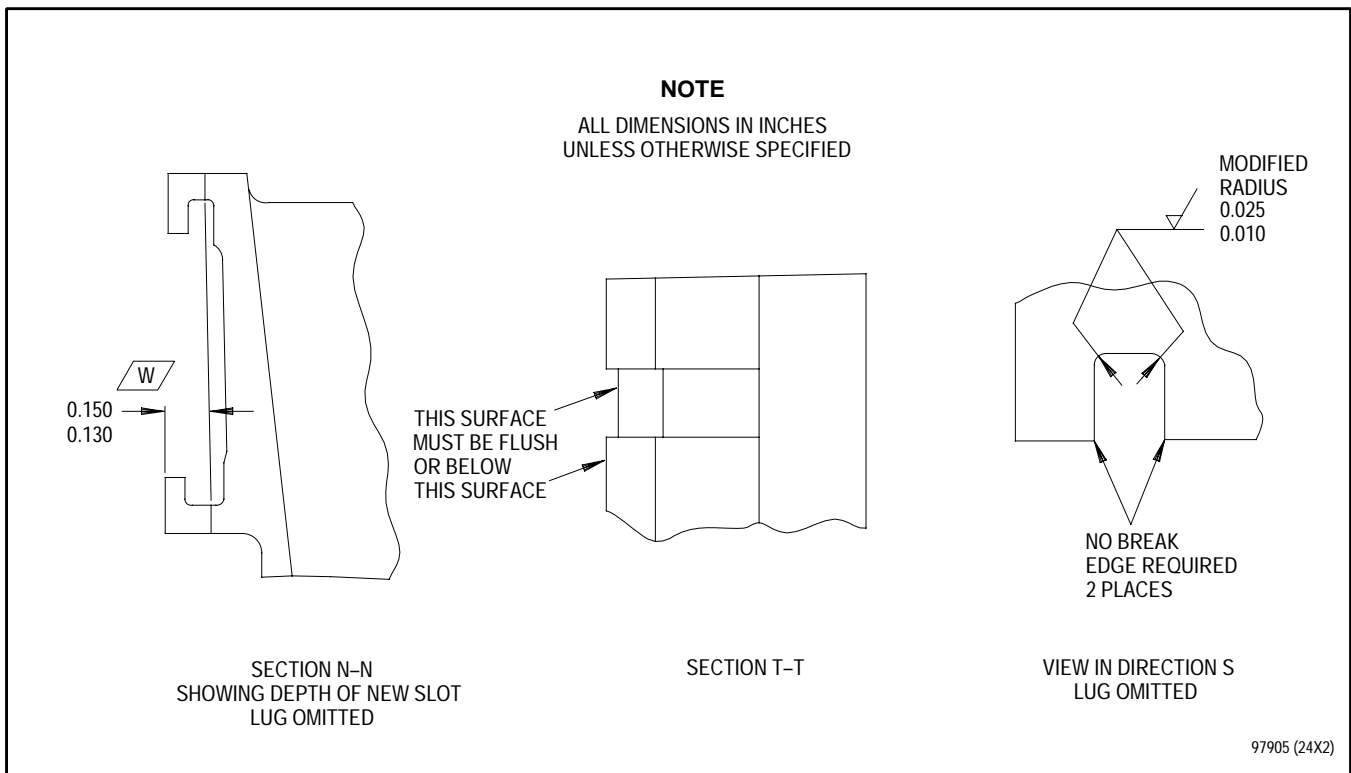


Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 5 of 6)

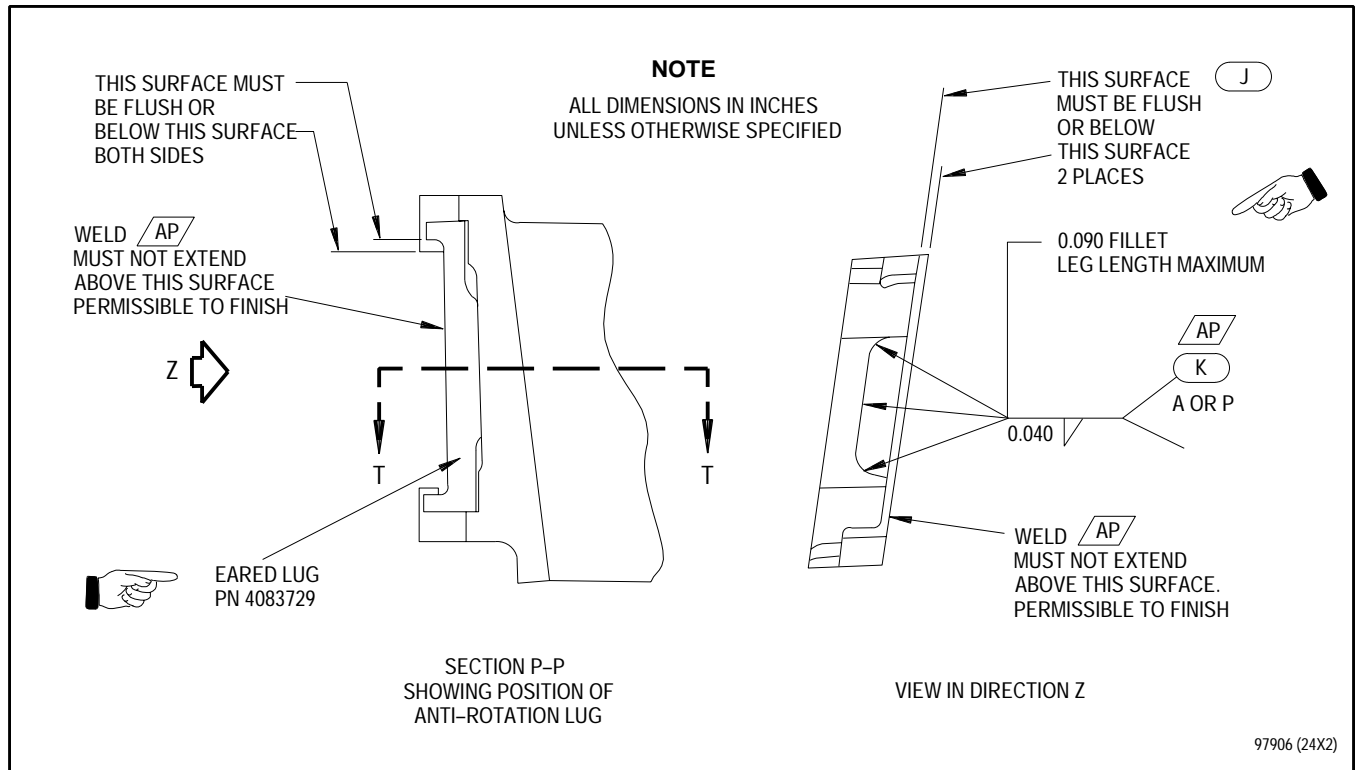


Figure 8. Eighth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 6 of 6)

Figure 9. Deleted.

**6. NINTH STAGE STATOR SEGMENT
ASSEMBLY - MISSING LUGS OR HALF-MOON
ANTIROTATION LUG REPLACEMENT (ALL
ASSEMBLIES EXCEPT PN 4077879 AND
4083979).**

(See figure 1 and Figures 10 and 11.)

NOTE

For repair of assemblies
PN 4077879 and 4083979, see
paragraph 2 or 3.

a. Deleted.

b. Replace antirotation lugs as
follows:

(1) Inspect stator segment
assembly to determine
incoming configuration. See
figure 10.

(a) If an eared antirotation
lug (View A) is
installed, replace with
another eared lug per
this paragraph.

(b) If installed antirotation
lug resembles rectangular
configuration (View B),
it is not necessary to
machine slot per step
b.(5). Install eared lug
per this paragraph.

(c) If installed antirotation
lug resembles half-moon
configuration (View C),
reoperate stator segment
per step b.(5) and
install eared lug per
this paragraph.

(d) If no lug is installed,
check for presence of
slot and inspect for
evidence of remnant of
weld material indicating
a lug had been installed
but is missing.

1 If no slot exists, do
not reoperate stator
segment per this
paragraph or install
any antirotation lug.

2 If slot is
rectangular with
remnant weld material
(View D), install
eared antirotation
lug per this
paragraph.

3 If slot is half-moon
configuration with
remnant weld material
(View E), reoperate
stator segment per
step b.(5) and
install eared lug per
this paragraph.

(2) Clean stator segment per
SPOP 208, Method B, or
SPOP 209. Refer to
T.O. 2-1-111.

- (3) Remove existing antirotation lug, if required, by cutting welds. See figure 11, Section B-B. Electrodischarge Metal Removal (EDM) may be used to remove eared lugs provided the following is accomplished: mask stator segment per SPOP 36 and figure 1, and refer to T.O. 2-1-111; tape using PMC 4000, 4001, 4134, 4138, 4139, or 4188 prior to applying maskant and wax; and polish weld area by hand to remove recast layer. Remove masking after EDM. PWA 71592 fixture may be used to aid eared lug removal. See note 2. Discard removed lug.
- (4) Remove remaining weld material from Area S. See figure 11, View K, and note 2.
- (5) For half-moon slot configuration only, machine new antirotation slot per figure 11, Views D, K, J, M, S, and Section L-L. PWA 71592 fixture may be used when machining slot. See note 3.
- (6) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (7) Fluorescent penetrant inspect machined areas of cast surface per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. No cracks allowed. Refer to T.O. 2-1-111.
- (8) Clean stator segment per SPOP 208, Method A, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (9) Weld new eared antirotation lug, PN 4083728, using Manual Gas Tungsten Arc (GTAW-MA) or Manual Plasma Arc per figure 11, Sections N-N, P-P, and View Y. Maintain fillet leg length from 0.040 inch minimum to 0.090 inch maximum. See note 4. Use PWA 71593 retainer set as required to hold lug in place during welding.
- (10) Clean stator segment per SPOP 208, Method B, or SPOP 209, as required. Refer to T.O. 2-1-111.
- (11) Fluorescent penetrant inspect weld per SPOP 82. Local fluorescent penetrant inspection per SPOP 70 is permissible. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.

c. Deleted.

Pages 35 and 36 deleted.

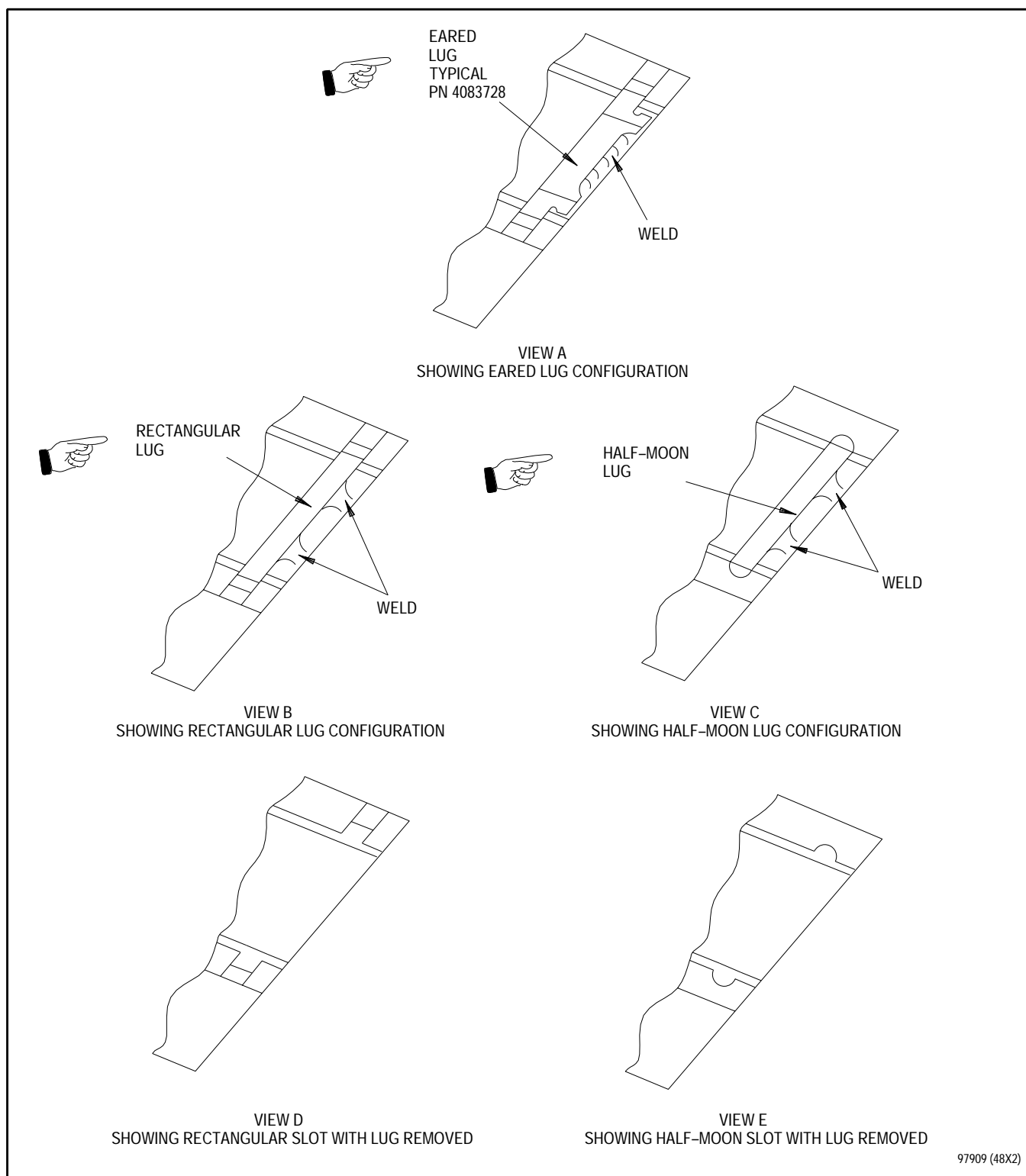
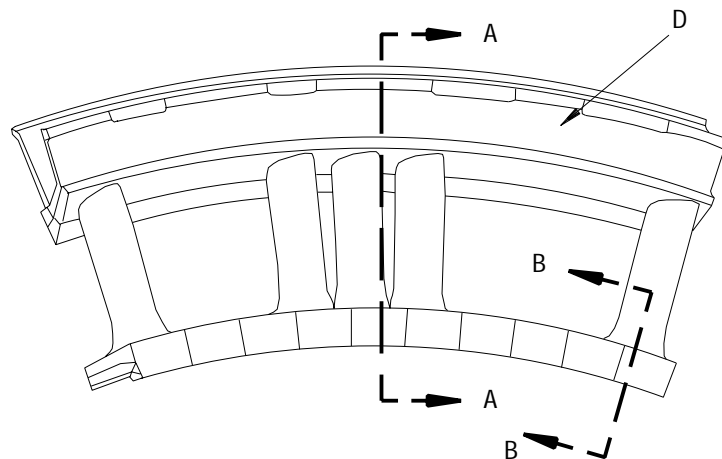


Figure 10. Ninth Stage Stator Segment - Antirotation Lug Configurations



VIEW SHOWING COMPRESSOR STATOR SEGMENT -
9TH STAGE, ASSEMBLY OF, AS FURNISHED
LOOKING AFT

NOTE

1. MATERIAL: STATOR SEGMENT, NICKEL ALLOY ;
LUG, NICKEL ALLOY.

2. (J) GRINDING PERMISSIBLE.

3. (L) MAY BE FINISHED PER ELECTRODISCHARGE
METAL REMOVAL (PWA 97-2) OR
WIRE ELECTRODISCHARGE METAL REMOVAL
(PWA 97-7). REFER TO TEXT FOR PROCEDURE.
THIS FEATURE IS TO BE LOCATED
WITHIN 0.005 OF TRUE POSITION
AT LEAST MATERIAL CONDITION IN RELATION
TO SURFACE $\boxed{-A-}$, DIAMETER $\boxed{-B-}$, AND
FEATURE $\boxed{-C-}$ WHEN DIAMETER $\boxed{-B-}$ AND
FEATURE $\boxed{-C-}$ ARE AT MAXIMUM MATERIAL
CONDITION.

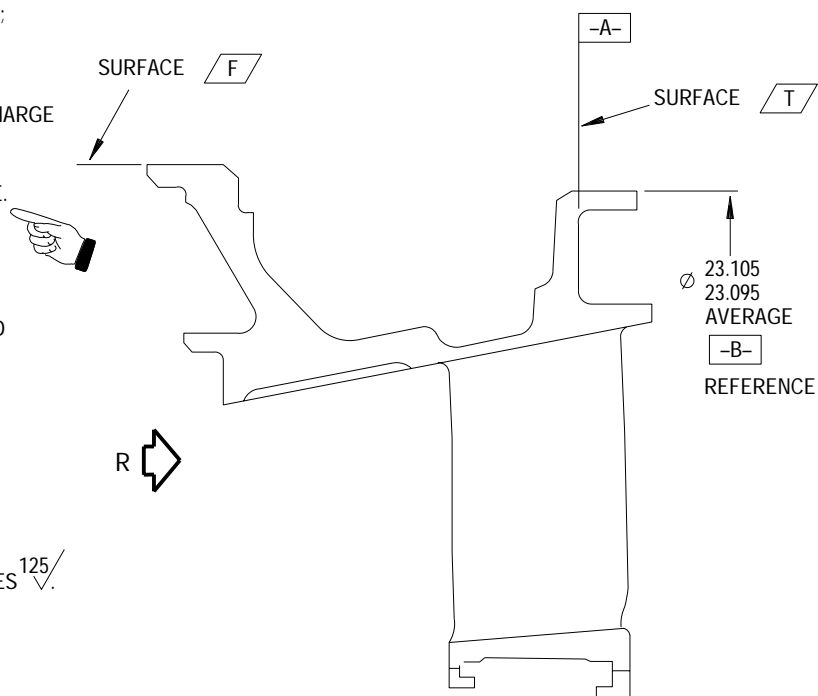
4. (K) WELD USING AMS 5837 WELD WIRE,
REFER TO T.O. 2-1-111, (PWA 16-333).

5. SURFACE TEXTURE PER PWA 388.
UNLESS OTHERWISE SPECIFIED ALL

CAST SURFACES \checkmark , ALL MACHINED SURFACES \checkmark^{125} .
6. IN FREE STATE, AFTER REOPERATION,
PART MUST CONFORM TO DIMENSION \boxed{U}
WHEN SURFACE \boxed{T} IS $\boxed{\varnothing .010}$.
ANGULAR RELATION TO OTHER FEATURES
NOT IMPORTANT.

7. UNLESS OTHERWISE SPECIFIED, BREAK
EDGES 0.003 TO 0.015.

8. ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED.



SECTION A-A
SHOWING EXISTING DATUMS
AS FURNISHED

97910 (48X2)

Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 1 of 6)

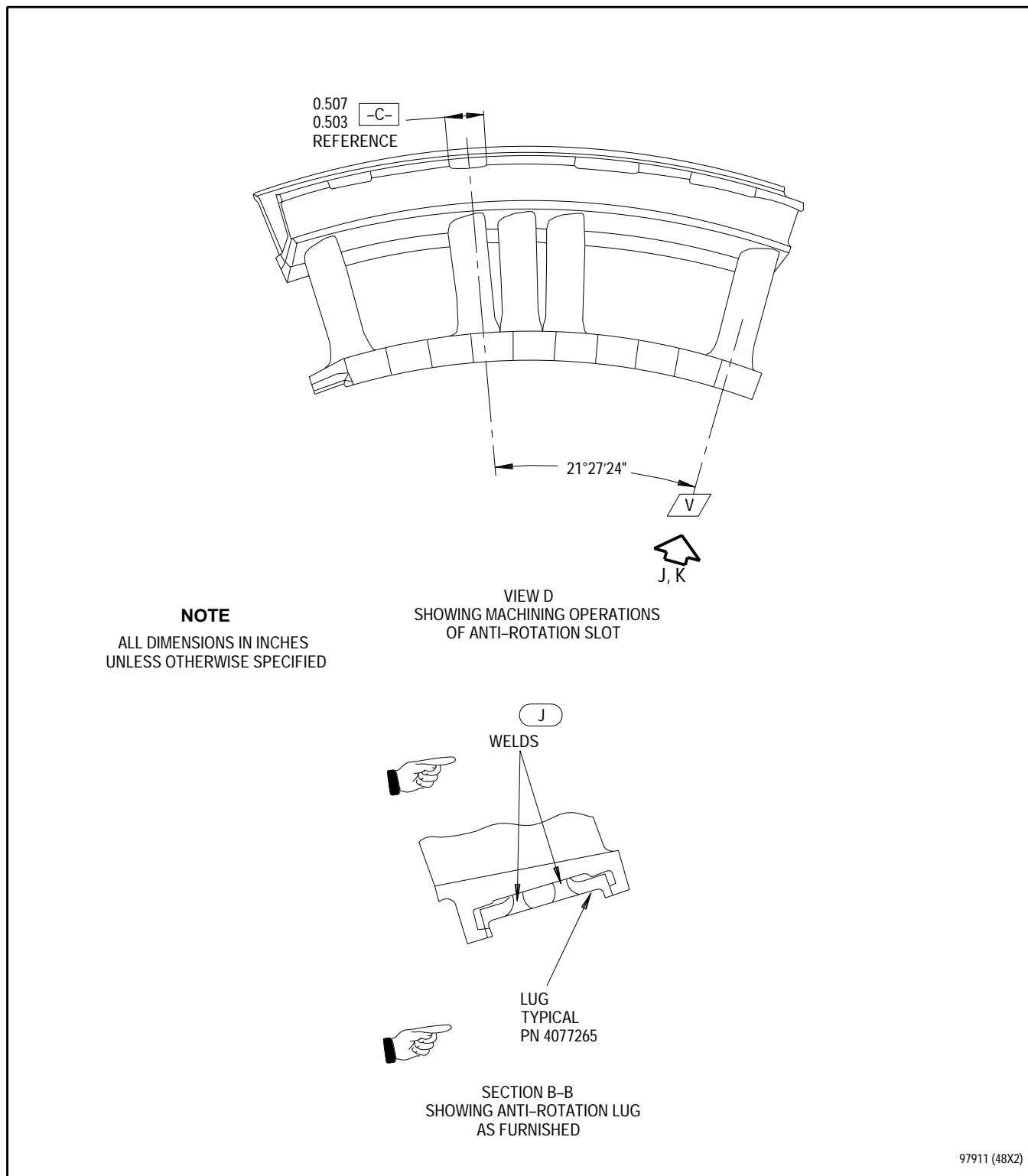


Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 2 of 6)

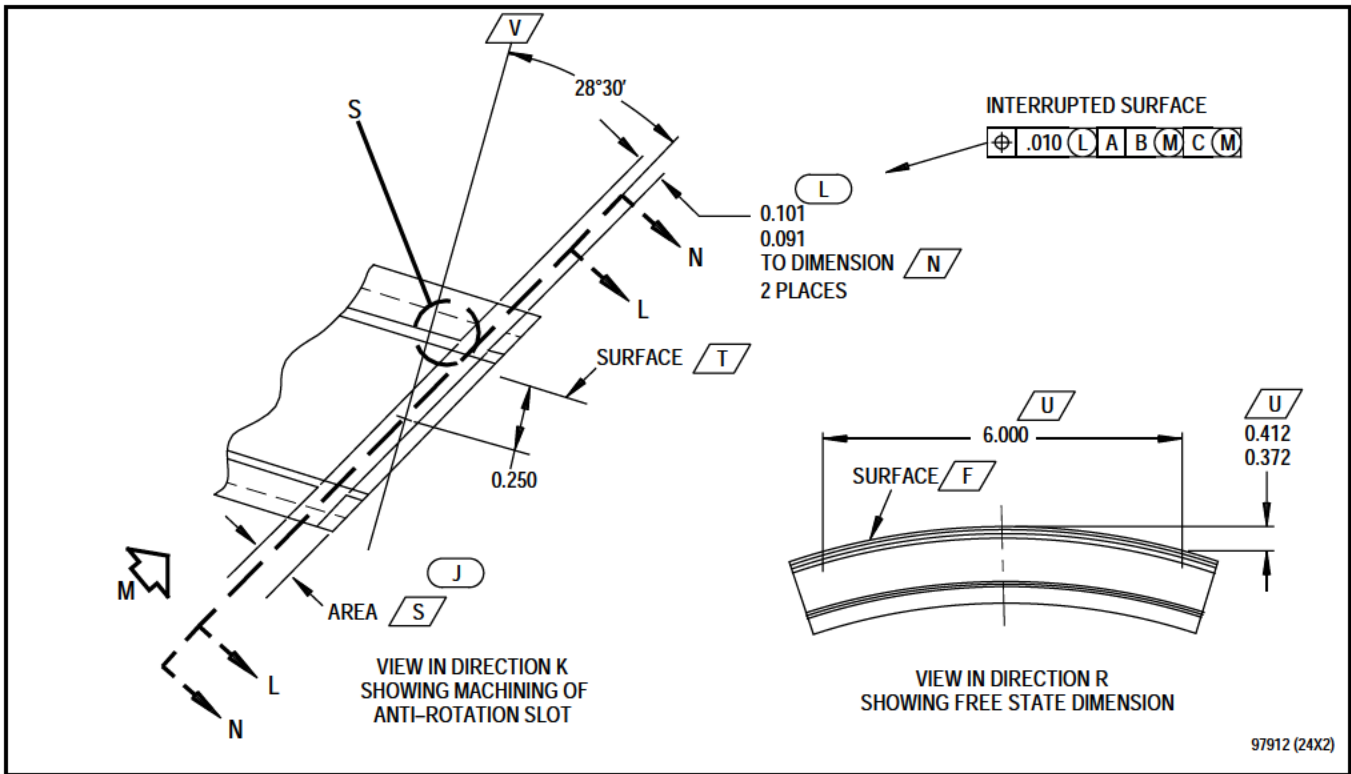


Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 3 of 6)

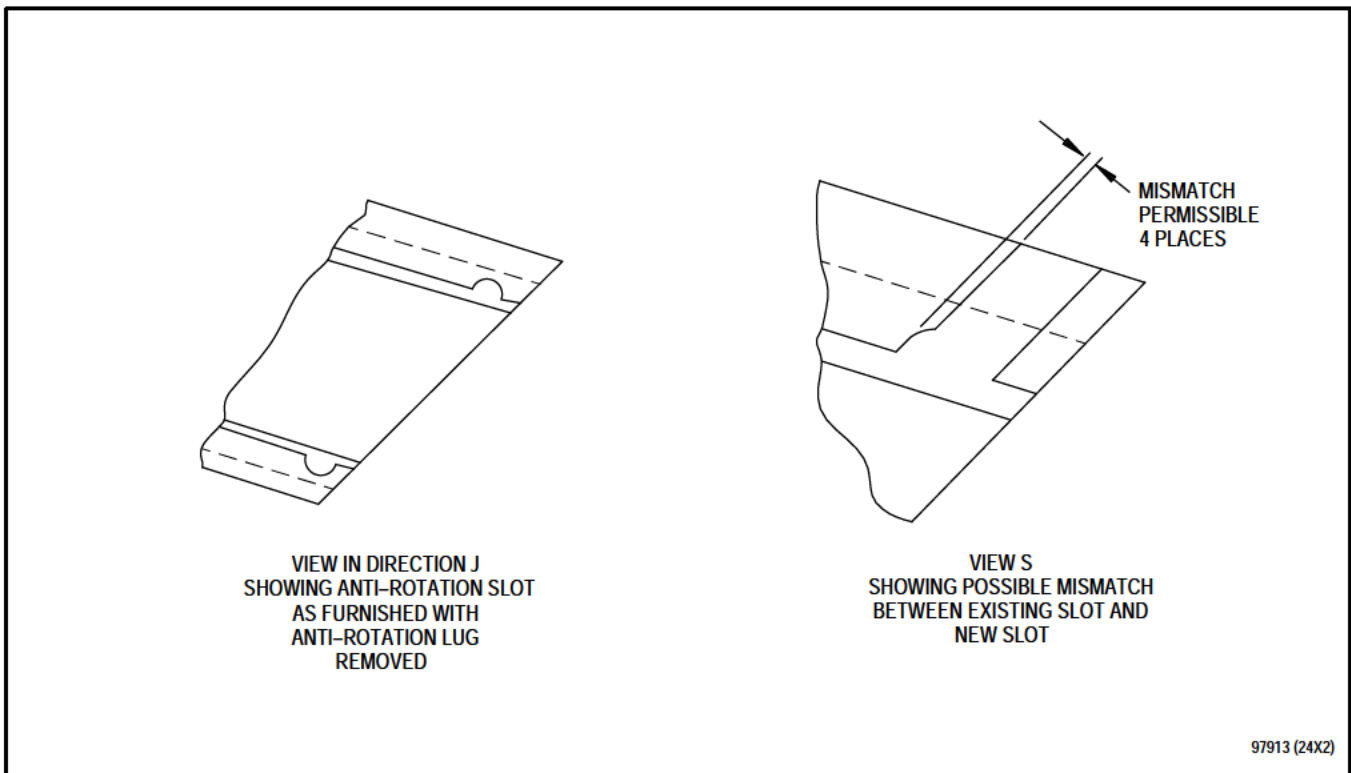


Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 4 of 6)

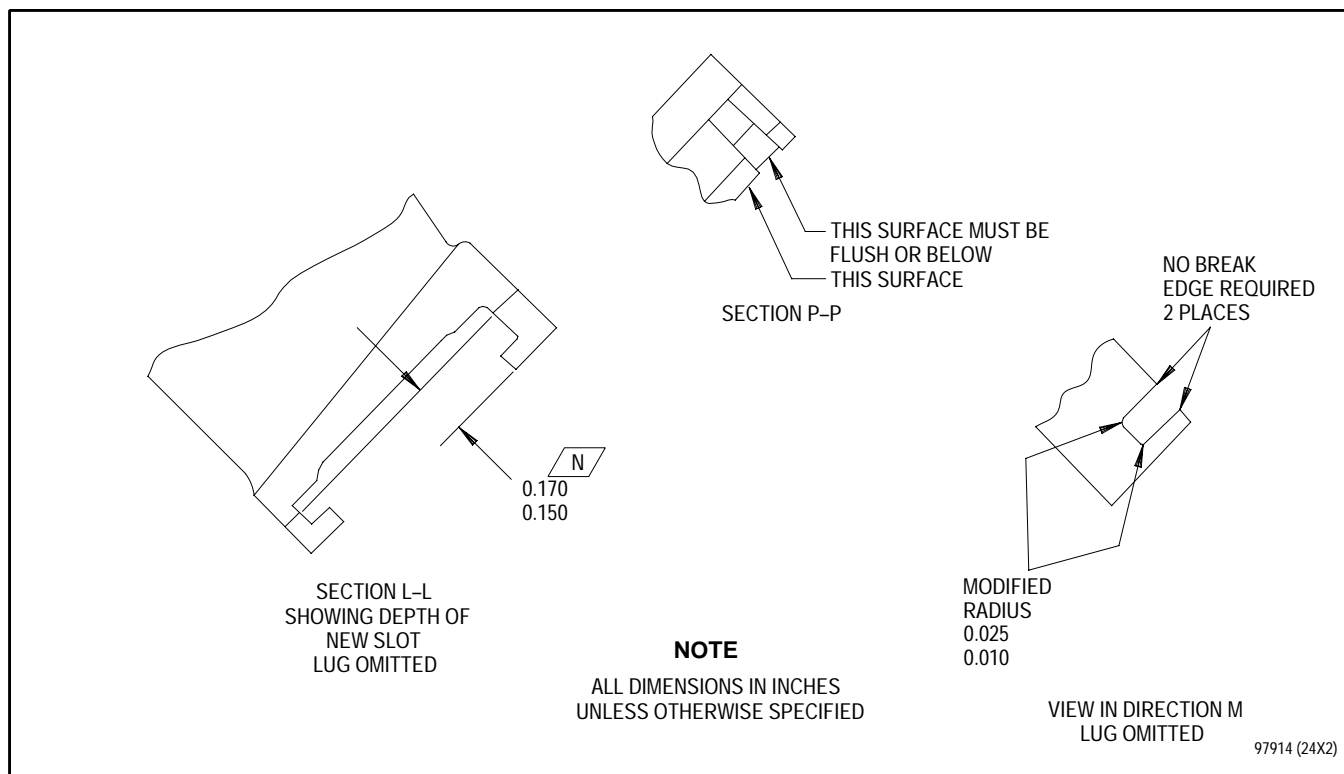


Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Anti-rotation Lug (Sheet 5 of 6)

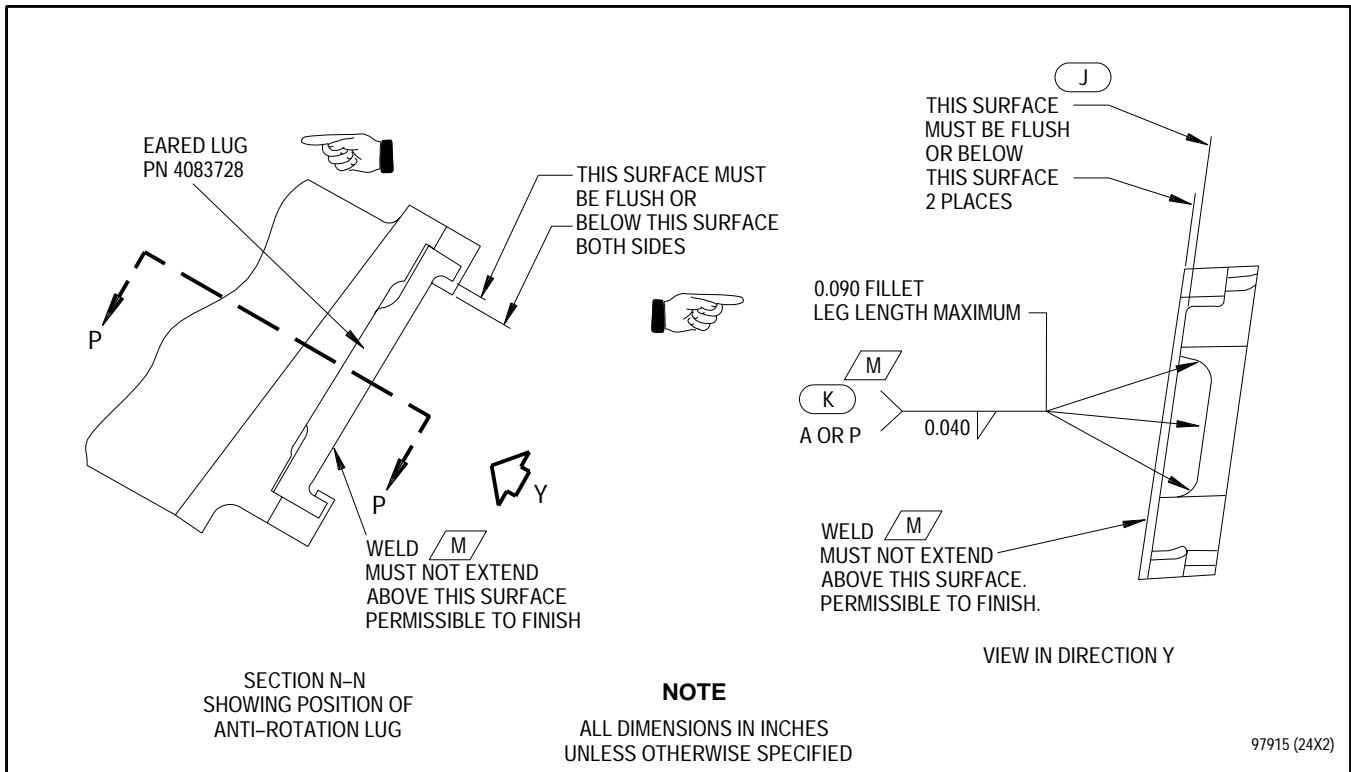


Figure 11. Ninth Stage Stator Segment - Reoperation to Accept Eared Antirotation Lug (Sheet 6 of 6)

Figure 12. Deleted.

**7. SEVENTH THROUGH NINTH STAGE
COMPRESSOR STATOR SEGMENTS - REMOVAL
AND APPLICATION OF PWA 279 ABRADABLE.**

Failure to use an approved source for this repair may result in a nonserviceable part.

NOTE

This repair is a source demonstration repair. It is recommended reparable parts be sent to an approved source for repair. An approved source list and information on becoming a qualified source can be obtained by contacting the cognizant USAF F100 Engineering Source Authority at the address listed in T.O. 2J-F100-53-1, WP 600 00.

**8. SEVENTH THROUGH NINTH STAGE
COMPRESSOR STATOR SEGMENTS - REMOVAL
AND APPLICATION OF PWA 284 ABRADABLE.**

Failure to use an approved source for this repair may result in a nonserviceable part.

NOTE

This repair is a source demonstration repair. It is recommended reparable parts be sent to an approved source for repair. An approved source list and information on becoming a qualified source can be obtained by contacting the cognizant USAF F100 Engineering Source Authority at the address listed in T.O. 2J-F100-53-1, WP 600 00.

WORK PACKAGE

TECHNICAL PROCEDURES

VANES, REAR COMPRESSOR, VARIABLE INLET -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	0	5	29
2	6	4	6	6 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Buffing, Power Denicking of Titanium Parts	
(SPOP 532) - - - - -	SWP 091 01
Nondestructive Inspection - - - - -	T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of the rear compressor variable inlet vanes.

**2. REAR COMPRESSOR VARIABLE INLET
STATOR VANE - BLEND REPAIR.**

(See Figure 1.)

NOTE

Stoning and polishing of compressor vanes shall be done lengthwise to vane and never across it. This is to ensure that no scratches, however minute, run across vane edge. Elimination of damaged areas in vane shall be performed by local hand blending of damaged area only. Surface finish shall be comparable to new vane. Buffing of entire area of vane is not permitted. Grinding is not permitted on air foil.

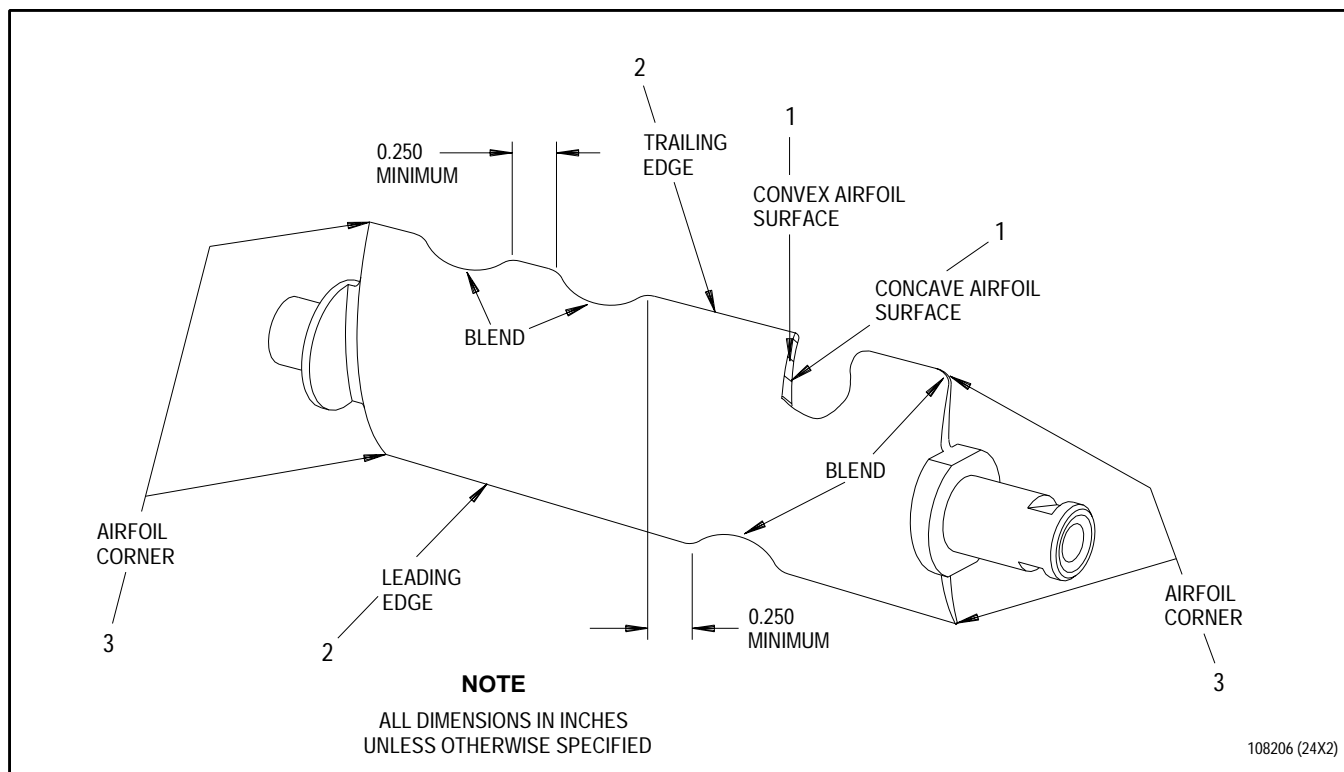
- a. Blend vanes without exceeding reparable limits in areas shown in figure 1. Refer to T.O. 2J-F100-53-1, SWP 091 01 (SPOP 532).

- b. All blend repairs to be full radius surface to surface and to blend into undamaged surface with 3/32 inch minimum radius.

NOTE

Nondestructive inspection materials contain chloride which can cause stress corrosion if not thoroughly cleaned from titanium alloy parts. During nondestructive inspection, keep all materials confined to local areas being inspected. After inspection, all traces of inspection materials shall be completely removed. Removal shall be verified by use of black light.

- c. Fluorescent penetrant inspect blended areas for cracks per T.O. 2J-F100-9. No cracks permitted.

**Reparable Area****Reparable Limit**

- | | |
|---|---|
| 1 | a. 0.010 inch maximum blend depth
b. Three airfoil surface blends maximum per vane |
| 2 | a. 0.050 inch maximum blend depth
b. 0.750 inch maximum total length for all blends combined on each vane
c. Blend length shall be ten times depth minimum.
d. Three edge blends maximum per vane
e. 0.250 inch minimum separation between blends |
| 3 | 0.125 inch radius after blending |

Figure 1. Rear Compressor Variable Inlet Stator Vane - Blend Repair

WORK PACKAGE

TECHNICAL PROCEDURES

CHAMBER ASSEMBLY, COMBUSTION -

REPAIR

EFFECTIVITY: ENGINE MODELS F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	20	4 - 5	20	6 - 8	16
2 - 3	16				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ALCOHOL, ISOPROPYL	TT-I-735
SERMETEL W	PWA 595-1

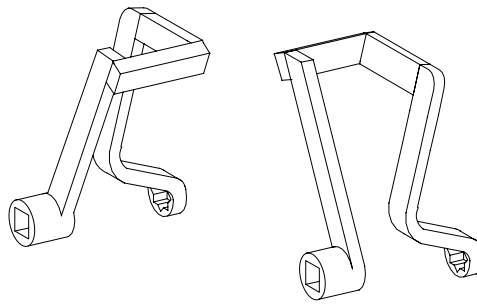
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
NUT, DEFLECTOR	4023115	AR

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	COMBUSTION CHAMBER ASSEMBLY - DEFLECTOR REMOVAL AND REPLACEMENT WITH COMBUSTION CHAMBER ASSEMBLED	
	TORQUE ADAPTER SET, COMBUSTION CHAMBER DEFLECTOR NUT - - - - -	PWA 71195

ILLUSTRATED SUPPORT EQUIPMENT



PWA 71195 -C

Figure T1. PWA 71195 TORQUE ADAPTER SET

1. INTRODUCTION.

- a. This work package contains instructions for repair of combustion chamber assembly.

2. COMBUSTION CHAMBER ASSEMBLY - DEFLECTOR REMOVAL AND REPLACEMENT WITH COMBUSTION CHAMBER ASSEMBLED.

(See Figure 1.)

NOTE

Up to 4 deflectors, no more than two adjacent and no more than three in a group of eight, can be replaced without disassembly of complete combustion chamber assembly.

- a. Deflectors shall be removed and replaced one at a time. Remove individual deflector as follows:

NOTE

PWA 71195 torque adapter set contains one each left offset and right offset wrench.

- (1) Using correct PWA 71195 offset wrench, remove four nuts(5, figure 1) retaining deflector.

- (2) Discard nuts.



Use care when removing deflectors to prevent chipping liner segment thermal barrier coating.

- (3) Remove deflector through aft end of combustion chamber assembly.

- b. Replace individual deflector as follows:

- (1) Ensure deflector threaded posts and nuts are grease and oil free. If required clean per SPOP 209, Method A, or wipe with isopropyl alcohol. Refer to T.O. 2-1-111.

- (2) Install deflector by positioning threaded posts and pin into appropriate post holes and aligning pin hole.

- (3) Ensure proper clearances(8) are maintained. Trimming of ceramic coating overspray is permissible to maintain proper clearances. (See figure 1.)

- (4) Install four washers(6) with dimples in slots of dome.

- (5) Ensure washers do not cover adjacent cooling holes.

- (6) Install four nuts(5) and hand tighten using PWA 71195 torque adapter set.

- (7) Maintain desired deflector ID edge to liner segment gap(7) and deflector to deflector gap(8).



Failure to follow torque sequence strictly for proper installation may result in reduced part performance.

- (8) Torque all nuts 12 to 15 pound-inches using PWA 71195 torque adapter with a dial indicator torque wrench. Shims may be used to maintain dimensional requirements while torquing nuts.

(9) Torque nuts to final torque as follows:

- (a) Loosen first nut in sequence one full turn (360 degrees) from starting point.
- (b) Determine run-on torque of first nut, 2 to 15 pound-inches range, using PWA 71195 torque adapter.



Overtorquing nut will result in deflector cracking during engine operation.

NOTE

There are two types of deflectors. Newer deflector has cooling pins on forward surface.

- (c) Final torque nut as follows:

1 For PN 4080361 deflector (without cooling pins), torque nut 2 to 3 pound-inches above run-on torque.

2 For PN 4081117 deflector (with cooling pins), torque nut 2 to 6 pound-inches above run-on torque.

- (d) In proper sequence repeat steps (a) through (c) until all nuts have been retorqued.

c. Ensure clearance dimensions (7, 8 and 15) are satisfied and dimples on all washers are into slots and completely cover slots. Correct as required by realigning deflector and repeating installation procedure.

WARNING

SermeTel W is toxic and contains chromium particles which are suspected carcinogens. Contact with alkaline solutions may produce explosive hydrogen gas. Keep ignition sources away. Follow special handling procedures. Prevent accumulation of dust and vapors. Provide adequate ventilation. Wear protective clothing/equipment. Avoid direct body contact.

- d. Shake PWA 595-1 (SermeTel W) aluminum coating well to thoroughly mix ingredients. Coating should be stirred continuously during application to avoid separation of ingredients.

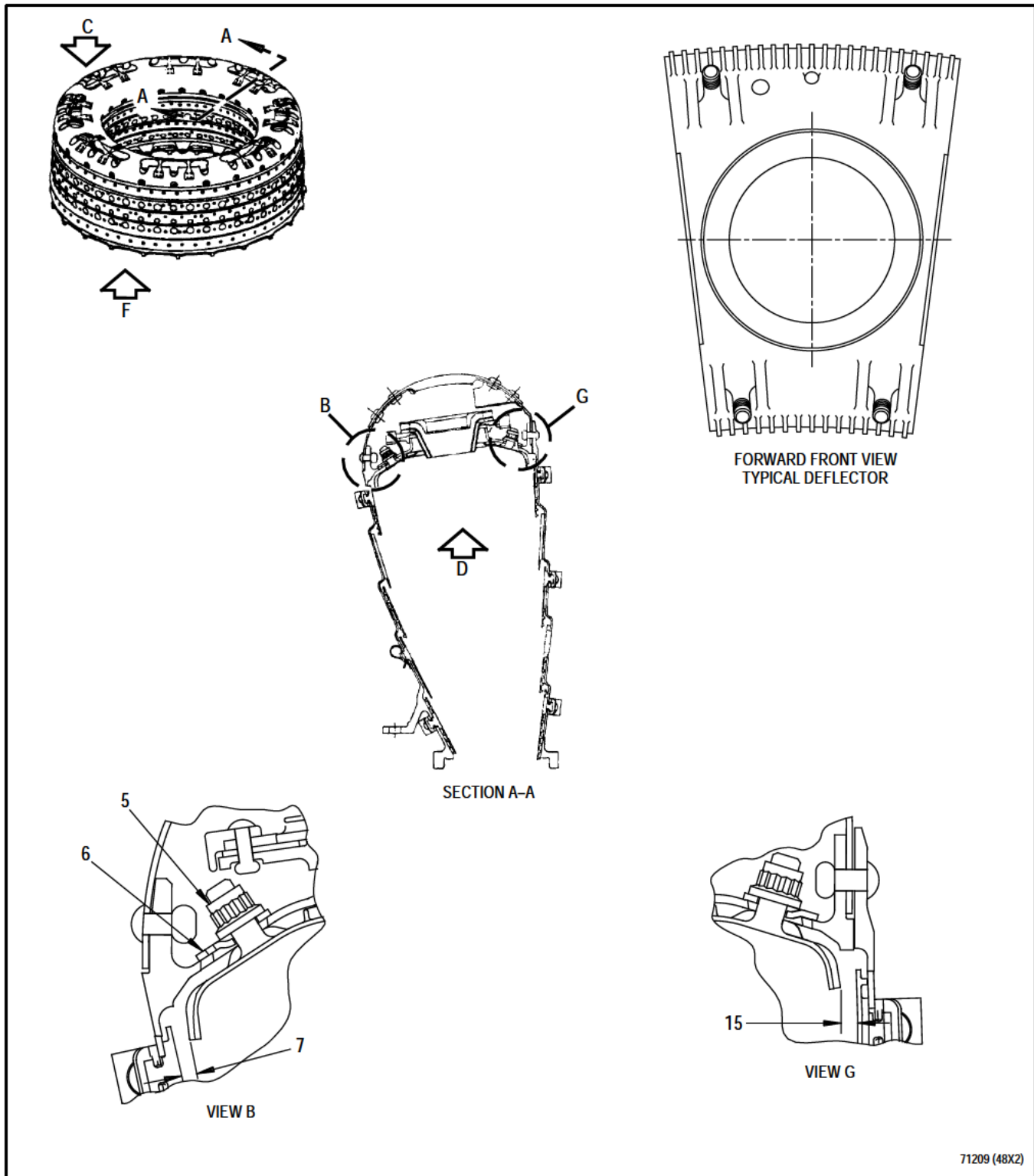


PWA 595-1 (SermeTel W) aluminum coating shall be applied only to deflector threaded posts and nuts as directed. Allowing contact with other parts may result in reduced part performance.

NOTE

PWA 595-1 (SermeTel W) aluminum coating is water soluble.

- e. Use #1 sable artist brush or equivalent to apply PWA 595-1 (SermeTel W) aluminum coating to only top of deflector threaded posts and nuts. Avoid dripping of coating by not overloading brush. Drips or spills should be wiped clean with water damp cloth or rinsed with water. Refer to T.O. 2-1-111, SPOP 162.



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Figure 1. Combustion Chamber Assembly - Deflector Removal And Replacement With Combustion Chamber Assembled (Sheet 1 of 2)

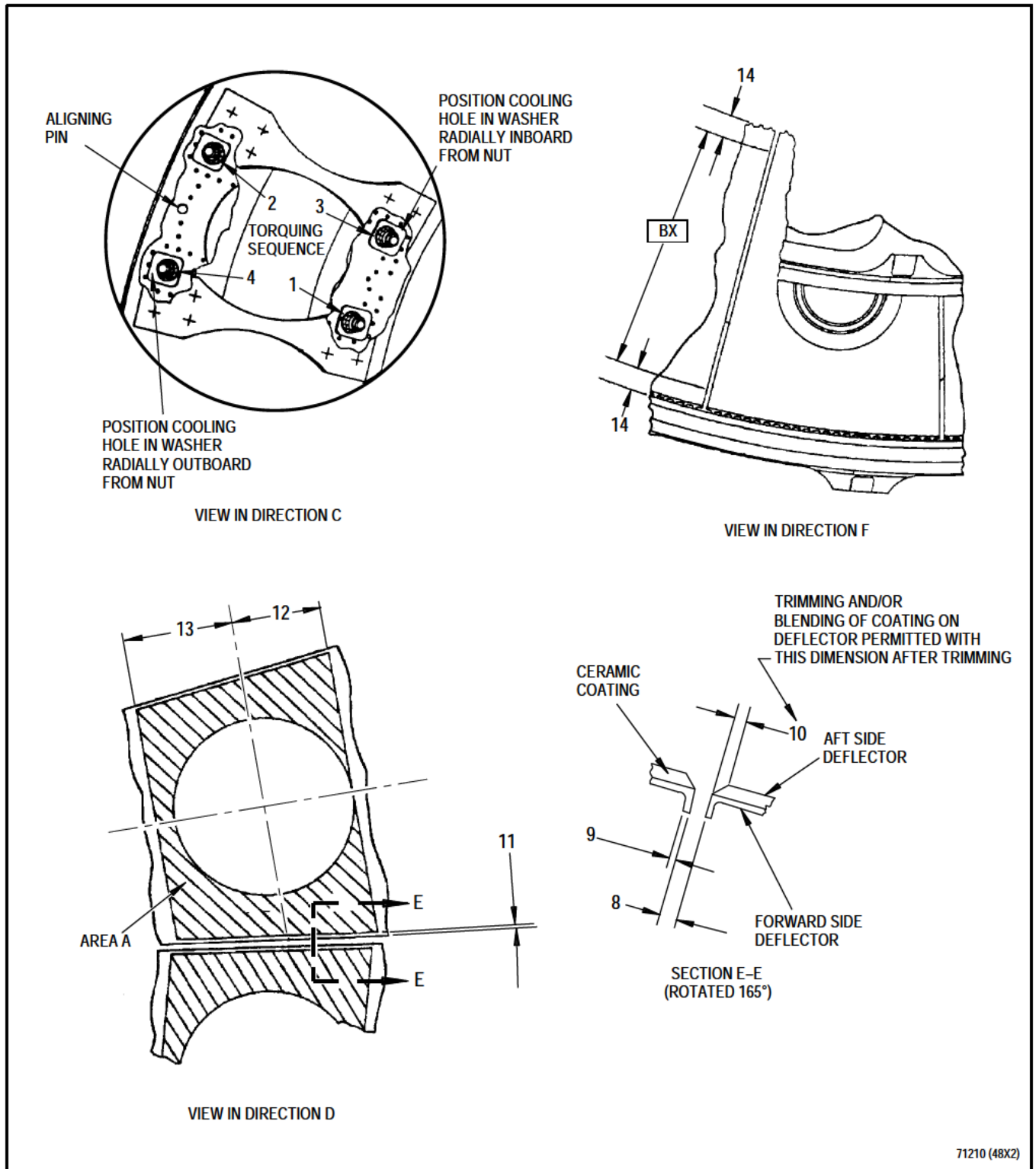


Figure 1. Combustion Chamber Assembly - Deflector Removal And Replacement With Combustion Chamber Assembled (Sheet 2 of 2)

Legend for figure 1

NOTE

Chipping or flaking of the ceramic coating (PWA 265) may be 1.000 square inch in area for each deflector, except no chipping or flaking of coating allowed in area A.

1. Torque this nut first
2. Torque this nut second
3. Torque this nut third
4. Torque this nut fourth
5. Deflector nut, typical PN 4023115, as required
6. Washer, typical PN 4075754, as required
7. 0.023 to 0.191 inch
8. 0.024 to 0.108 inch gap for distance BX, 0.024 to 0.135 inch gap for distance 14
9. 0.020 inch minimum after trimming
10. 0.020 inch maximum
11. 0.040 inch maximum, both sides
12. 0.850 inch minimum
13. 1.023 inch minimum
14. 0.300 inch maximum distance for 0.024 to 0.135 inch permissible gap between deflectors
15. 0.044 to 0.176 inch

WORK PACKAGE

TECHNICAL PROCEDURES

SUPPORT ASSEMBLY, FIRST STAGE TURBINE STATOR -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	5 Added	29	6 Blank Added	29
3 - 4	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Qualified Repair Source List (QRSL) Core Engine Module -	WP 603 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of the 1st stage turbine stator support assembly.

2. FIRST STAGE TURBINE OUTER AIR SEALING RING - PLATE NUT REPLACEMENT.

(See Figure 1.)

- Remove rivets securing plate nut by drilling upset head (on plate nut surface).
- Remove unserviceable plate nut.

NOTE

Hole in nut must be located within 0.005 inch radius of true position in relation to hole in ring.

- Position new plate nut over existing hole in ring.
- Using 0.096 to 0.100 inch diameter drill, transfer drill rivet holes into plate nut.
- Install rivets with manufactured heads against ring. Upset rivets. Refer to T.O. 2-1-111.

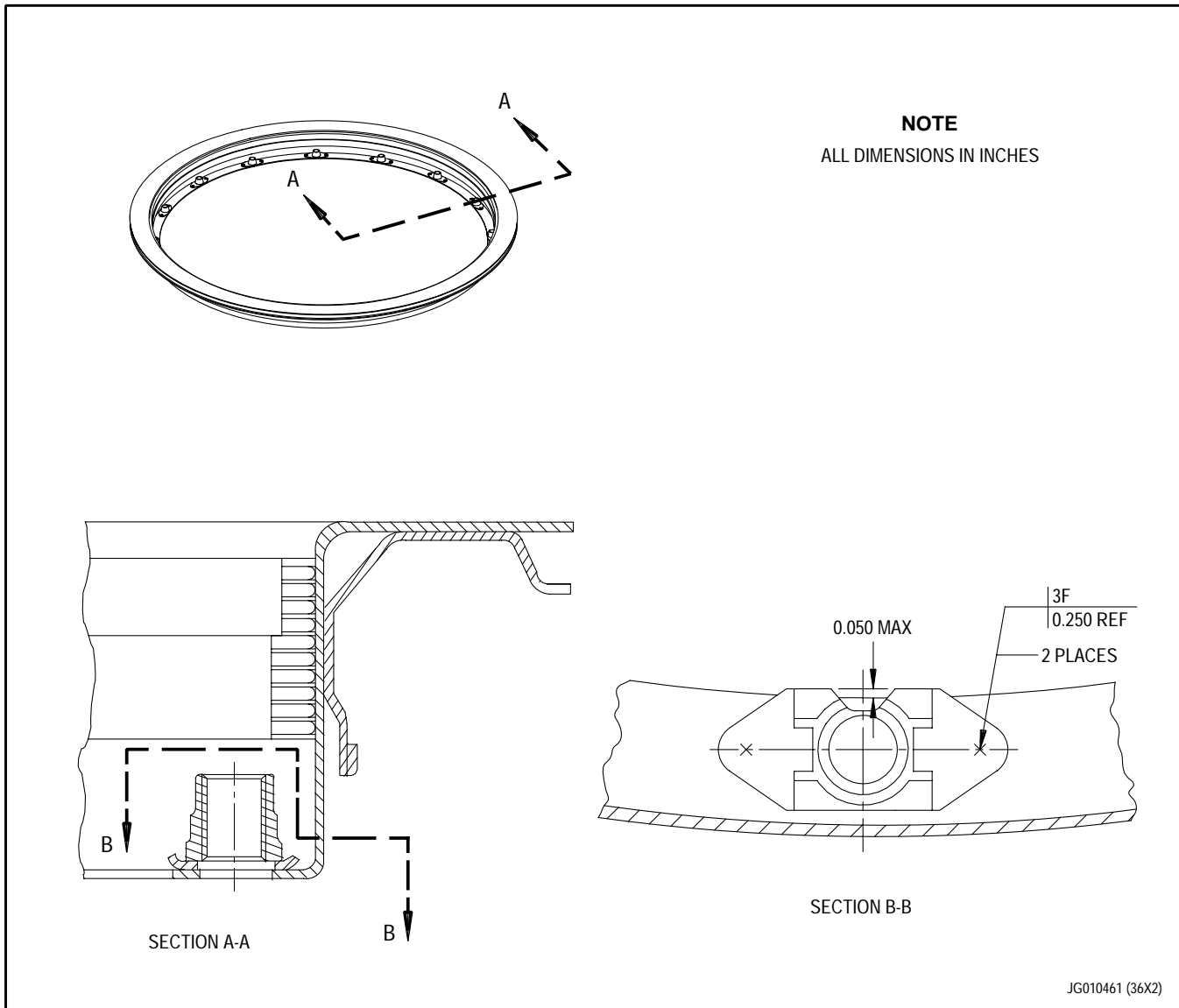


Figure 1. First Stage Turbine Outer Air Sealing Ring - Plate Nut Replacement.

3. FIRST STAGE TURBINE AIR SEALING RING (TYPICAL PN 4080430) - HONEYCOMB REPLACEMENT.

NOTE

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if a vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. Repair is proprietary. Refer to T.O. 2J-F100-53-1, WP 603 00, for QRSL by Task Code.

Task Code	Distress
JGDFGZD	Honeycomb wear

4. FIRST STAGE TURBINE INNER AIR SEALING RING (TYPICAL PN 4070980) - HONEYCOMB REPLACEMENT.

NOTE

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if a vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. Repair is proprietary. Refer to T.O. 2J-F100-53-1, WP 603 00, for QRSL by Task Code.

Task Code	Distress
JGDFGZC	Honeycomb wear

WORK PACKAGE**TECHNICAL PROCEDURES****DISK-DRUM ROTOR, REAR COMPRESSOR, REAR, ASSEMBLY
(SEVENTH THROUGH THIRTEENTH STAGE) -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 16

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4D	29	6A Added	14	7 - 9	29
5	29	6B Blank Added	14	10 Blank	20
6	9				

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Grinding, Blending, Lapping, Buffing, and Peening - - - - -	WP 091 00
General Repair Procedures - Peening, Steel Shot (SPOP 501) - - - - -	SWP 091 08
Qualified Repair Source List (QRSL) Core Engine Module -	WP 603 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Application of Adhesive Sealant PWA 36056 - - - -	WP 627 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS**Nomenclature****Specification/Vendor Part Number**

CLOTH, ABRASIVE, CROCUS

P-C-458

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 7th through 13th stage rear compressor disk-drum rotor assembly.
- b. If disk-drum rotor assembly is installed in transportation stand, remove from stand per WP 622 00 if necessary for repair. Install rotor assembly in transportation stand per WP 035 00 after repair.

2. DISK-DRUM ROTOR, REAR COMPRESSOR, REAR, ASSEMBLY - BLEND REPAIR.

(See Figure 1.)

- a. Blend pits, nicks, scratches, and dents except in No. 4 bearing journal, splines, and heatshield as follows:
 - (1) Scratches - blend depth shall not exceed 0.003 inch after polishing.
 - (2) Pits, nicks, and dents - blend depth shall not exceed 0.003 inch after polishing.
 - (3) Blend shall not exceed 1.00 inch in diameter.
 - (4) Blend distance shall be at least 15 times depth of damage.
 - (5) Minimum wall thickness shall be maintained.
See figure 1.
 - (6) Surface finish shall be as smooth or smoother than surrounding parent material.
 - (7) Blends shall be separated by at least 2.00 inches of unblended wall (this also applies to blends on opposite sides of web).

- (8) Locking tang wall thickness shall be 0.055 inch minimum after removal of 0.003 inch maximum material.

- (9) Area F blend repair:

- (a) Blend allowed 360 degrees to minimum wall thickness of 0.147 inch as measured from bottom of threads (minor diameter) on OD of shaft.

- (b) Surface finish of all blends shall be smooth as, or smoother than adjacent surfaces.

- (c) Blend shall be smooth transition into adjacent surfaces. If radius is present after blending, it shall not be less than 0.250 inch.

- (d) Local fluorescent penetrant inspect per SPOP 70, and inspect per SPFS-M. Refer to T.O. 2-1-111. Shotpeen of blended area is not required.

- b. Blend as follows, observing limitations in step a.

- (1) Use fine stones, files, or abrasive cloth of silicon carbide or aluminum oxide to remove all trace of damage while removing as little material as possible.
- (2) Maintain blend dimensions of figure 1.

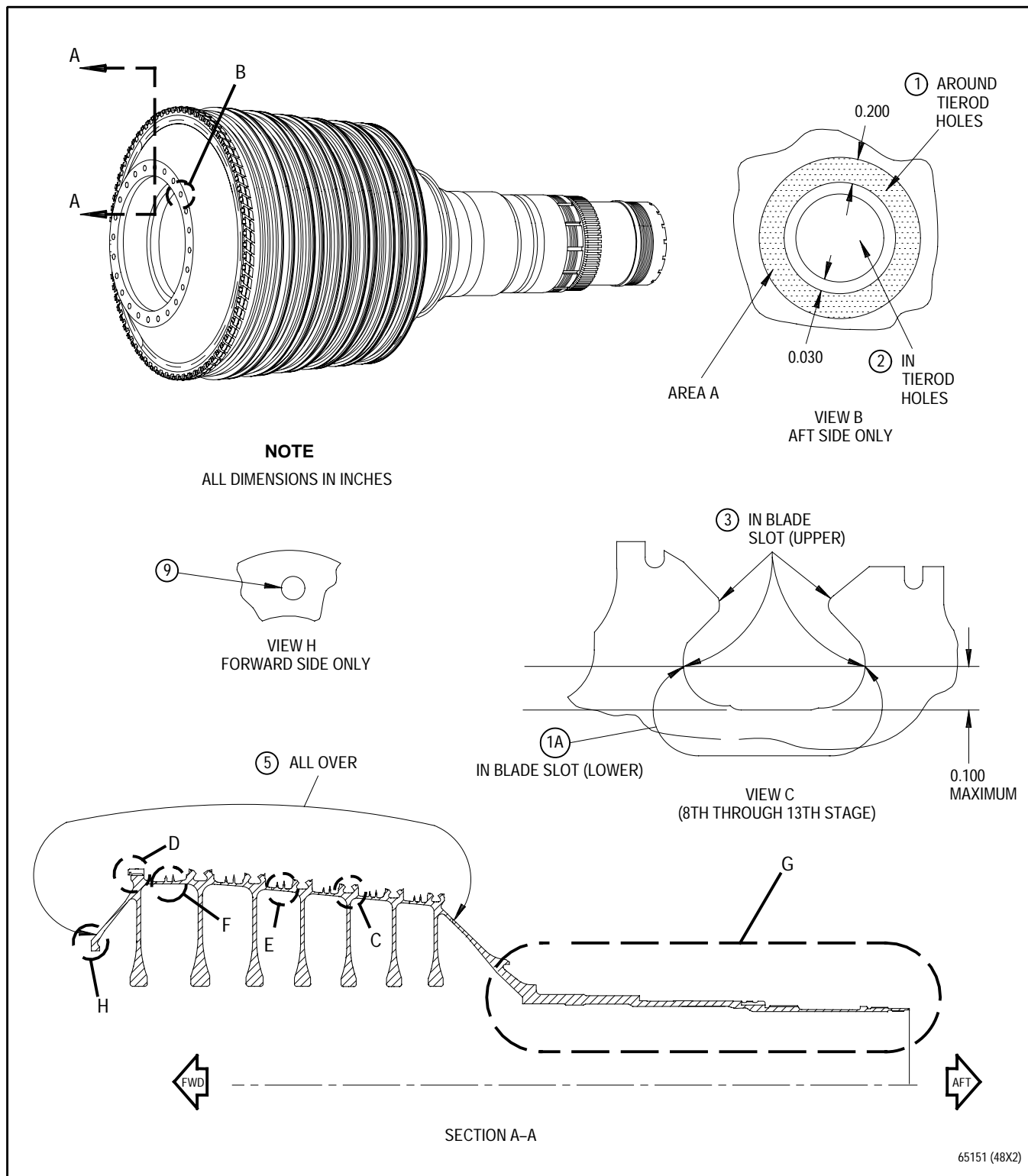


Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 1 of 6)

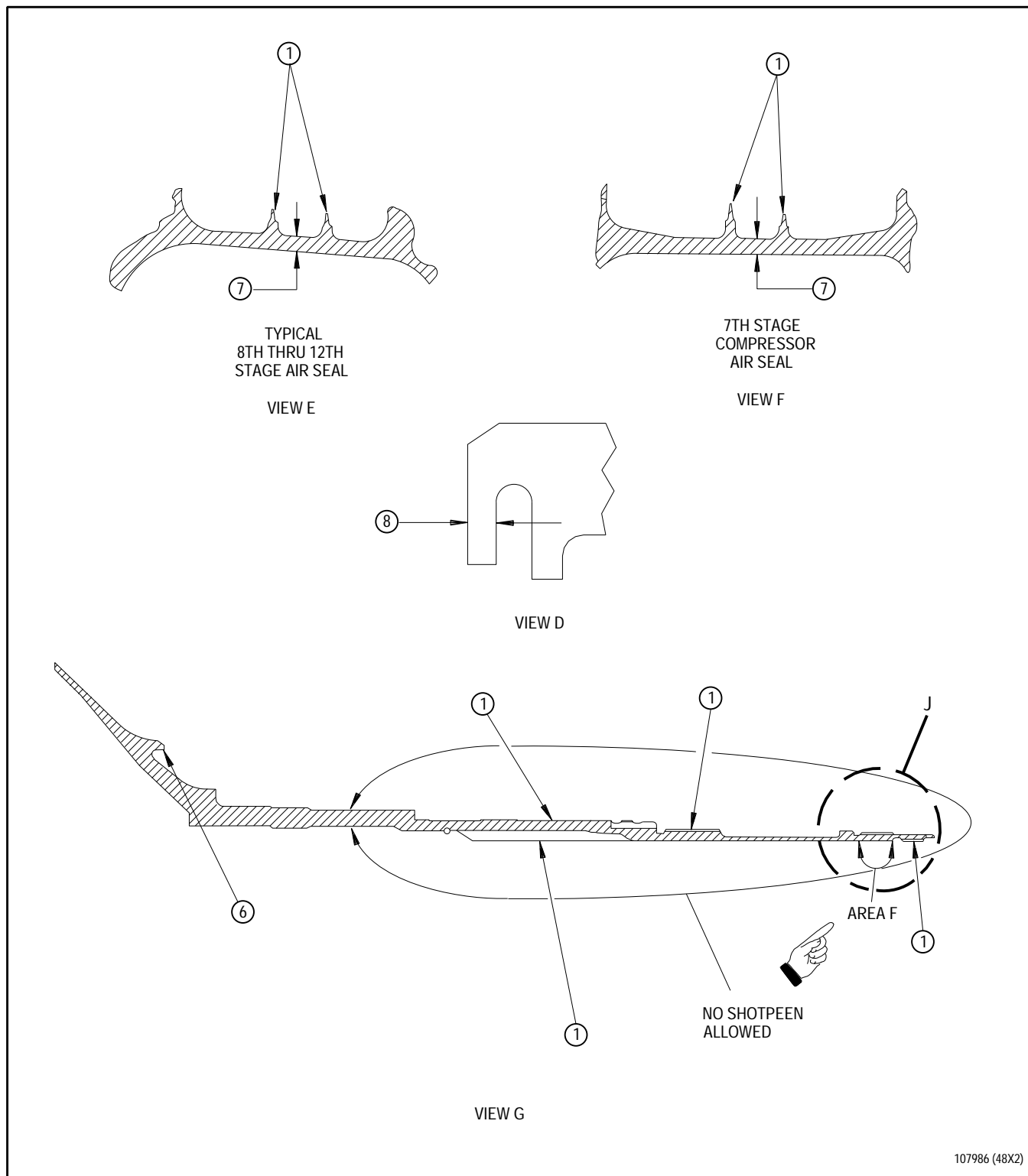


Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 2 of 6)

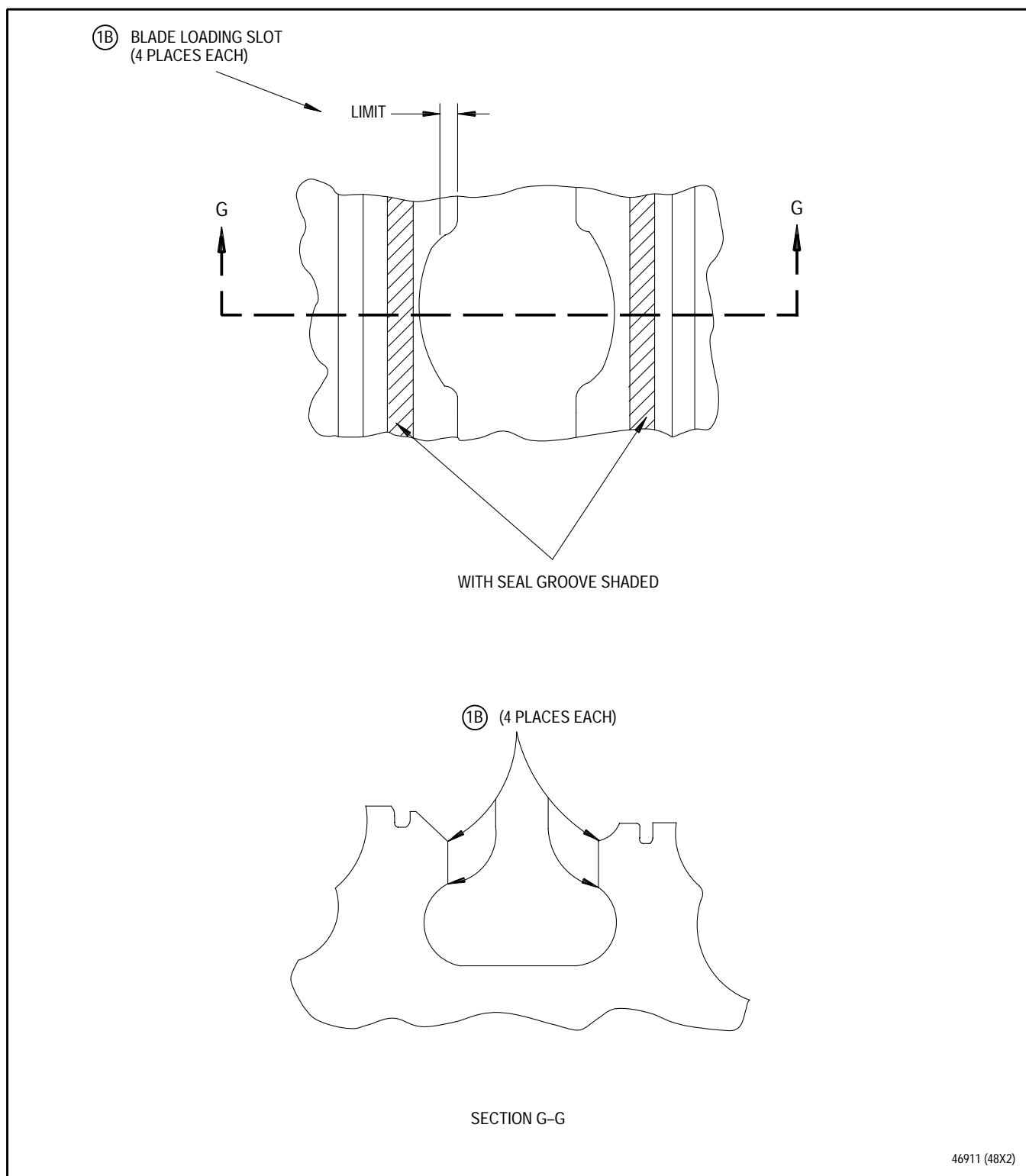


Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 3 of 6)

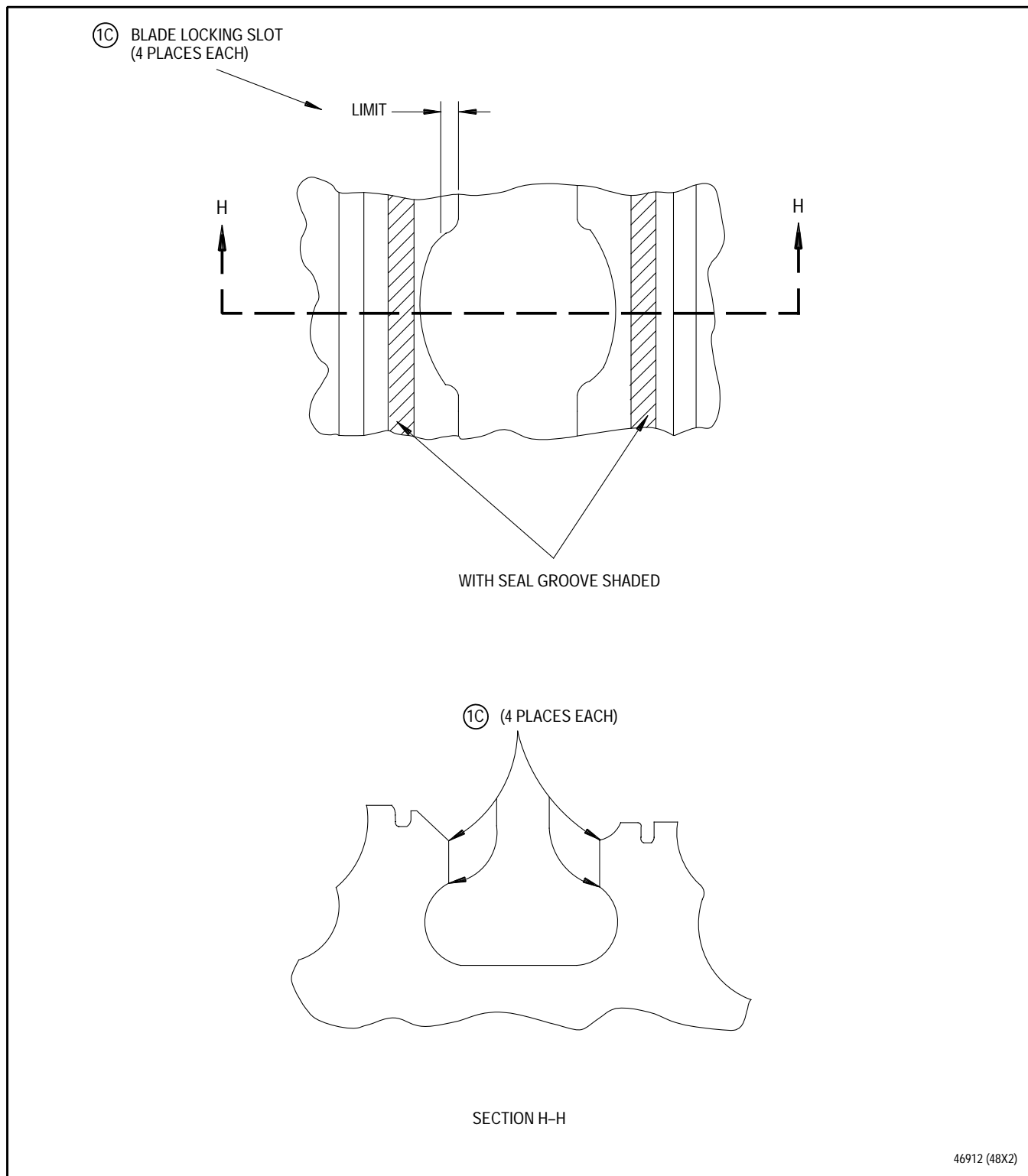


Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 4 of 6)

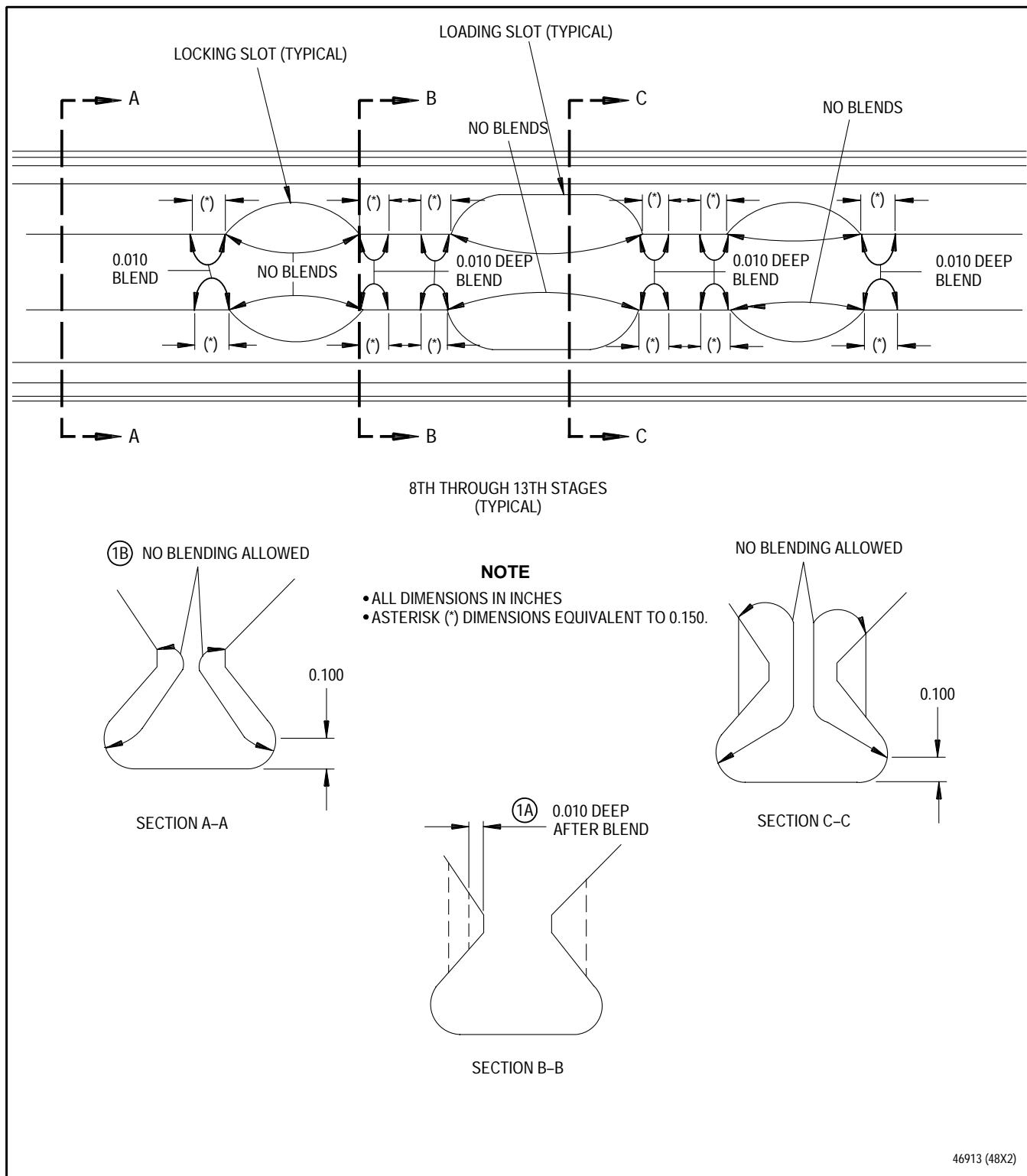
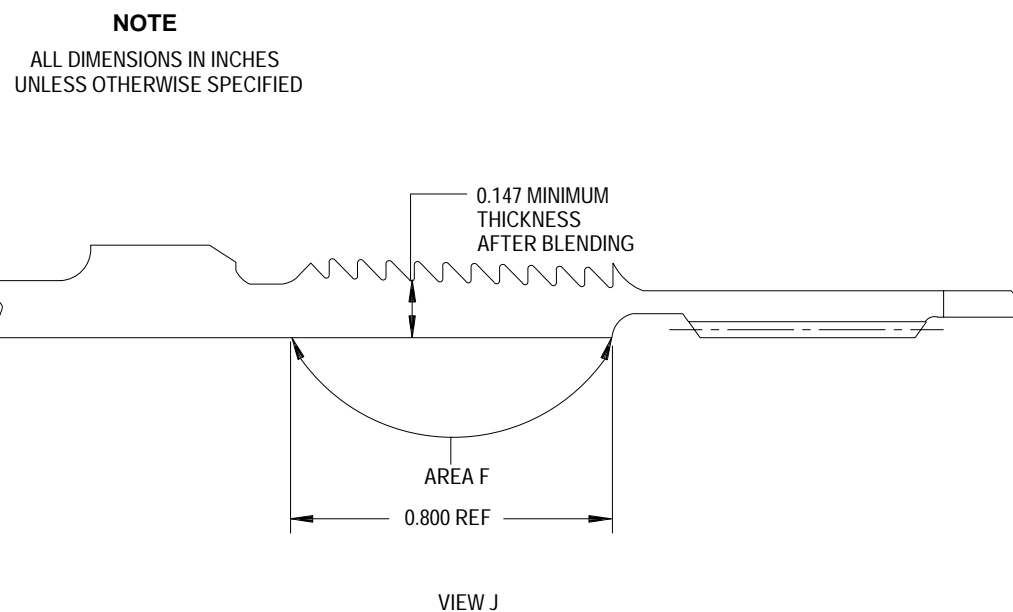


Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 5 of 6)



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Figure 1. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Blend Repair (Sheet 6 of 6)



If disks are to be nondestructive inspected while still containing blades, it shall be accomplished by careful local application of the penetrant. If any penetrant contacts the blade root sealant, affected blades must be removed and resealed after thorough cleaning of disk and disk details. Refer to T.O. 2J-F100-53-7, WP 201 00 and WP 627 00.

- c. Fluorescent penetrant inspect all blends. Refer to T.O. 2J-F100-9. No cracks allowed.



Do not shotpeen tierod holes, around tierod holes, blade slots, or knife-edge seals. (See figure 1.)

- d. Shotpeen blended areas to intensity of 6A using SAE 110 max steel shot with hardness of Rockwell C45-55 or equivalent. Refer to T.O. 2J-F100-53-1, SWP 091 08 (SPOP 501). No lines of demarcation allowed.

Legend for figure 1

- 1. No blending or shotpeening allowed
- 1A. 0.010 inch maximum depth after blend
- 1B. 0.010 inch maximum depth after blend, four places
- 1C. 0.010 inch maximum depth after blend, four places
- 2. 0.200 inch
- 3. 0.030 inch
- 4. To run out of radius. No blending or shotpeening allowed.
- 5. Peen intensity waived but full coverage required, both sides, 7 places
- 6. 7.500 ± 0.020 to Surface A
- 7. 0.100 inch minimum
- 8. 0.055 inch minimum
- 9. Surface H. See paragraph 2A.

**2A. DISK-DRUM ROTOR, REAR COMPRESSOR,
REAR, ASSEMBLY OF, FORWARD FLANGE,
FORWARD SIDE - BLEND REPAIR** (See
figure 1.)

a. Blend pits, nicks, scratches,
and dents on forward flange,
forward side as follows:

- (1) Maximum blend depth shall be
0.010 inch.
- (2) Use fine stones, files, or
abrasive of silicon carbide
or aluminum oxide to remove
all trace of damage while
removing as little material
as possible.
- (3) Blend distance shall be 15
times depth of damage.
- (4) Surface finish shall be as
smooth or smoother than
surrounding parent material.
- (5) Maximum surface area of
blend shall be 0.075 squared
inches.

- (6) Maintain 0.003 to 0.050
round edge around hole if
blend extends into hole.
- (7) Blends shall be smooth and
continuous.
- (8) One blend maximum per lug at
each of 24 places.
- (9) Fluorescent penetrant
inspect all blends. Refer to
T.O. 2J-F100-9. No cracks
allowed.
- (10) Shotpeen blended areas to
intensity of 6A using SAE
110 maximum cast steel shot
with hardness of Rockwell
C45-55 or equivalent. Refer
to T.O. 2J-F100-53-1, SWP
091 08 (SPOP 501). No lines
of demarcation permitted.

3. DISK-DRUM ROTOR, REAR COMPRESSOR, REAR, ASSEMBLY - KNIFE-EDGE BLENDING.

(See Figure 2.)

NOTE

- Do not attempt to straighten knife-edges of air seals.
 - Knife-edge air seal blending repairs are to be completed after aluminum oxide coating is removed. Aluminum oxide coating must be reapplied once blend repair is complete.
- a. All damage shall be blended using fine files and stones. Refer to T.O. 2J-F100-53-1, WP 091 00. Remove all pickup and raised metal. Observe following limits:
- (1) Blending shall be limited to two continuous inches on any one knife-edge or four total inches of noncontinuous blends per knife-edge.
 - (2) Noncontinuous blends shall be separated by minimum of two inches of unblended knife-edge. One inch separation required for blends adjacent to bend with displacement from radial center plane greater than 0.010 inch but less than 0.050 inch.
- (3) Maximum blend depth shall be 0.050 inch.
 - (4) Each blended area shall have 0.500 inch minimum radius at each end of blend and 0.500 inch minimum transition radius into unblended material.
 - (5) Blended areas on two or more knife-edges shall be separated by minimum of two inches of unblended area.
- b. Blend shall be smooth and continuous with aspect ratio (length to depth) equal to 14 to 1 or greater.
- c. Surface finish of all blends shall be smooth as, or smoother than adjacent non-grit blasted surfaces.
- d. Fluorescent penetrant inspect per SPOP 84. Refer to T.O. 2-1-111. Examine indications under white light at 10X magnification. No cracks allowed.

Legend for figure 2

1. Example of blended area (all knife-edges)
2. 2.000 inches minimum between blends on same or adjacent knife-edges
3. 0.500 inch radius minimum, all locations
4. 2.000 inches maximum blend length
5. Any amount of bending is reparable provided final blend meets maximum allowable blend depth (6) and length (4) limits.
6. 0.050 inch maximum blend depth. Blends requiring blend depth greater than this are not serviceable and not reparable.

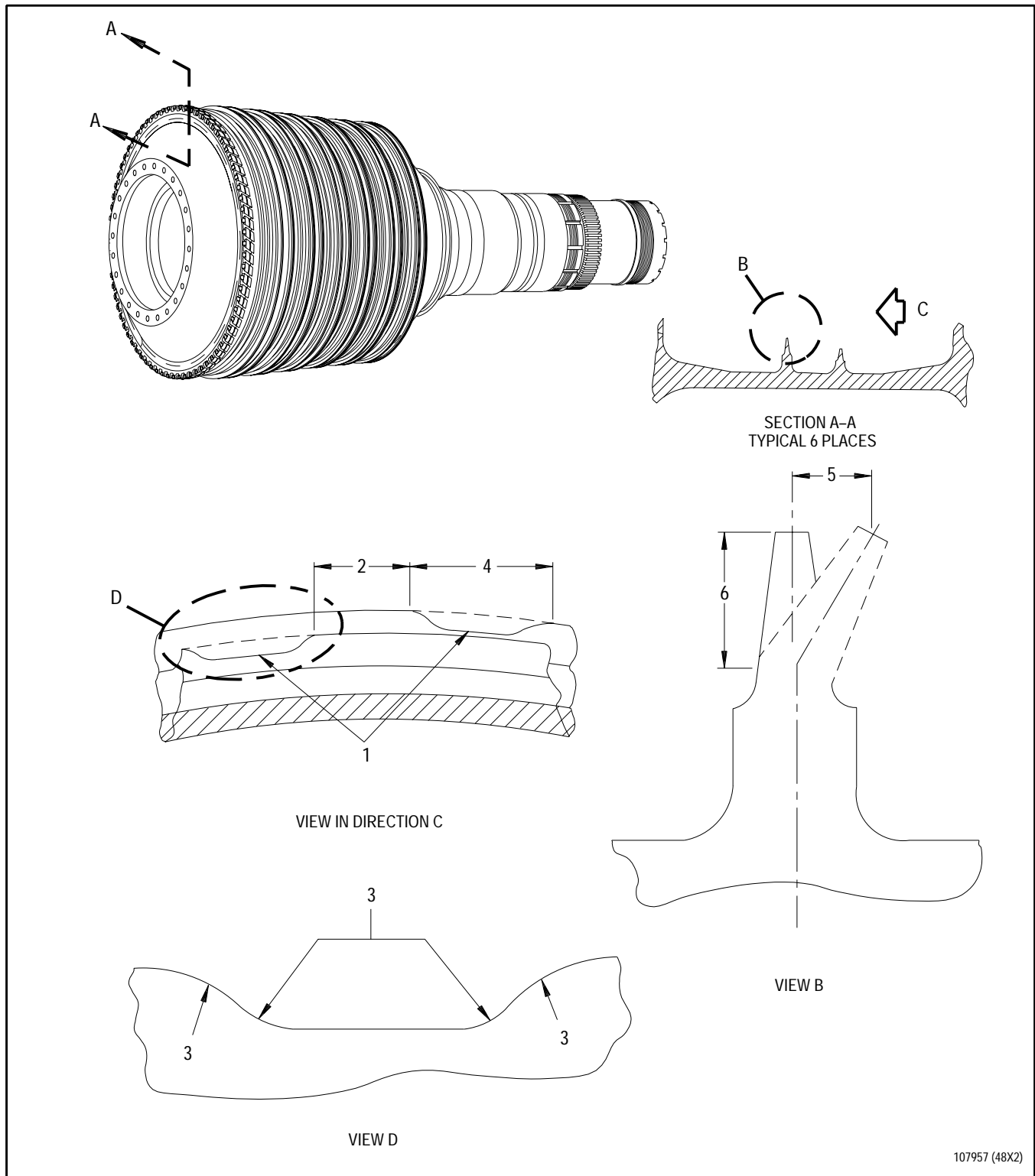


Figure 2. Disk-Drum Rotor, Rear Compressor, Rear, Assembly - Knife-Edge Blending

4. DISK-DRUM ROTOR, REAR COMPRESSOR, REAR, ASSEMBLY - NO. 4 BEARING JOURNAL FLAME SPRAY REPAIR.

NOTE

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor shall notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. This is a vendor proprietary repair. Refer to T.O. 2J-F100-53-1, WP 603 00 for Qualified Repair Source List (QRSL) by Task Code:

- JGDFGZM 7th-13th Drum, journal wear, coat

5. DISK-DRUM ROTOR, REAR COMPRESSOR, REAR, ASSEMBLY - KNIFE-EDGE COATING REPAIR.

NOTE

Vendor repair procedures listed in Qualified Repair Source List (QRSL) shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor desires to revise procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. Perform proprietary repair as follows:

- (1) Proprietary repairs for following distress mode may be performed only by qualified repair sources identified in QRSL. Refer to T.O. 2J-F100-53-1, WP 603 00.

- JGDFGZD Worn knife-edge coating

TECHNICAL PROCEDURES

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4		25			

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts By Solvent Cleaning - - - - -	SPOP 208

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
DRY ICE	SOLID CO2

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BUMPER	4079278	8
PIN	2181046	1
RIVET	MS9318-052	16

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 4th stage compressor case assembly.
- b. This work package contains repairs for bumper replacement and headless shoulder pin replacement.
- c. Locally clean bumper area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- d. Align rivet holes in replacement bumper and case.
- e. Rivet bumper to case. Refer to T.O. 2-1-111. See figure 1.

2. FOURTH STAGE COMPRESSOR CASE ASSEMBLY - BUMPER REPLACEMENT.

(See Figure 1.)

- a. Remove rivets securing bumper to case by drilling through rivet manufactured head and driving rivet out with a steel drift. Refer to T.O. 2-1-111.
- b. Discard bumper and rivets.

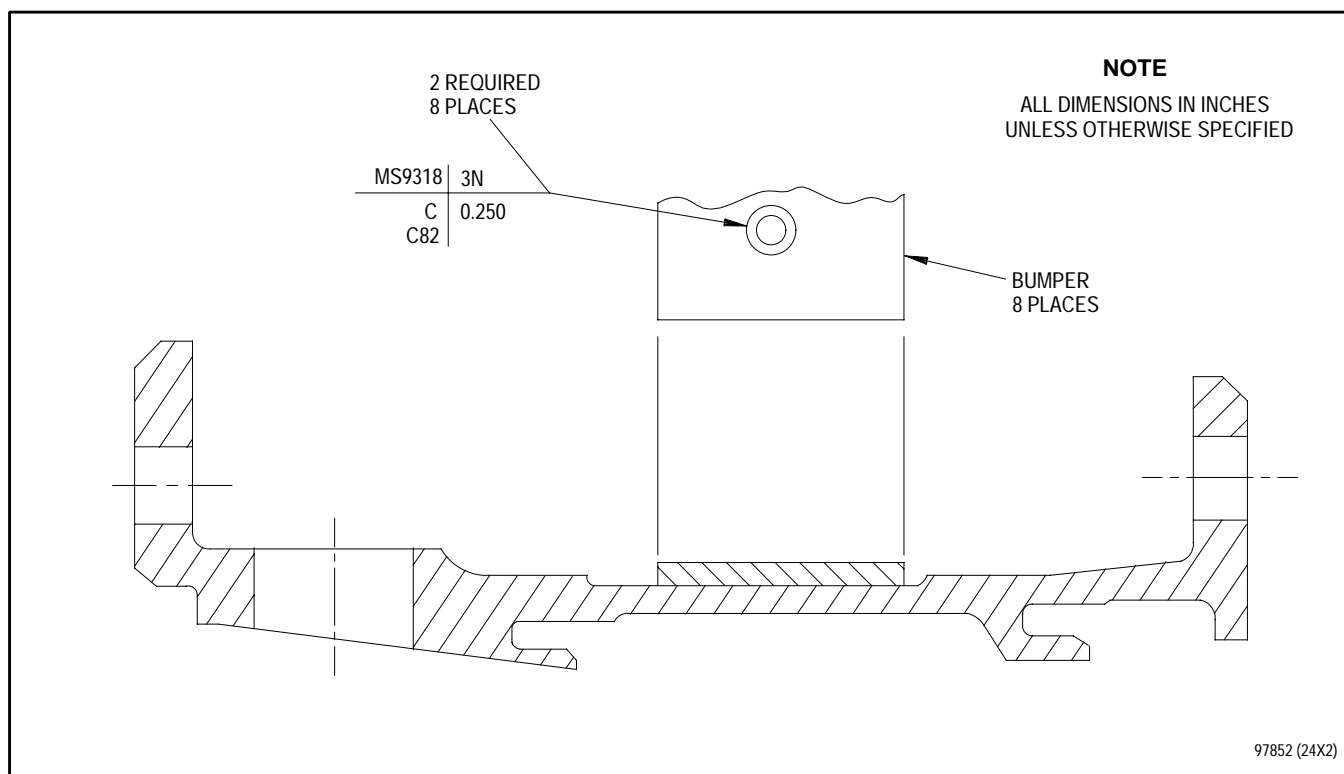


Figure 1. Fourth Through Ninth Stage Compressor Case Assembly - Bumper Replacement

**3. FOURTH STAGE COMPRESSOR CASE
ASSEMBLY - PIN REPLACEMENT.**

(See Figure 2.)

- a. Press out unserviceable headless shoulder pin.
- b. Chill replacement pin in dry ice (solid CO₂) for 10 minutes minimum.
- c. Press replacement pin into hole.

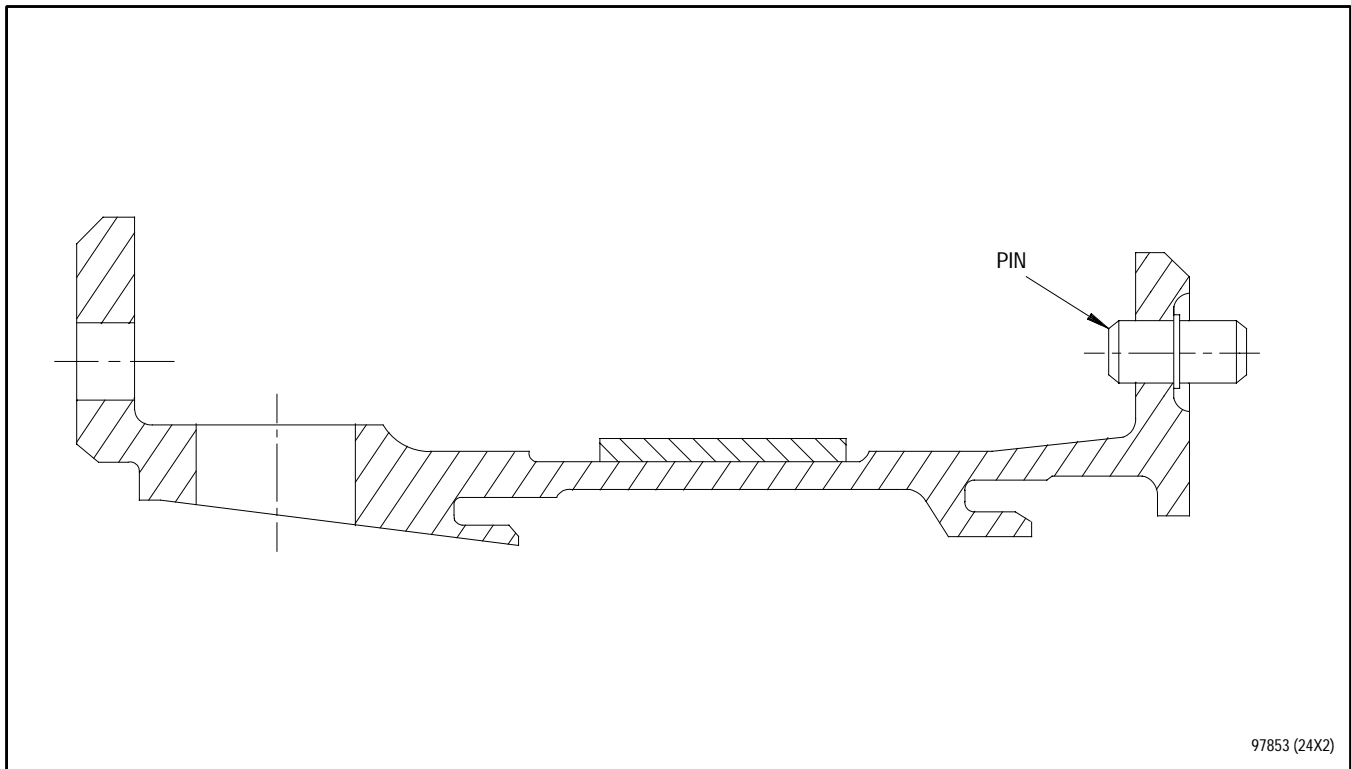


Figure 2. Fourth Stage Compressor Case Assembly - Pin Replacement

WORK PACKAGE

TECHNICAL PROCEDURES

**SHROUD SEGMENT SETS, COMPRESSOR STATOR,
FOURTH, FIFTH, AND SIXTH STAGE -**

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	25	4 Blank	25		

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

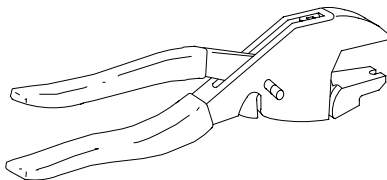
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
PIN, SHOULDER, HEADLESS	4076952	1

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	FOURTH, FIFTH, AND SIXTH STAGE COMPRESSOR STATOR SHROUD SEGMENT SETS - PIN REPLACEMENT	
	SET, PUSHER/PULLER, 4TH, 5TH, 6TH STAGE COMPRESSOR STATOR SEGMENTS (229) - - - - -	PWA 57897

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57897 -C

Figure T1. PWA 57897 SET

1. INTRODUCTION.

- a. This work package contains instructions for repair of 4th, 5th, and 6th stage compressor stator shroud segment sets.

2. FOURTH, FIFTH, AND SIXTH STAGE COMPRESSOR STATOR SHROUD SEGMENT SETS - PIN REPLACEMENT.

(See Figure 1.)

- a. Using PWA 57897 set detail-1 body and detail-2 jaw, remove pin from shroud. Discard pin.
- b. Using PWA 57897 set detail-1 body, insert new pin into hole. See figure 1.

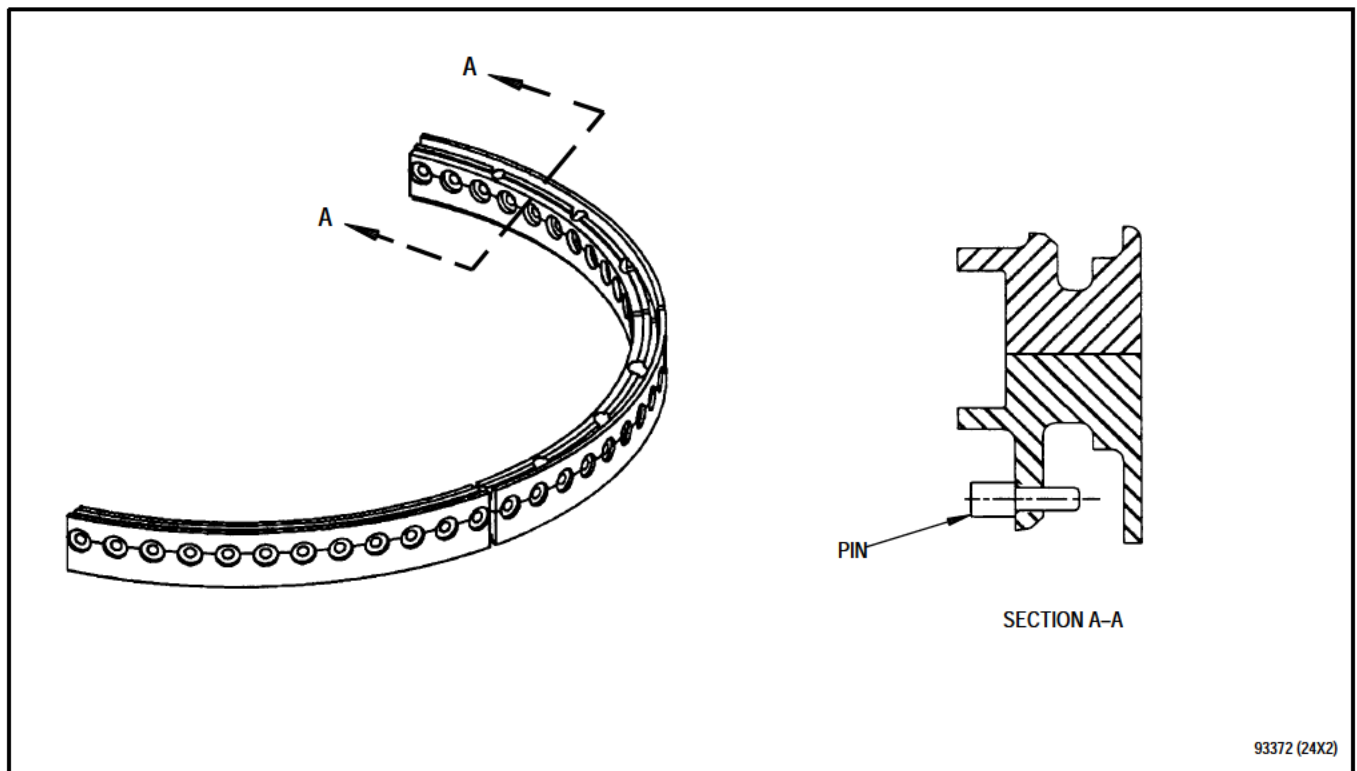


Figure 1. Fourth, Fifth, and Sixth Stage Compressor Stator Shroud Segment Sets - Pin Replacement

WORK PACKAGE

TECHNICAL PROCEDURES

STATOR, COMPRESSOR EXIT -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 10					
		25			

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts By Aqueous Cleaning - - - - -	SPOP 209
Standard Fluorescent Penetrant Inspection - - - - -	SPOP 62
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Cleaning Procedures - Cleaning, Grit Blast, Dry (SPOP 218) - - - - -	SWP 031 13
General Repair Procedures - Masking Procedures (SPOP 36) - - - - -	SWP 092 12
General Repair Procedures - Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
--------------	----------------------------------

GRIT, SILICON CARBIDE (PMC 3053-31)	SILICON CARBIDE 60
-------------------------------------	--------------------

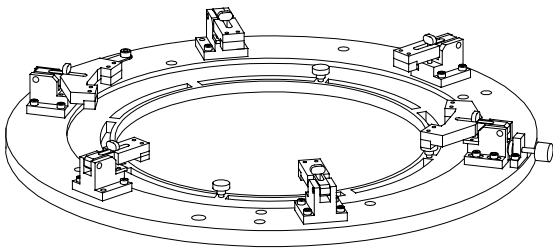
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

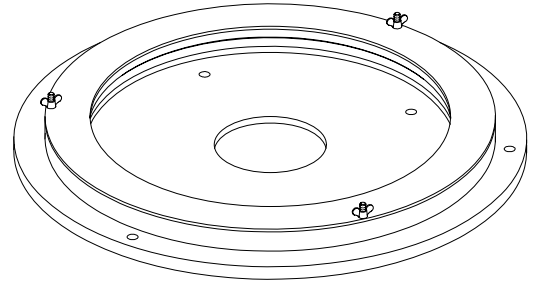
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMPRESSOR EXIT STATOR - MOUNTING LUG SLOT REPAIR	
	FIXTURE, MACHINING, HIGH PRESSURE COMPRESSOR EXIT STATOR REPAIR - - - - -	PWA 70579
	FIXTURE, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 70580

ILLUSTRATED SUPPORT EQUIPMENT



PWA 70579 -C

Figure T1. PWA 70579 FIXTURE



PWA 70580 -C

Figure T2. PWA 70580 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for repair of compressor exit stator.

2. COMPRESSOR EXIT STATOR - MOUNTING LUG SLOT REPAIR.

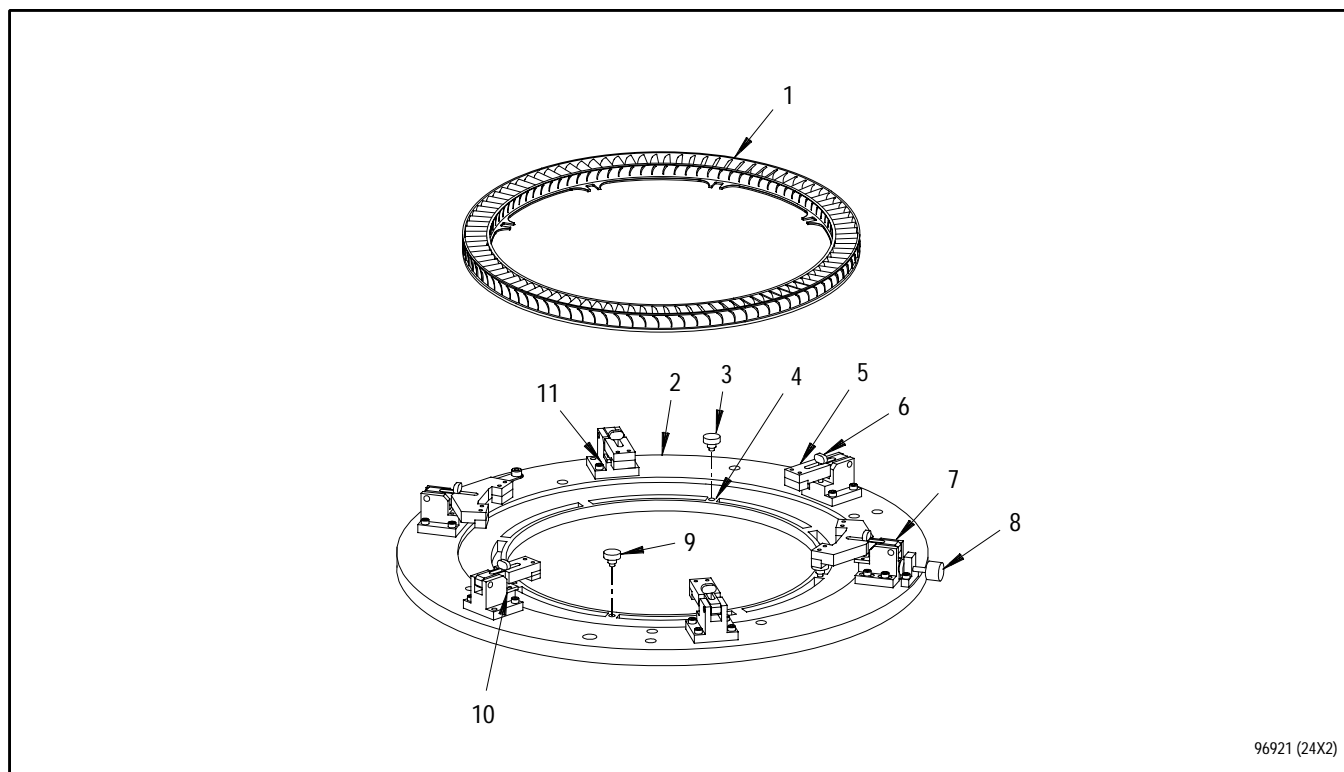
(See Figures 1 through 3.)

NOTE

This procedure may be used to repair individual or all mounting lug slots.

- a. Clean compressor exit stator(1, figure 1) per SPOP 209, Method A. Refer to T.O. 2-1-111.
- b. Install stator(1) in PWA 70579 fixture(2) as follows:
 - (1) Rotate six quarter-turn screws(6) to unlock swing clamps(5). Raise swing clamps.
 - (2) Install stator(1), mounting lugs down, into fixture, aligning stator offset lug with offset lug slot(4) marked OFFSET LUG on fixture.
 - (3) Insert two detail-8 locator pins(3) through stator lugs into fixture at offset lug slot(4) and near sliding locator(7). Insert detail-7 locator pin(9) through stator lug into fixture approximately 180 degrees from offset lug slot(4).
 - (4) Adjust sliding locator(7) using adjustment screw(8) to position stator against fixed locators(10 and 11).
 - (5) Lower swing clamps(5) into position over stator and lock into place using quarter-turn screws(6).

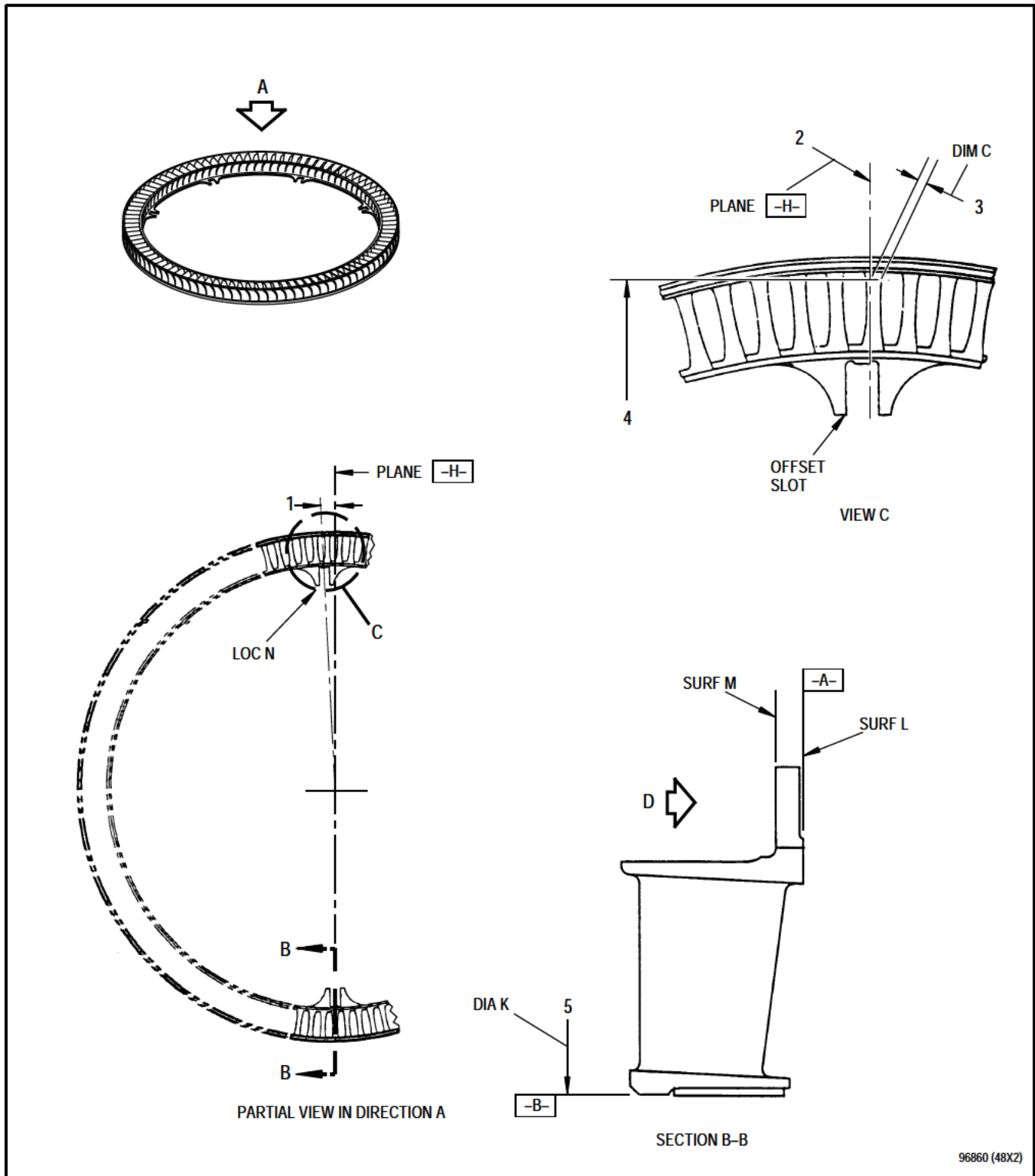
- c. Machine stator mounting lug slots to pre-machine dimensions shown in figure 2. Refer to T.O. 2-1-111. Remove locator pin(3 or 9, figure 1) only when necessary to machine a pinned slot. Install locator pin after machining slot.
- d. Remove stator from PWA 70579 fixture.
- e. Deburr machined slots 0.003 to 0.015 inch.
- f. Fluorescent penetrant inspect machined surfaces per SPOP 62, Method A. Refer to T.O. 2-1-111. No cracks allowed.
- g. Clean stator per SPOP 209, Method A. Refer to T.O. 2-1-111.
- h. Install compressor exit stator(3, figure 3) in PWA 70580 fixture as follows:
 - (1) Remove three wing nuts(2) and remove mask(1) from base assembly(4).
 - (2) Install stator(3), mounting lugs down, into base assembly(4).
 - (3) Install mask(1) and secure using three wing nuts(2).
- i. Mask exposed area of stator except areas of lugs to be plasma coated. Refer to T.O. 2J-F100-53-1, SWP 092 12, except lacquer and wax is not required.



96921 (24X2)

1. Compressor exit stator
2. PWA 70579 fixture
3. Detail-8 locator pin (2 places)
4. Offset lug slot
5. Swing clamp
6. Quarter-turn screw
7. Sliding locator
8. Adjustment screw
9. Detail-7 locator pin
10. Fixed locator
11. Fixed locator

Figure 1. Compressor Exit Stator - Installation Into PWA 70579 Fixture



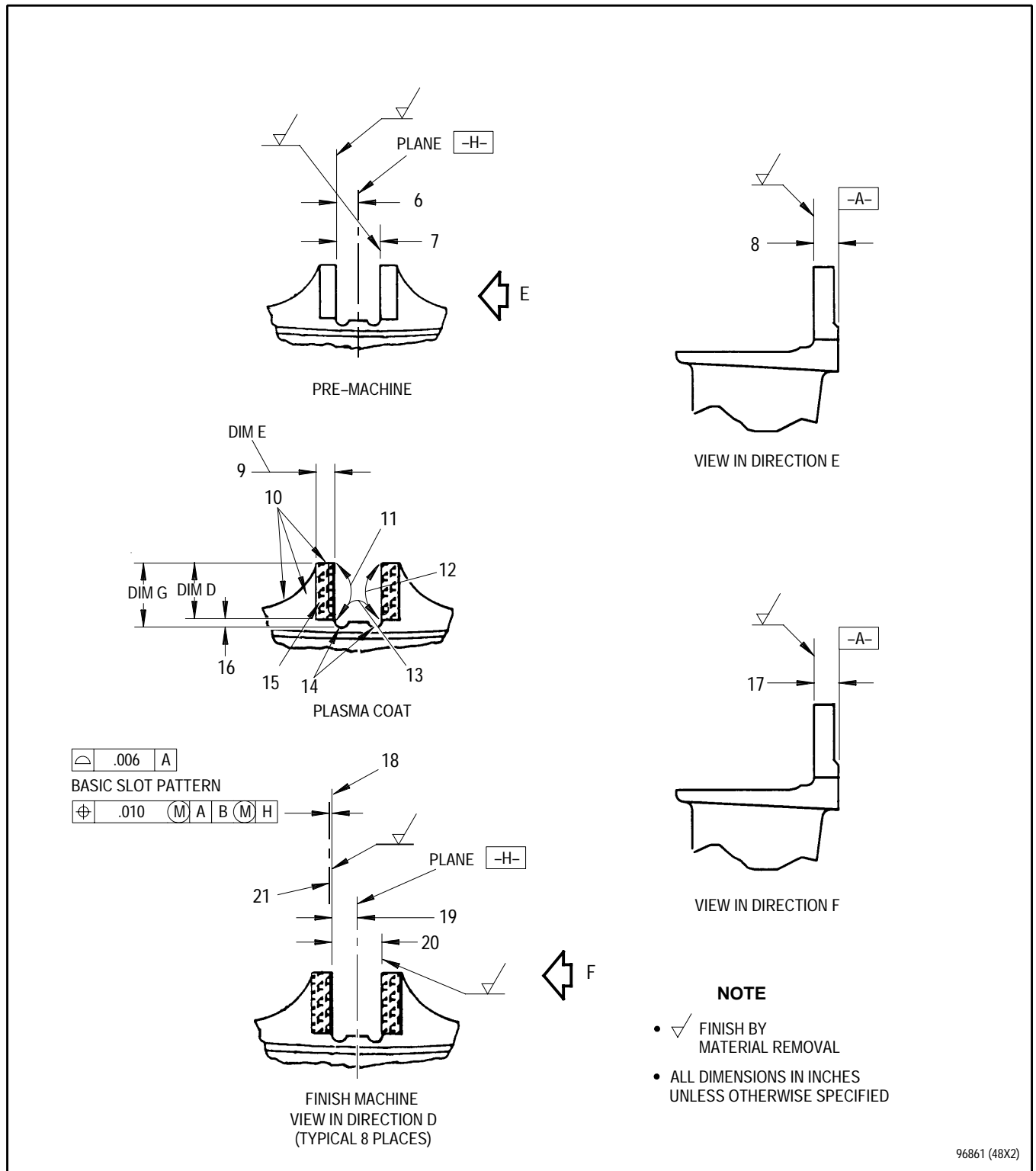


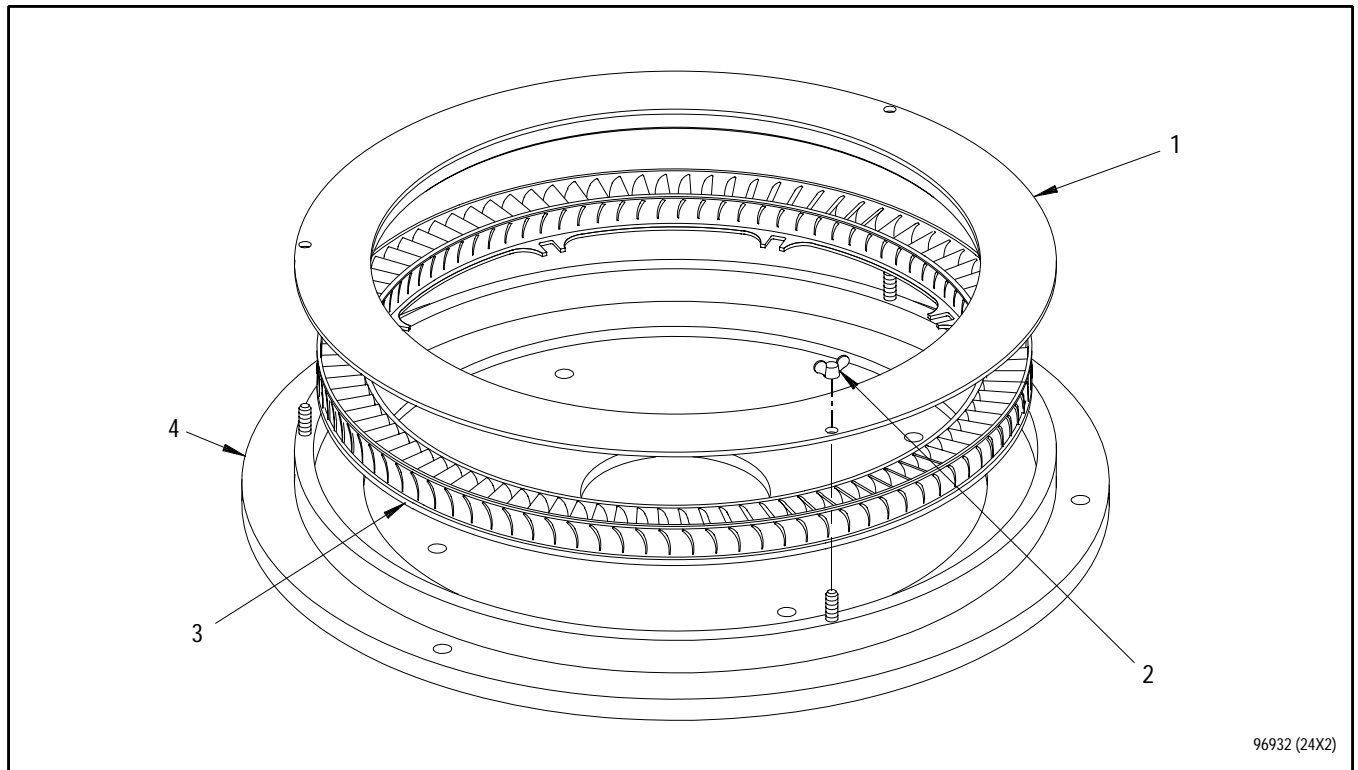
Figure 2. Compressor Exit Stator - Mounting Lug Slot Repair (Sheet 2 of 2)

Legend for figure 2

NOTE

- All dimensions apply when Surface L is flat within 0.001 inch and Diameter K maintains a clearance envelope of 19.041 inches diameter in free state or constrained. Constraint contact allowed only on Surfaces L and M and Diameter K.
- In free state, Surface L is flat within 0.010 inch and Diameter K maintains 19.023 to 19.055 inches diameter.

1. 0°43'23" from Plane H
2. Plane H established by Dimension C and axis of Diameter K
3. 0.125 inch, Dimension C
4. 9.329 inches, from axis Diameter K
5. 19.040 inches, average diameter at Maximum Material Condition
6. 0.216 inch, maximum, prior to coating
7. 0.418 inch, maximum, prior to coating
8. 0.173 inch, minimum, prior to coating
9. 0.130 inch, both sides of slot
10. Coating optional and may be incomplete, both sides of slot
11. PWA 53-5 coating, this side only, 0.003 to 0.006 inch thick. Overspray permitted to Dimension G only.
12. Coating optional and may be incomplete, this side of slot, but dimension (20) must be maintained.
13. No coating allowed
14. 0.055 to 0.065 inch radius, reference, both sides of slot. No coating allowed in these radii.
15. Coat area bounded by Dimensions D and E, both sides of slot, this side of flange only. Overspray permitted to Dimension G only.
16. 0.055 inch, both sides of slot
17. 0.176 to 0.182 inch, after coating
18. This surface of 7 slots on the basis of 8 slots equally spaced and 1 slot offset at Location N
19. 0.204 inch basic. Dimension shall be maintained after coating.
20. 0.404 to 0.412 inch, after coating, 8 slots
21. Profile tolerance zone extends outboard of basic dimension



1. Mask
2. Wing nut
3. Compressor exit stator
4. Base assembly

Figure 3. Compressor Exit Stator - Installation Into PWA 70580 Fixture

- j. Grit blast plasma coat area(11, figure 2) per SPOP 218, except use No. 60 grit silicon carbide grit at 35 to 45 psi for pressure type machines or 70 to 80 psi for suction type machines. Refer to T.O. 2J-F100-53-1, SWP 031 13.
- k. Remove and replace masking as required to remove any trapped grit prior to coating.



Failure to coat part within specified time after grit blast can result in surface contamination.

- l. Within two hours after grit blast, plasma coat per PWA 53-5 and plasma coat view of figure 2. Minimum coating thickness 0.003 inch. Refer to T.O. 2J-F100-53-1, WP 096 00.
- m. Remove stator from PWA 70580 fixture and remove masking material.
- n. Install stator in PWA 70579 fixture per step b.
- o. Machine repaired mounting lug slots to finish machine dimensions shown in figure 2. Remove locator pin(3 or 9, figure 1) only when necessary to machine a pinned slot. Install locator pin after machining slot.
- p. Remove stator from PWA 70579 fixture.
- q. Clean stator per SPOP 209, Method A. Refer to T.O. 2-1-111.

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, COMPRESSOR, TENTH THROUGH TWELFTH STAGE -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	25	2B Blank Added	25	3 - 6	25
2A Added	25			7 - 8 Added	25

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Standard Fluorescent Penetrant Inspection (Local Application) - - - - -	SPOP 70
Degreasing of Titanium and Non-Titanium Parts By Solvent Cleaning - - - - -	SPOP 208
Degreasing of Titanium and Non-Titanium Parts By Aqueous Cleaning - - - - -	SPOP 209
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Buffing, Power Denicking of Steel, Nickel, and Cobalt Parts (SPOP 533) - - - - -	SWP 091 02

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
DRY ICE	SOLID C02

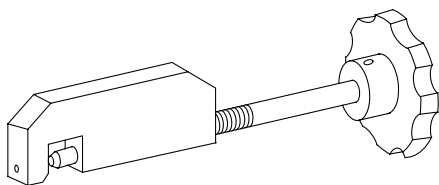
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BOSS-BOREScope, COMPRESSOR CASE	4077303	1
COLLAR	ST2485-09	2
NUT OPTION	4075466	68
PIN	4077008	1
PIN	ST2484-08	2

APPLICABLE SUPPORT EQUIPMENT

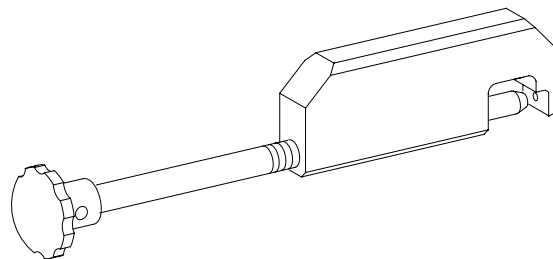
Paragraph	Function - Tool Nomenclature	Tool Number
6	TENTH THROUGH 12TH STAGE COMPRESSOR CASE ASSEMBLY - SELF-LOCKING CLINCH NUT REPLACEMENT	
	PUSHER, CLINCH NUT, TURBINE EXHAUST CASE, AUG NOZZLE SUPPORT ASSY - - - - -	PWA 56558 OR
	PUSHER, TURBINE EXHAUST CASE, CLINCH NUT - - - - -	PWA 55915

ILLUSTRATED SUPPORT EQUIPMENT



PWA 55915 -C

Figure T1. PWA 55915 PUSHER



PWA 56558 -C

Figure T2. PWA 56558 PUSHER

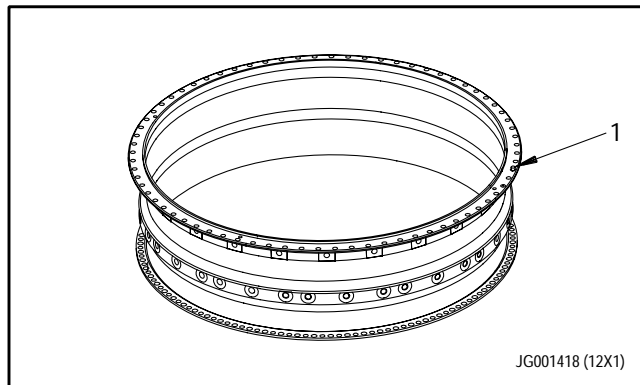
1. INTRODUCTION.

- a. This work package contains instructions for the repair of the tenth through twelfth stage compressor case assembly.

2. TENTH THROUGH TWELFTH STAGE COMPRESSOR CASE ASSEMBLY - PIN REPLACEMENT.

(See Figure 1.)

- a. Remove unserviceable pin using caution not to distort flange or damage hole diameter.
- b. Chill replacement pin in dry ice (solid CO₂) for 10 minutes minimum.
- c. Use standard drift to install replacement pin.



1. Pin

Figure 1. Tenth through Twelfth Stage Compressor Case Assembly - Pin Replacement

3. TENTH THROUGH TWELFTH STAGE COMPRESSOR CASE ASSEMBLY - DENT REPAIR.

(See Figure 2.)

- a. Clean case per SPOP 209, Method A. Refer to T.O. 2-1-111.

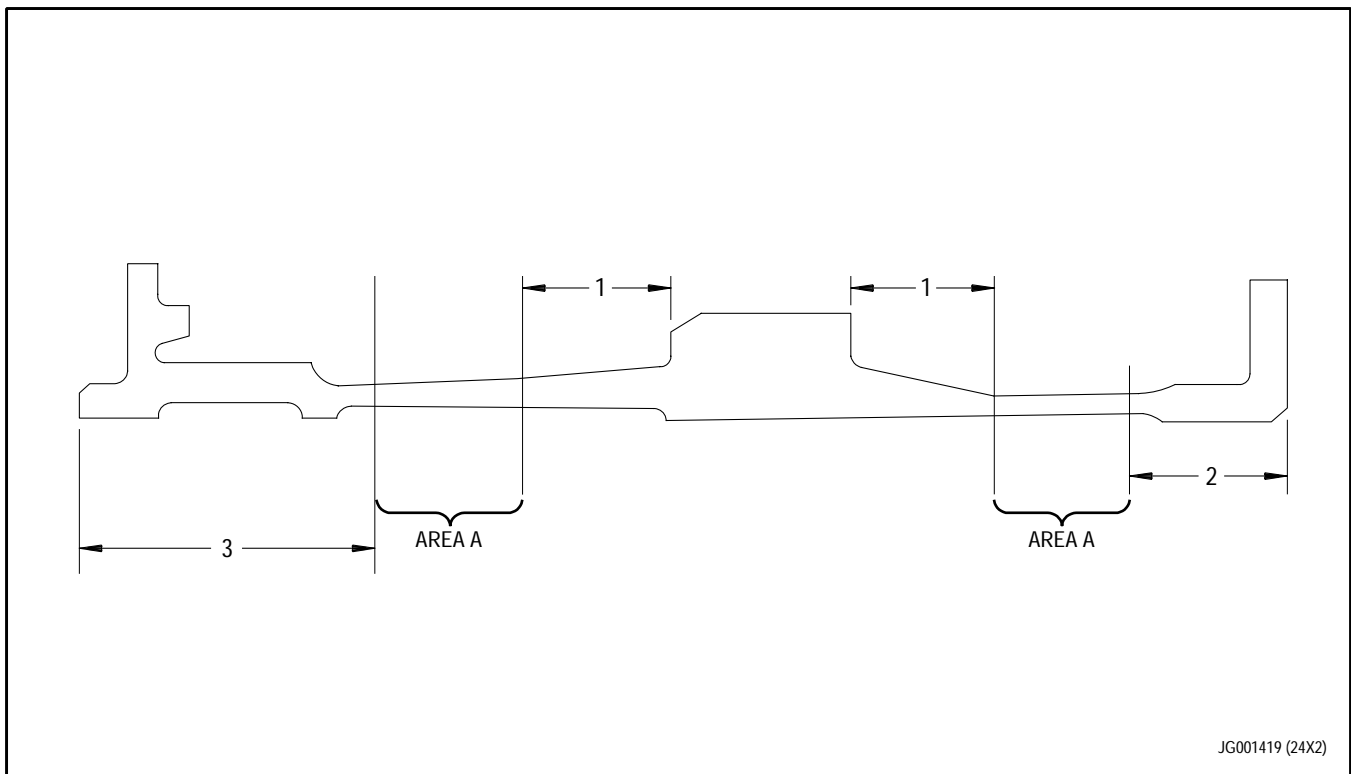
NOTE

Any dent exceeding specified requirements is not reparable per this repair.

- a1. Ensure dent meets maximum reparable limits of: 0.020 inch deep, and 3.000 inches long. Any dent exceeding any one requirement is not reparable per this repair. See figure 2 for reparable area.
- b. Heat locally to 1100° to 1200°F (593° to 648°C) and remove dents by applying pressure or tapping. Maintain 0.060 inch minimum wall thickness.
- c. Maintain surface finish of area being repaired.
- d. Fluorescent penetrant inspect per SPOP 70. Refer to T.O. 2-1-111. No cracks allowed.

**4. TENTH THROUGH TWELFTH STAGE
COMPRESSOR CASE ASSEMBLY - NICKS, PITS,
AND SCRATCHES REPAIR.**

- a. Clean case per SPOP 209,
Method A. Refer to T.O. 2-1-111.
- b. Blend nicks, pits, and
scratches. Refer to
T.O. 2J-F100-53-1, SWP 091 02
(SPOP 533). Maximum blend depth
is 0.015 inch. Remove minimum
amount of material. Maintain
minimum wall thickness of
0.055 inch.
- c. Minimum width of blend shall be
15 times length.
- d. Maintain surface finish of area
being repaired. Surface finish
should be equivalent to that of
the adjacent surface.
- e. Fluorescent penetrant inspect
per SPOP 70. Refer to
T.O. 2-1-111. No cracks
allowed.



1. 1.000 inch minimum
2. 0.750 inch minimum
3. 2.000 inches minimum

Figure 2. Tenth through Twelfth Stage Compressor Assembly - Dent Repair

5. TENTH THROUGH 12TH STAGE COMPRESSOR CASE ASSEMBLY - BOSS AND PINS/COLLARS REPLACEMENT.

(See Figure 3.)

NOTE

Pins and collars can be removed with common hand tools (Allen hex wrench and pliers) or with vendor supplied tools (HI-LOK HLK10 HI-LOK/HI-Tigue collar removal tool) or equivalent.

- a. Remove pin and collar.
 - (1) Screw collar counterclockwise while preventing pin from rotating (similar to removing a nut from a bolt).
 - (2) Remove pin.
 - (3) Discard pin and collar.
- b. Remove boss.
- c. Clean boss area.
 - (1) Clean boss area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- d. Replace boss, pin, and collar.
 - (1) Position replacement boss on case, align with existing pin holes. See figure 3 for boss orientation.
 - (2) Insert pins into existing holes, case, and boss.
 - (3) Manually thread replacement collar onto pin.

NOTE

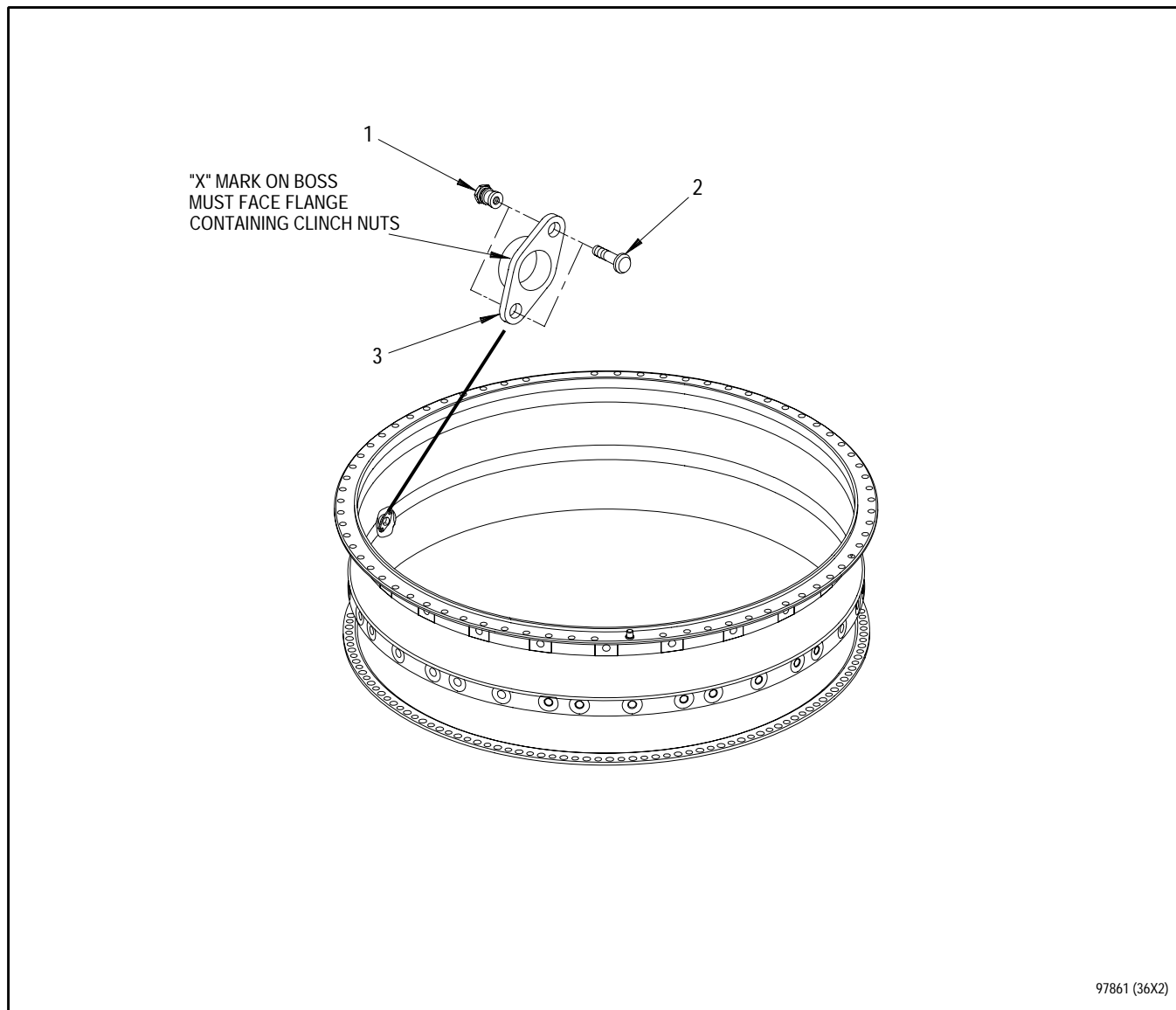
Pins and collars can be assembled with common hand tools.

- (4) Screw collar clockwise using collar hex while holding pin until hex has been torqued off.
- (5) Discard collar hex.

6. TENTH THROUGH 12TH STAGE COMPRESSOR CASE ASSEMBLY - SELF-LOCKING CLINCH NUT REPLACEMENT.

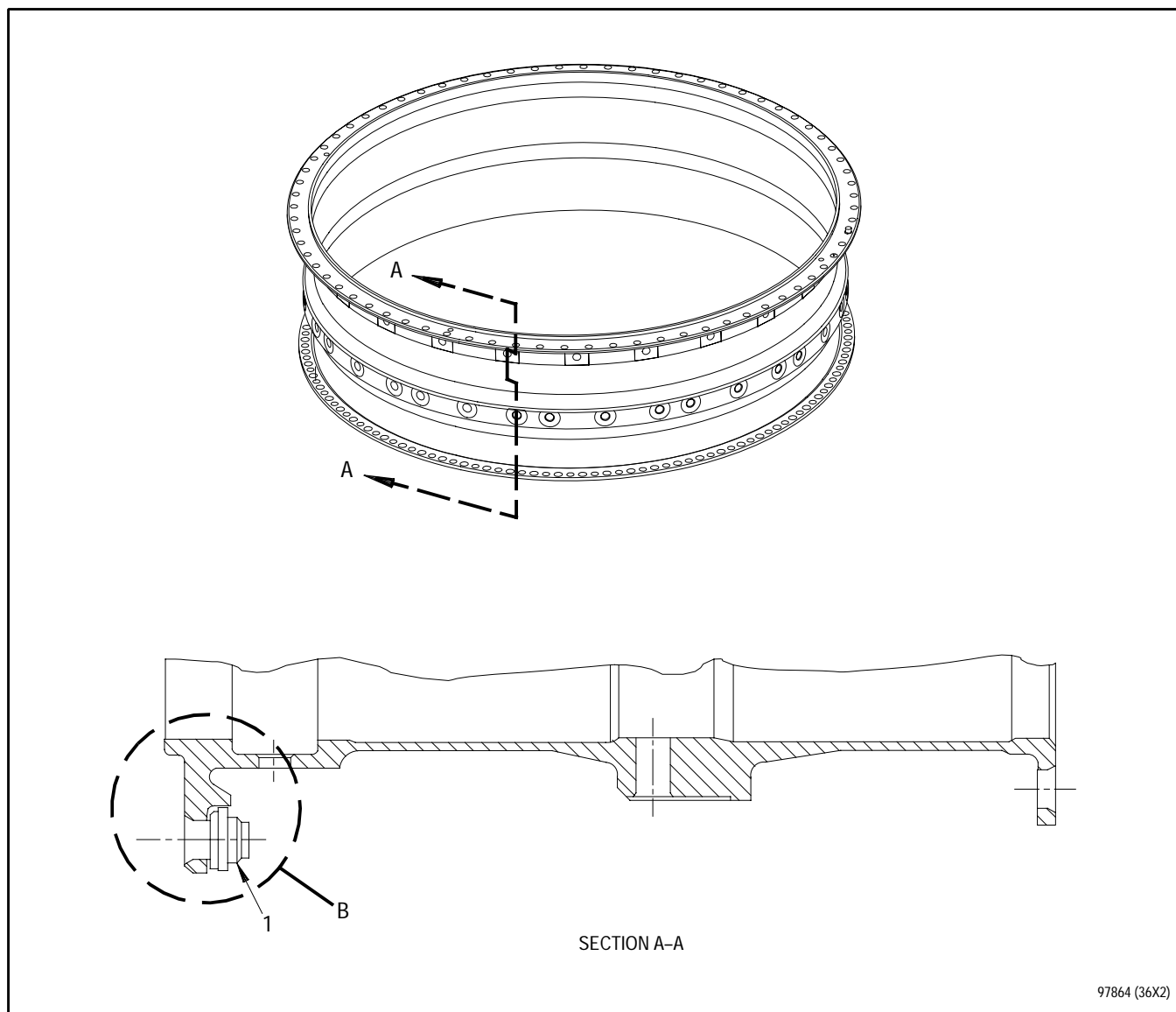
(See Figure 4.)

- a. Drill flared end of nut with letter M drill (0.302 inch diameter maximum) and remove. (See figure 4.)
- b. Clean nut hole area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- c. Install new nut in hole.
- d. Flare clinch nut.
 - (1) Hold nut in anvil of PWA 56558 pusher.
 - (2) Tighten pusher against nut until nut is flared. (See figure 4, sheet 2.)



1. Collar
2. Pin
3. Boss

Figure 3. Tenth Through Twelfth Stage Compressor Case Assembly - Boss And Pins/Collars Replacement

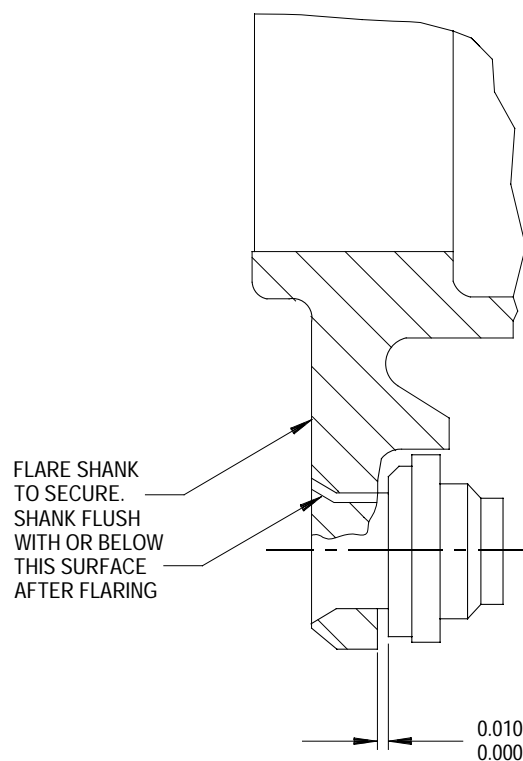


1. Clinch nut

Figure 4. Tenth Through Twelfth Stage Compressor Case Assembly - Self-Locking Clinch Nut Replacement (Sheet 1 of 2)

NOTE

ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



VIEW B

97865 (36X2)

Figure 4. Tenth Through Twelfth Stage Compressor Case Assembly - Self-Locking Clinch Nut Replacement (Sheet 2 of 2)

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, COMPRESSOR INTERMEDIATE -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 40

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	27	10 - 11	1	27	27
2A Added	27	12	6	28	1
2B Blank Added	27	13 - 23	1	29 - 34 Added	25
3	27	24	27	35 - 36	27
4 - 8	1	25 - 26	1	37 - 38 Added	27
9	27				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Grinding, Machine, of Titanium Parts (SPOP 530) - - - - -	SWP 091 03
Plasma and Flame Spray Coating Procedures, General - - - - -	WP 096 00
Compound, Antigalling (PWA 36545) Application (SPOP 748) - - - - -	SWP 098 07
General Installation of Heli-Coil Inserts - - - - -	T.O. 44H1-1-117

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ACETONE	O-A-51
ALCOHOL, ISOPROPYL (PMC 9094)	TT-I-735
METHYL ETHYL KETONE	TT-M-261
PENCIL (CRAYON), SILVER, METAL	COLORBRITE NO. 2101
MARKING (HARD) PMC 4059-7	

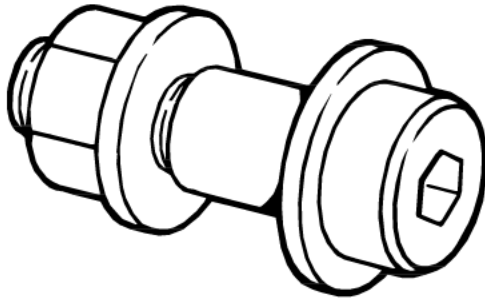
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
HELICAL COIL INSERT	MS124655	AS REQUIRED
HELICAL COIL INSERT	MS124656	AS REQUIRED
HELICAL COIL INSERT	MS124735	AS REQUIRED
INSERT IC	ST2786-02	61
LOCKWIRE	MS9226-04	AS REQUIRED
RIVET (BRACKET)	MS9318-058	AS REQUIRED
STUD	ST2665-08	5
STUD	ST2665-16	4

APPLICABLE SUPPORT EQUIPMENT

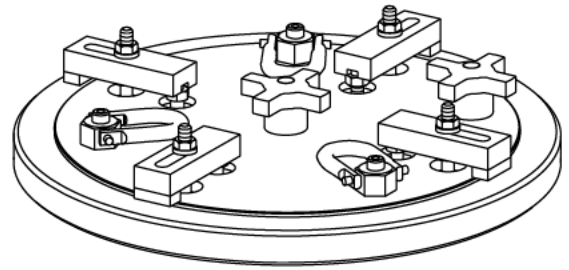
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMPRESSOR INTERMEDIATE CASE ASSEMBLY - GEARBOX MOUNT BUSHING REPLACEMENT	
	PULLER, COMPRESSOR INTERMEDIATE CASE BUSHINGS - - - -	PWA 50719
4	COMPRESSOR INTERMEDIATE CASE ASSEMBLY - REPAIR OF WORN GEARBOX MOUNT LUG HOLES	
	PULLER, COMPRESSOR INTERMEDIATE CASE BUSHINGS - - - -	PWA 50719
12	COMPRESSOR INTERMEDIATE CASE ASSEMBLY - INNER PLATFORM LEADING EDGE REPAIR	
	FIXTURE, MACHINE, INTERMEDIATE CASE, 229 - - - - -	PWA 71322
	FIXTURE, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 71003
	MASK, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 71004
	MASK, GRIT BLAST/PLASMA SPRAY - - - - -	PWA 71005

ILLUSTRATED SUPPORT EQUIPMENT



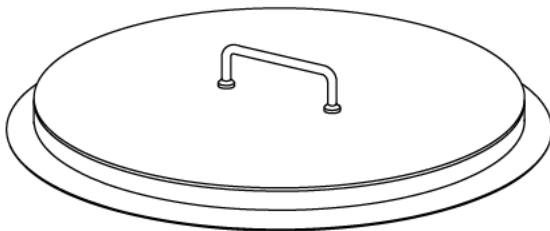
PWA 50719 -C

Figure T1. PWA 50719 PULLER



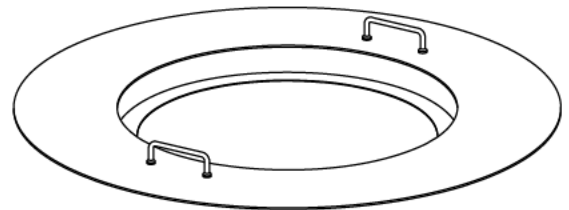
PWA 71003 -C

Figure T2. PWA 71003 FIXTURE



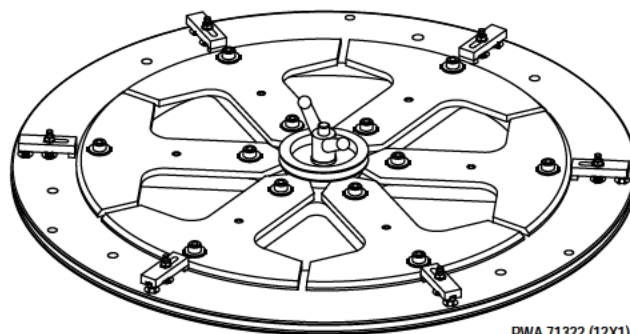
PWA 71004 -C

Figure T3. PWA 71004 MASK



PWA 71005 -C

Figure T4. PWA 71005 MASK



PWA 71322 (12X1)

Figure T5. PWA 71322 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for repair of compressor intermediate case assembly.
- b. The repairs covered in this work package are as follows:

Repair	Paragraph
Gearbox mount bushing replacement	2
Antiseize/antigalling compound application	3
Repair of worn gearbox mount lug holes	4
Pin replacement	5
Bracket replacement	6
Identification plate replacement	7
Inner forward flange threaded hole	8
Plasma spray	9

2. COMPRESSOR INTERMEDIATE CASE ASSEMBLY - GEARBOX MOUNT BUSHING REPLACEMENT.

(See Figure 1.)

- a. Remove unserviceable bushings(1, figure 1) by machining, being careful not to remove parent material from case.

NOTE

There are four flanged bushings, two on each of two lugs on the intermediate case flange.

- b. Clean locally with acetone, isopropyl alcohol or methyl ethyl ketone.
- c. Select replacement bushings to provide tight fit with case. Refer to T.O. 2J-F100-53-1, WP 801 00, Reference 2922.
- d. Place bushing, flanged end first, on piloted end of PWA 50719 puller.
- e. Install threaded end of tool through appropriate hole in flange of intermediate case.
- f. Install nut detail on threaded end of tool and tighten to pull bushing into case.
- g. Apply antigalling compound to bushing surfaces. (See paragraph 3.)

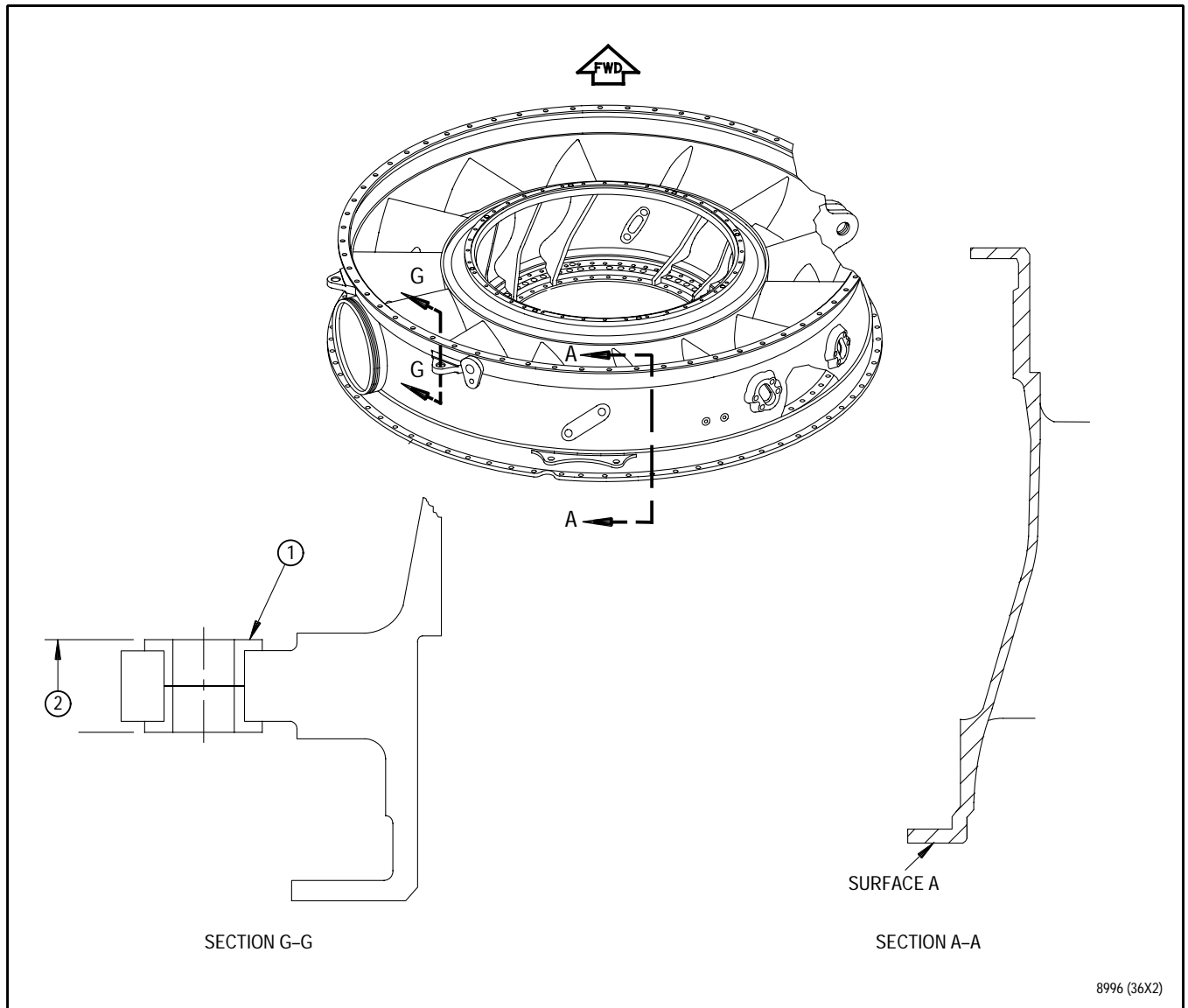


Figure 1. Compressor Intermediate Case Assembly - Gearbox Mount Bushing

T.O. 2J-F100-53-7

WP 469 00

**3. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - ANTIGALLING COMPOUND
APPLICATION.**

(See Figure 2.)

- a. Apply antigalling compound per PWA 36545 to areas shown in figure 2. Refer to T.O. 2J-F100-53-1, SWP 098 07 (SPOP 748). No surface preparation required.

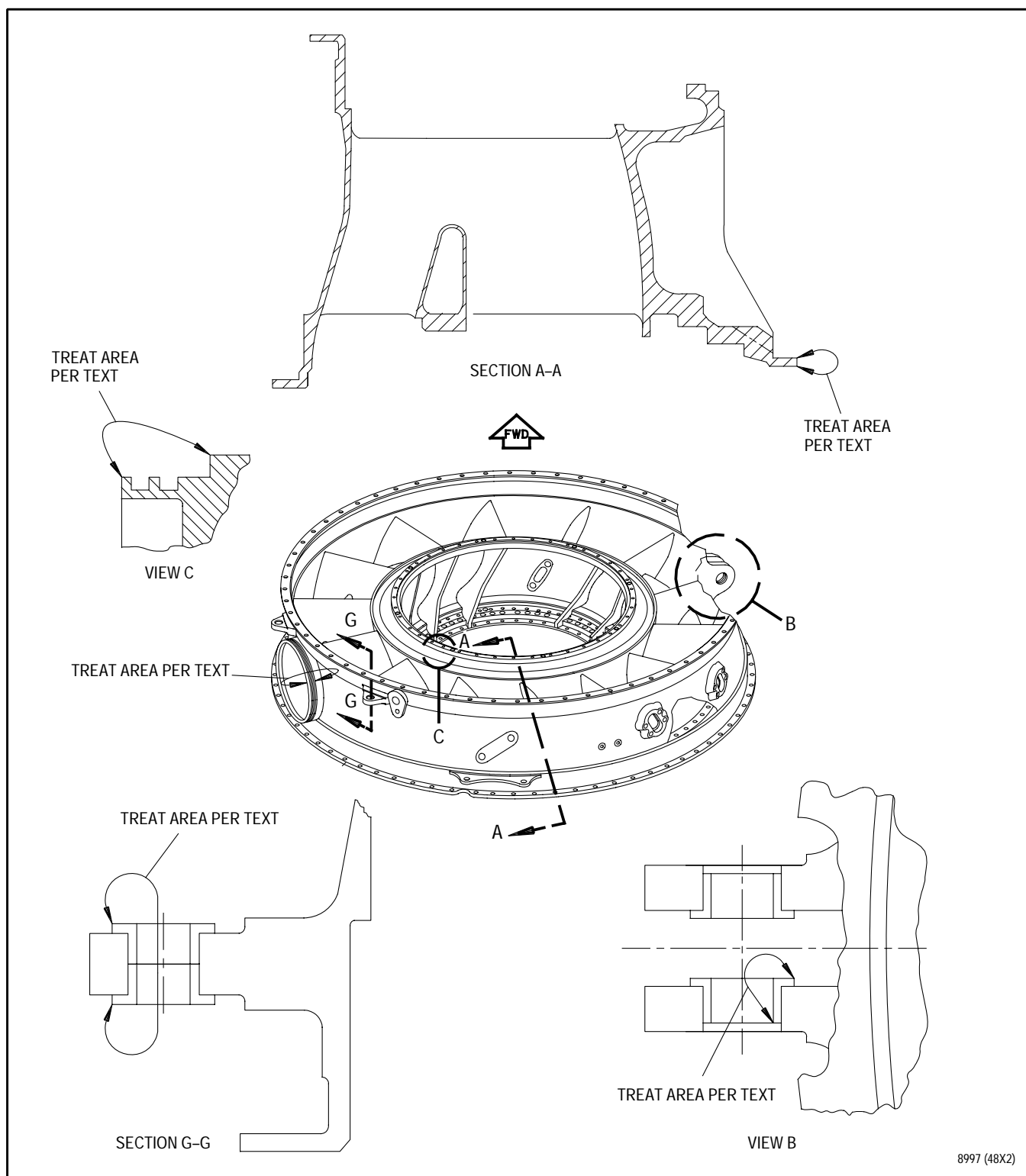
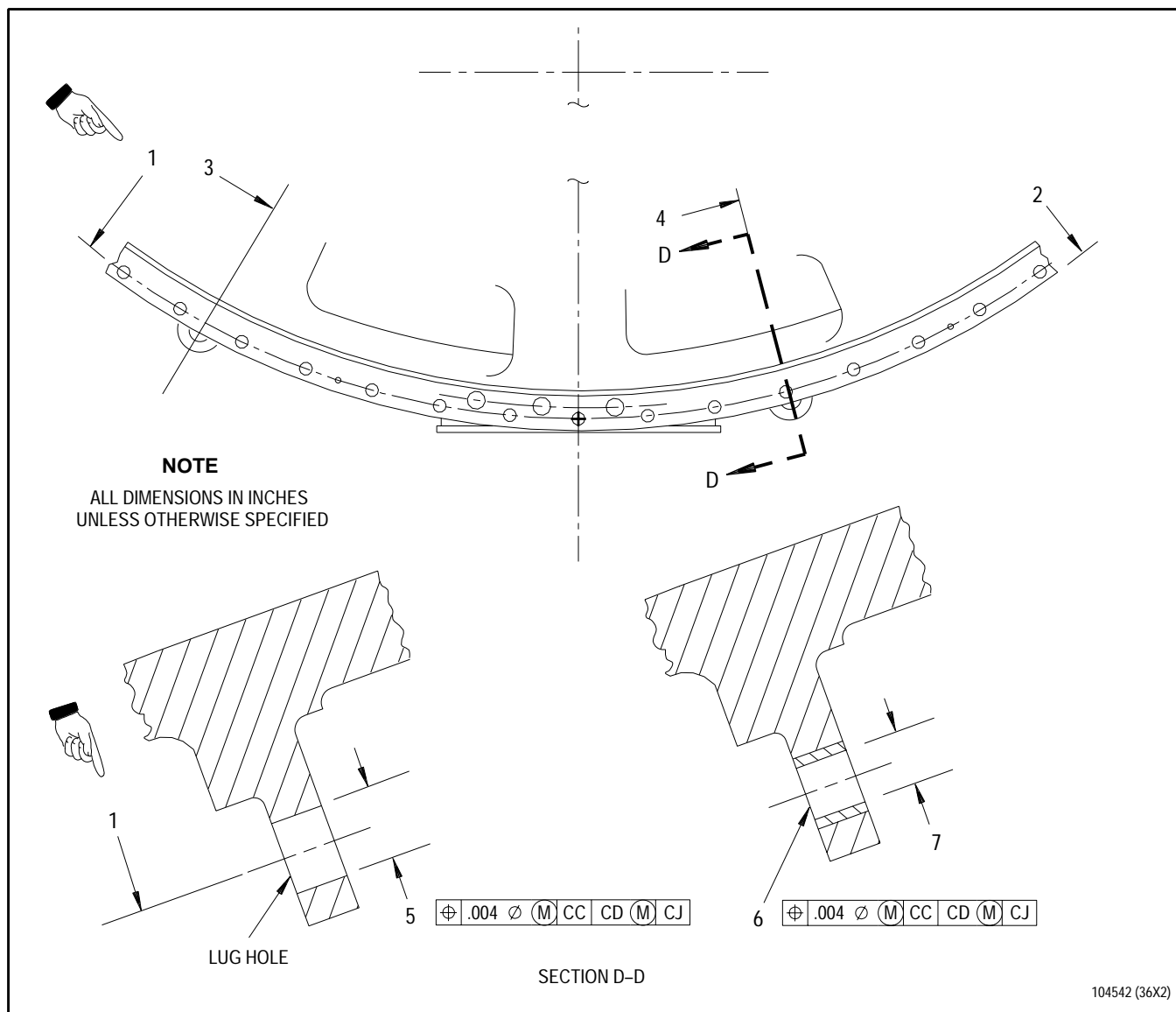


Figure 2. Compressor Intermediate Case Assembly - Antigalling Compound Application

**4. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - REPAIR OF WORN GEARBOX
MOUNT LUG HOLES.**

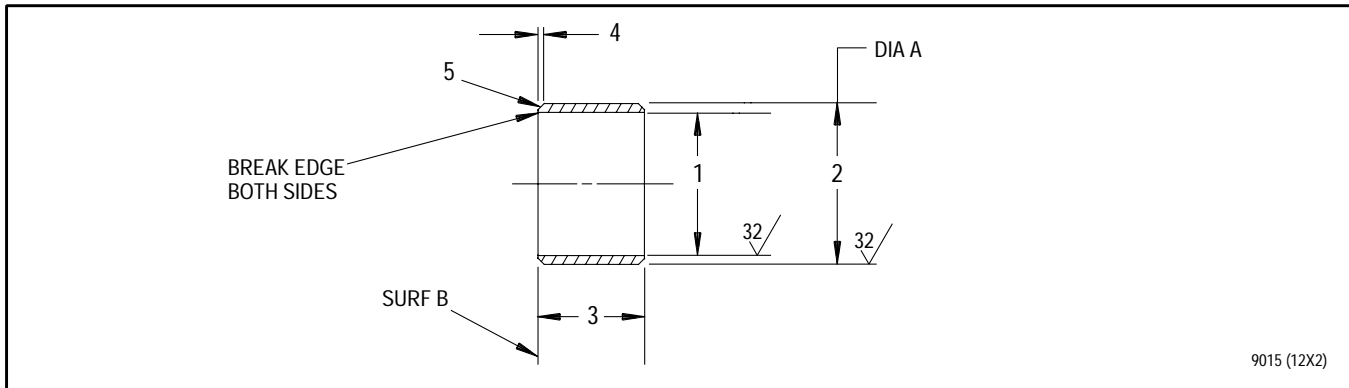
(See Figures 3 and 4.)

- a. Drill and ream new hole to dimension(5, figure 3). Break edges.
- b. Fluorescent penetrant inspect local area. Refer to T.O. 2J-F100-9 (SPOP 70). No cracks allowed.
- c. Fabricate sleeve(6) using AMS 5744. (See figure 4.)
- d. Chill sleeve with liquid nitrogen or dry ice/acetone.
- e. Place sleeve on piloted end of PWA 50719 puller.
- f. Install threaded end of tool through lug hole.
- g. Install nut on threaded end of tool and tighten to pull sleeve flush with case.
- h. Remove tooling.
- i. Ream sleeve hole to dimension (7, figure 3). Break edges.



1. 17.078 inch radius
2. 17.179 inch radius
3. $164^{\circ} 48'$
4. $208^{\circ} 3'$
5. Chamfer $90^{\circ} \pm 2^{\circ}$ including 0.614 to 0.634 inch diameter both sides, located in relation to hole diameter within 0.015 inch minimum radial distance.
6. Sleeve
7. 0.499 to 0.500 inch diameter

Figure 3. Compressor Intermediate Case Assembly - Sleeve Repair Dimensions



1. 0.499 to 0.500 inch diameter concentric with Diameter A within 0.002 inch diameter.
2. 0.5660 to 0.5655 inch diameter to form a tight fit between case and sleeve. Also, diameter must be square to Surf B within 0.003 inch total.
3. 0.360 to 0.370 inch
4. Chamfer 0.010 to 0.020 inch $\times 45^\circ \pm 5^\circ$, 2 places.
5. Unless otherwise stated, break edges 0.003 to 0.015 inch.

Figure 4. Compressor Intermediate Case Assembly - Gearbox Mount Lug Sleeve

**5. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - PIN REPLACEMENT.**

(See Figure 5.)

a. Remove unserviceable pin(s) as follows:

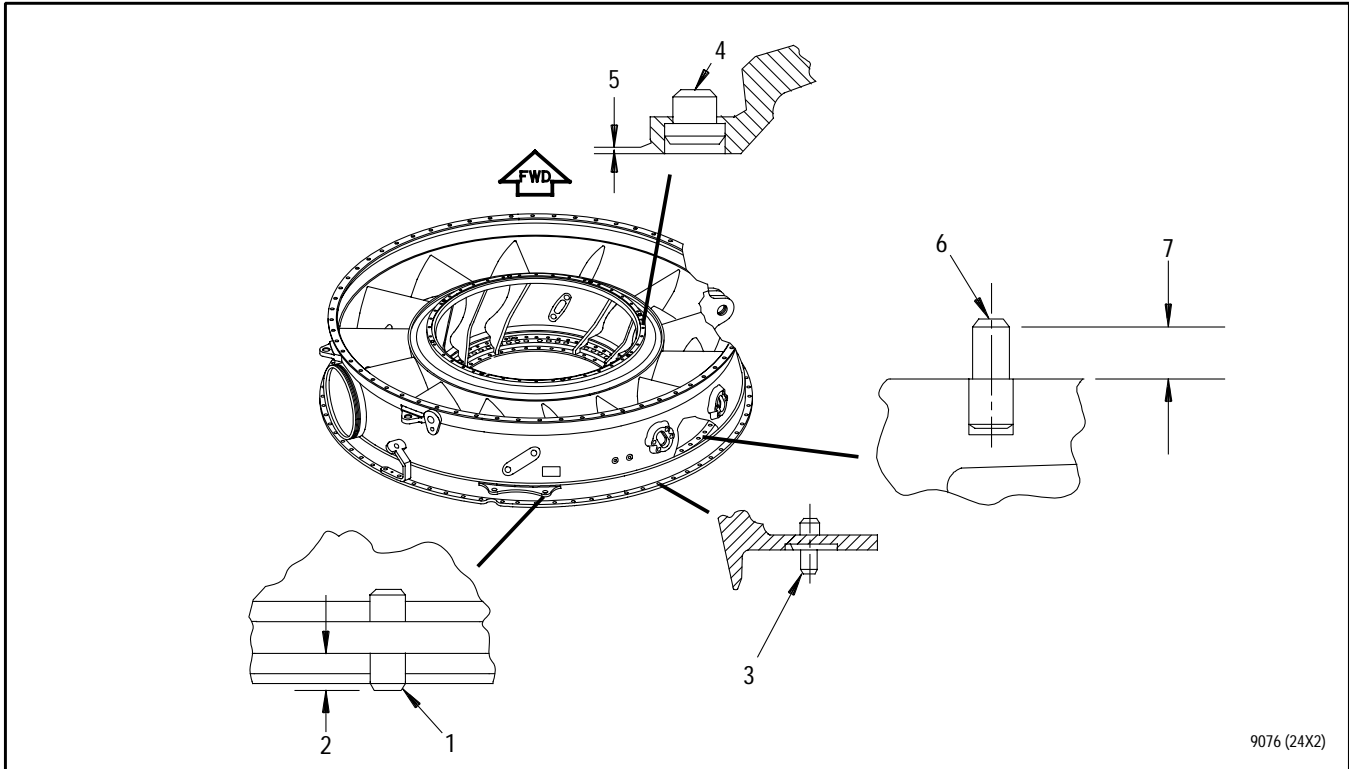
- (1) Press out unserviceable headless straight pin (PN 425422).
- (2) Press out unserviceable headless shoulder pin (PN 476067).
- (3) Drift out unserviceable round headed straight pin (PN 4001894).

- (4) Drift out unserviceable headless shoulder pin (PN 4069985).

- (5) Remove unserviceable headless shoulder pin (PN 444613). Refer to T.O. 2-1-111.

b. Chill replacement pin.

c. Press replacement pin into hole per requirements of figure 5.



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1. Headless straight pin (PN 425422), 2 places
2. 0.365 to 0.385 inch, 2 places
3. Headless shoulder pin (PN 476067), 1 place
4. Round headed straight pin (PN 4001894), 1 place
5. 0.005 inch minimum, both sides
6. Headless shoulder pin (PN 4069985), 1 place
7. 0.294 to 0.314 inch
8. Headless shoulder pin (PN 444613), 2 places
9. 0.179 to 0.199 inch

Figure 5. Compressor Intermediate Case Assembly - Pin Replacement (Sheet 1 of 2)

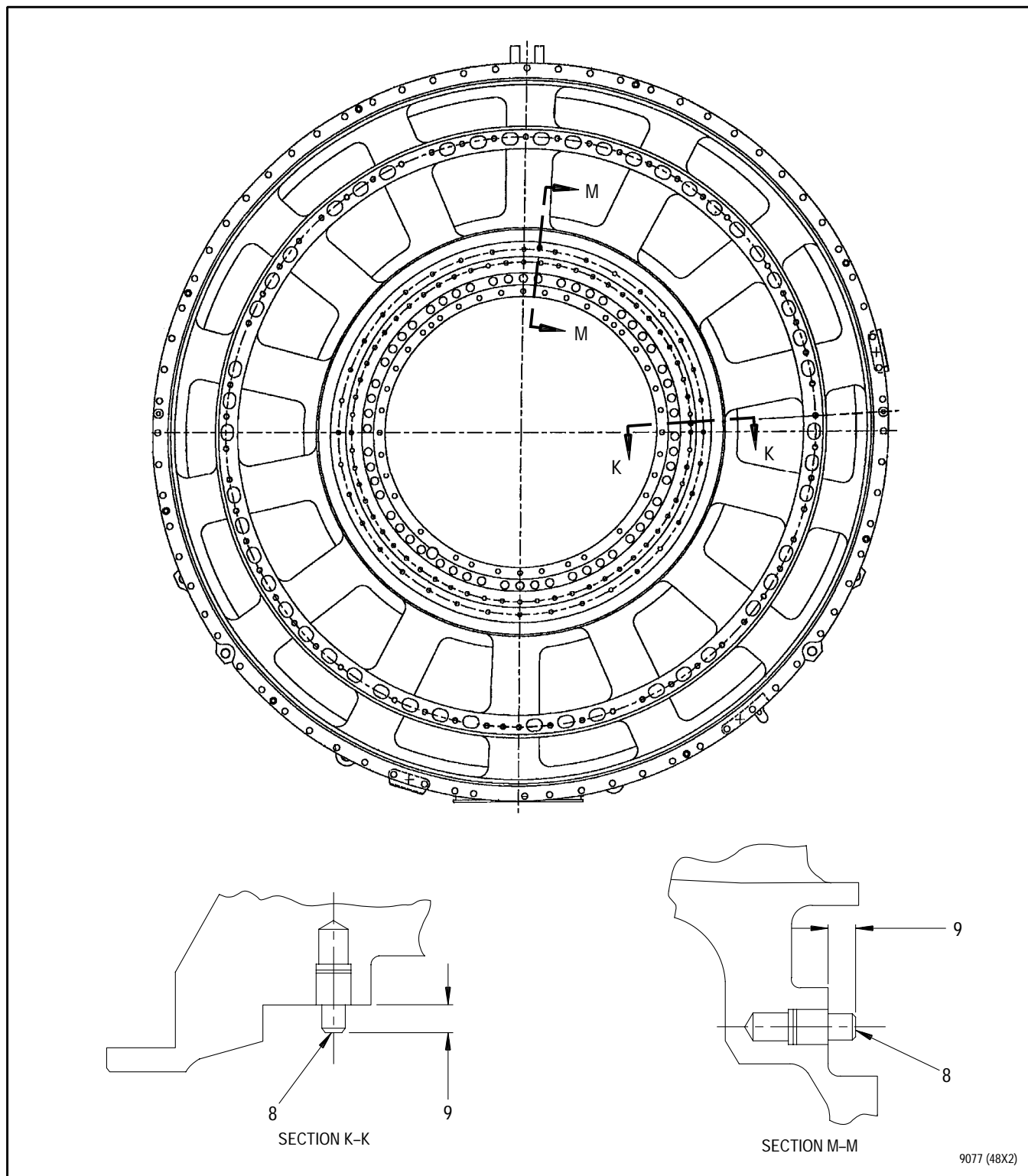


Figure 5. Compressor Intermediate Case Assembly - Pin Replacement (Sheet 2 of 2)

**6. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - BRACKET REPLACEMENT.**

(See Figure 6.)

NOTE

Loose or missing rivets may be replaced per this repair without removing or replacing serviceable bracket.

- a. Remove rivet by grinding upset head and punching out rivet. Remove all pieces of rivet from case.
- b. Remove unserviceable bracket.
- c. Install replacement bracket aligning bolt holes in bracket and case with a 0.250 to 0.270 inch diameter rod.

- d. Install rivet as shown. Refer to T.O. 2-1-111. Rivet head shall be flush or below surface.

Legend for figure 6

1. Loop clamp bracket (PN 4075633)
2. Rivet as shown
3. Loop clamp bracket (PN 4077354)
4. Angle bracket (PN 4077222)
5. Loop clamp bracket (PN 4074053)
6. Rivet as shown

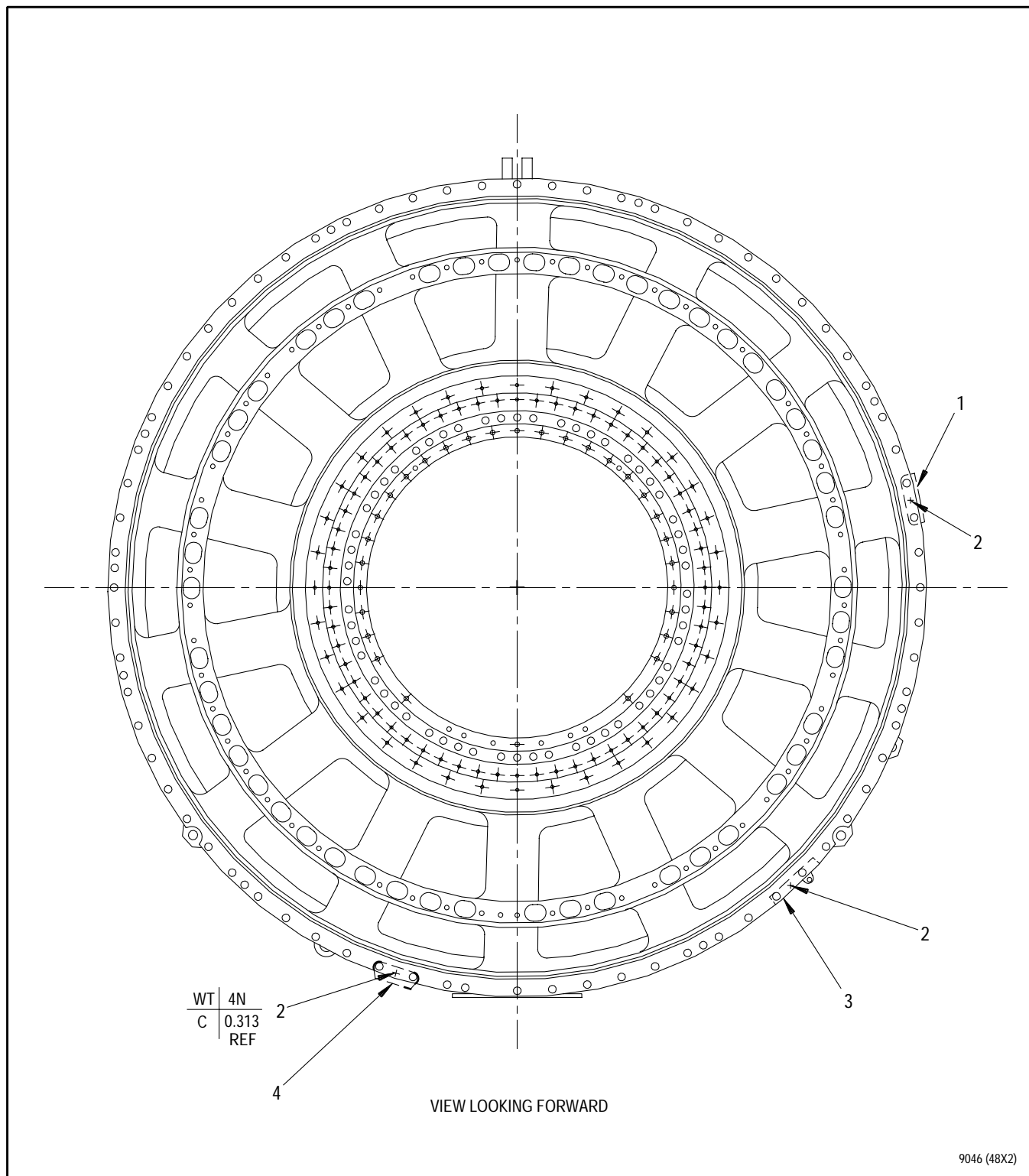


Figure 6. Compressor Intermediate Case Assembly - Bracket Replacement (Sheet 1 of 2)

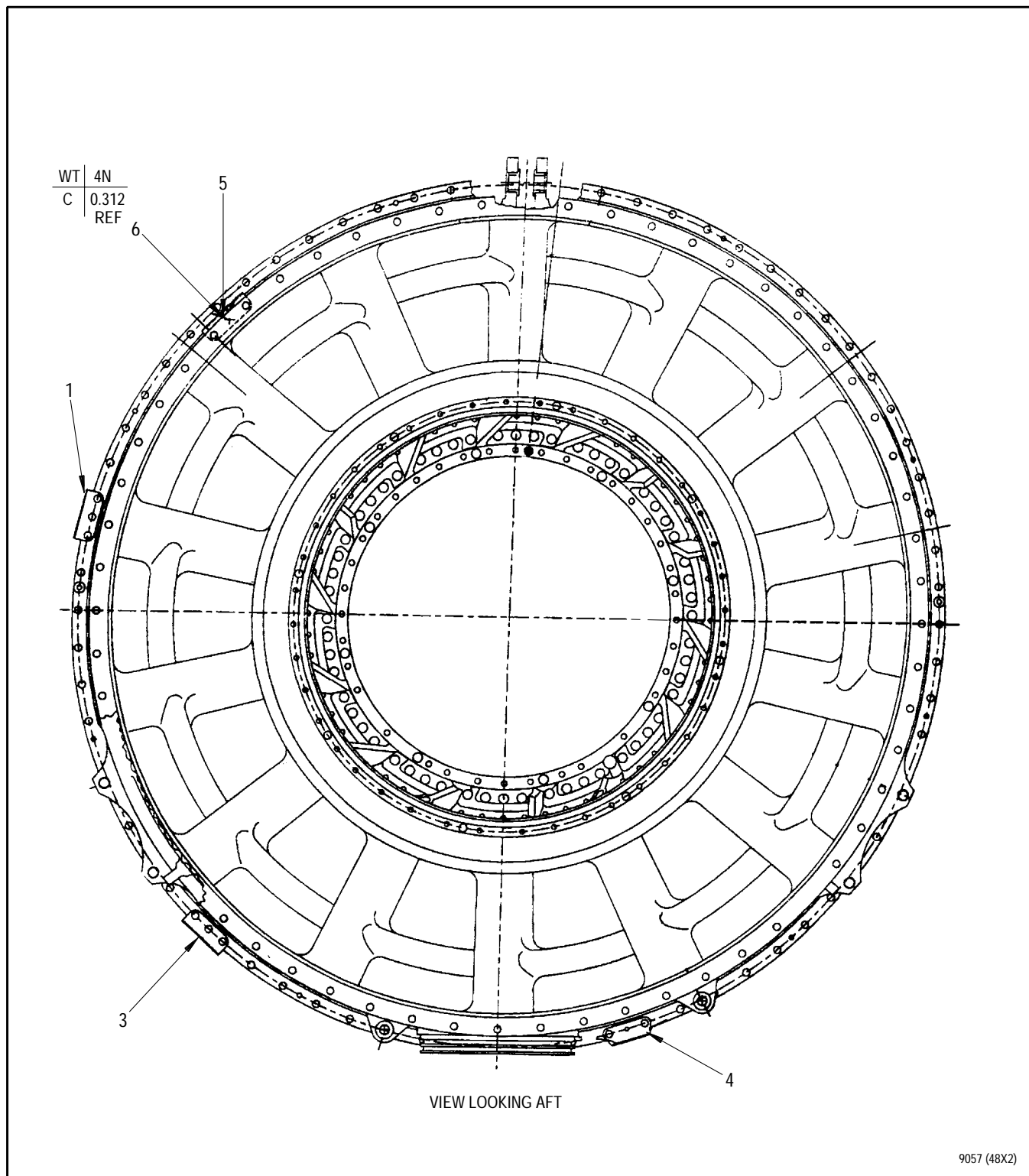


Figure 6. Compressor Intermediate Case Assembly - Bracket Replacement (Sheet 2 of 2)

**7. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - IDENTIFICATION PLATE
REPLACEMENT.**

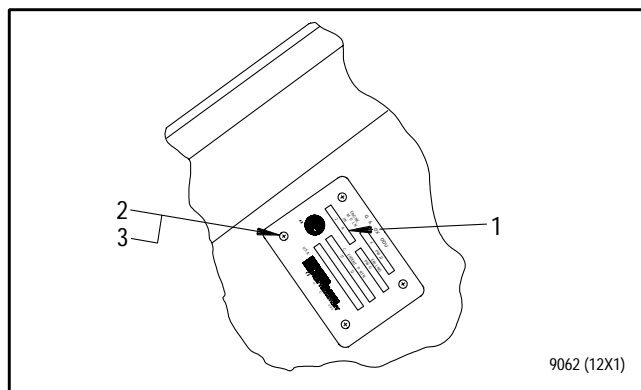
(See Figure 7.)

NOTE

Identification plate is not detail of intermediate case, but shall be transferred from unreparable case to new case.

- a. If identification plate is unserviceable, remove it by removing safety wire and four screws. See figure 7.

- b. Position replacement identification plate so that printed side is up and can be read.
- c. Install identification plate with four screws and safety wire per PWA 316. Refer to T.O. 2-1-111. See figure 7.



1. Identification plate (PN 4075514)
2. Screw (PN 593720), 4 places
3. MS9226-04 safety wire

Figure 7. Compressor Intermediate Case Assembly - Identification Plate Replacement

**8. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - INNER FORWARD FLANGE
THREADED
HOLE REPAIR.**

(See Figure 8.)

- a. Drill out old threads(1) using 13/64 inch diameter bit for full depth of hole(4).
- b. Chamfer Surface A per (2). Break edges on both ends of hole 0.003 to 0.015 inch.
- c. Thread holes as required using Heli-coil 3FPB tap. Refer to T.O. 44H1-1-117.
- d. Install Heli-coil insert into tapped hole using insert tool number 7552-3. Rotate insert into tapped hole until one turn of tapped portion is visible. Use a 10(0.190) - 32 x 0.190 free running stainless steel insert (Heli-coil PN 1191-3CN0190).
- e. Insert Heli-coil tang break-off tool number 3695-3 into insert and with a sharp blow, break off tang.

Legend for figure 8

1. 0.190-32UNJF-3B. 40 holes, 34 holes on the basis of 40 holes equally spaced and 6 holes offset. Diameter shall be located within 0.010 inch diameter of true position at Maximum Material Condition in relation to diameters CH and CN at Maximum Material Condition and Surface CG.
2. Chamfer $90^\circ \pm 5^\circ$ including 0.190 to 0.220 inch diameter

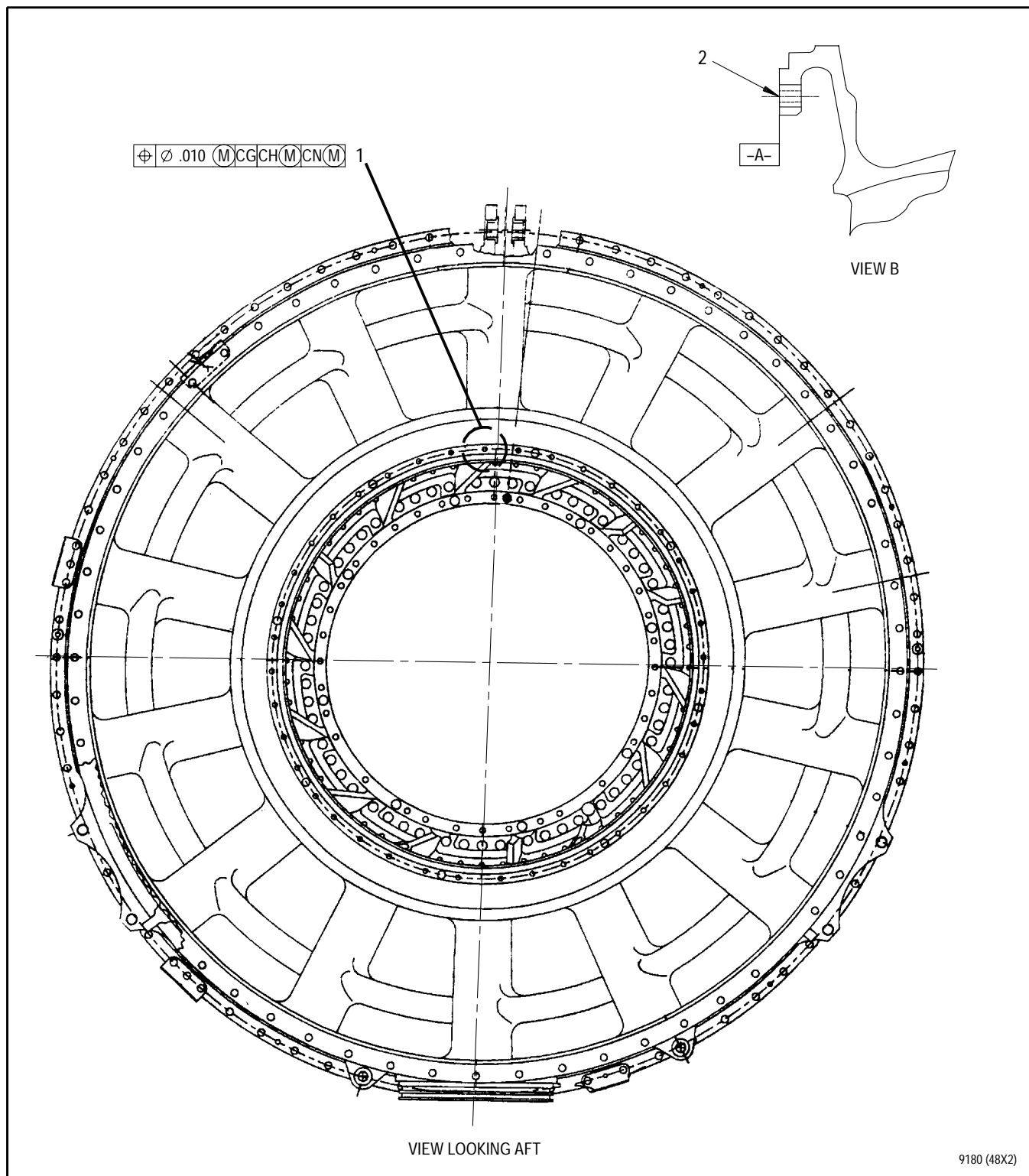


Figure 8. Compressor Intermediate Case Assembly - Inner Forward Flange Threaded Hole Repair

**9. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - PLASMA SPRAY REPAIR.**

(See Figure 9.)

- a. Machine worn snap diameters to clean up damage, as necessary, per figure 9. Remove a minimum amount of material. Grinding, if used, shall be per T.O. 2J-F100-53-1, SWP 091 03 (SPOP 530).
- b. Fluorescent penetrant inspect for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

NOTE

Case material is PWA 1265-2 cast titanium alloy.

- c. Plasma spray per PWA 53-37. Refer to T.O. 2J-F100-53-1, WP 096 00.
- d. Machine to required final dimensions per figure 9.

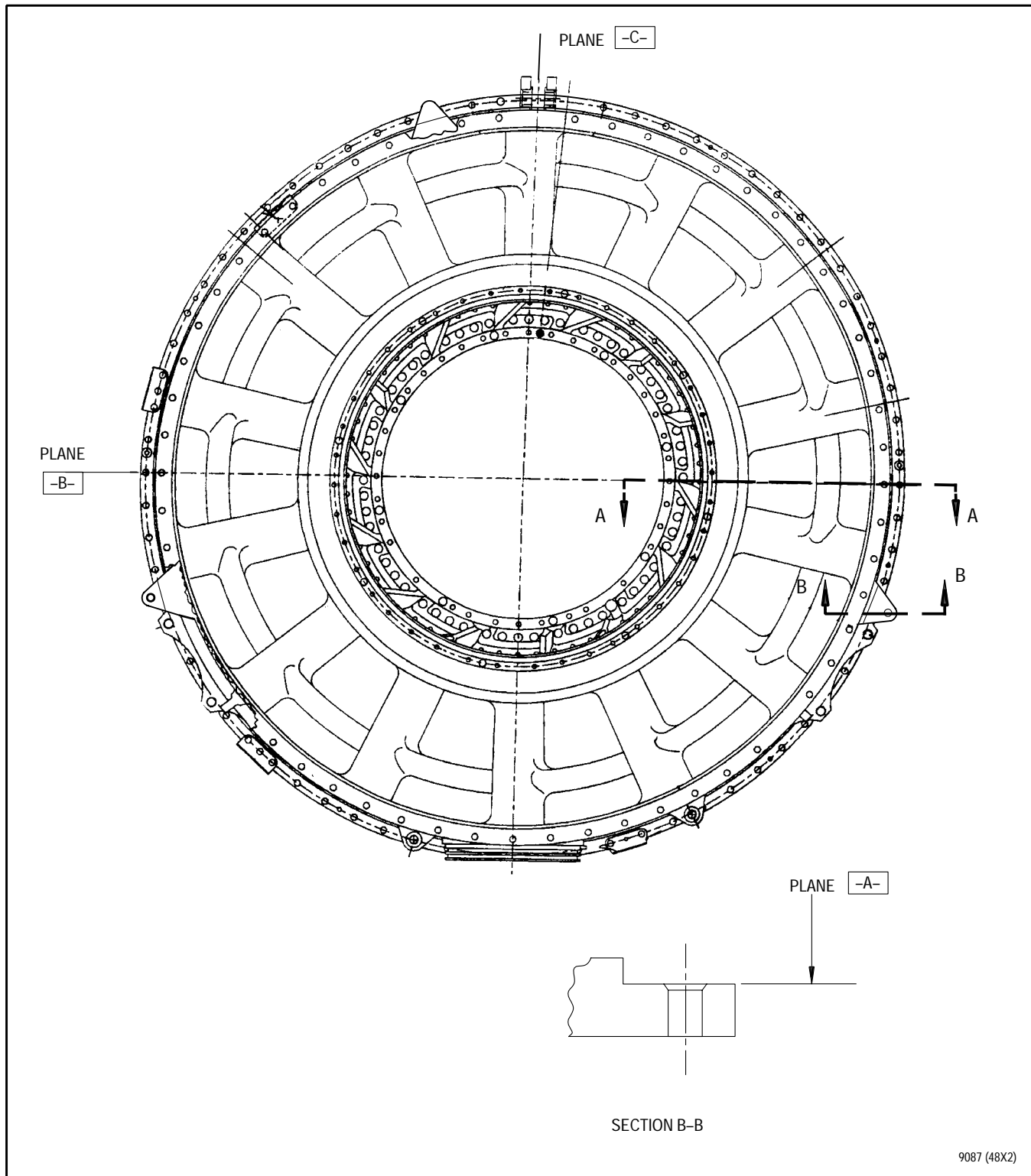


Figure 9. Compressor Intermediate Case Assembly - Plasma Spray Repair (Sheet 1 of 5)

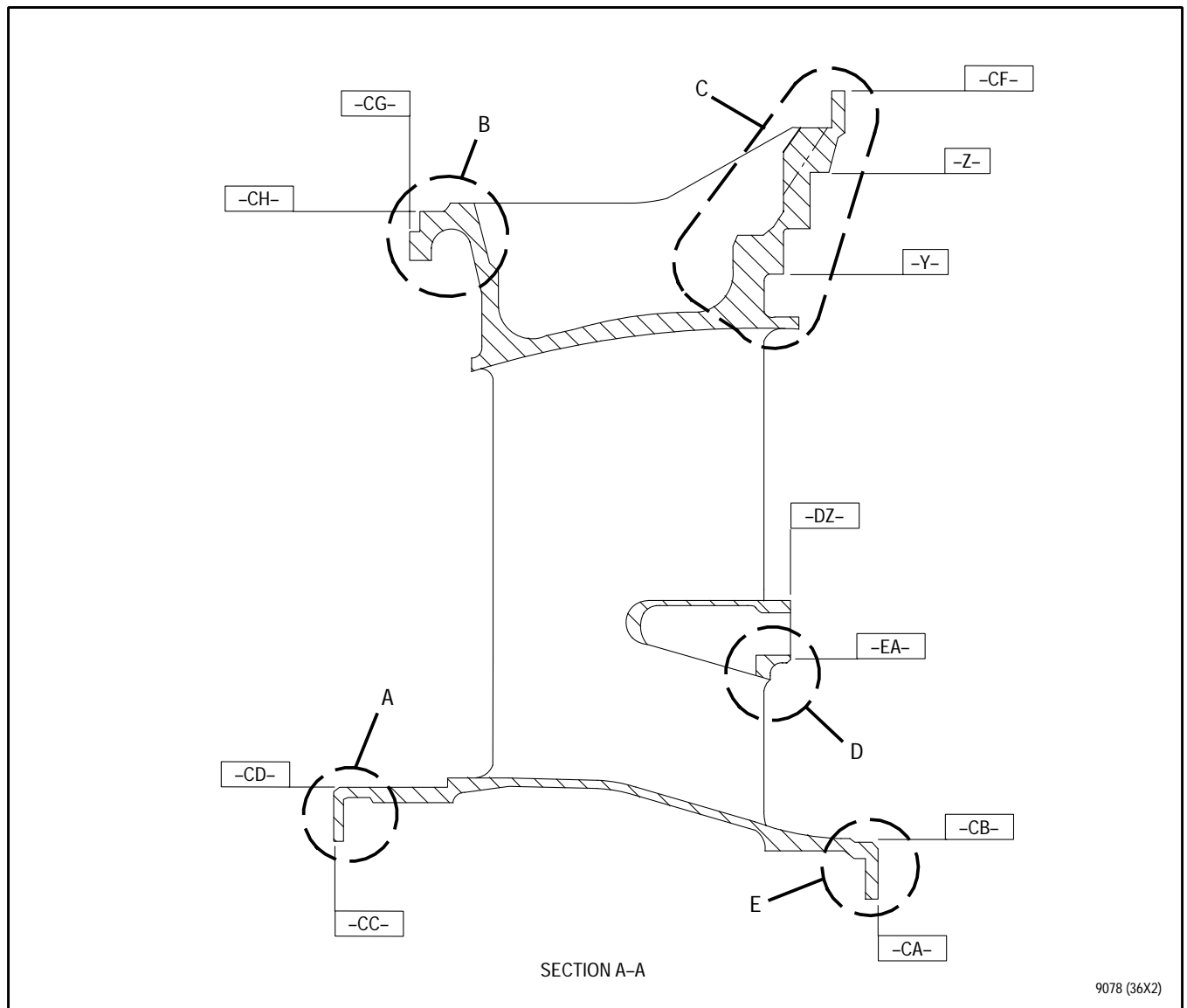


Figure 9. Compressor Intermediate Case Assembly - Plasma Spray Repair (Sheet 2 of 5)

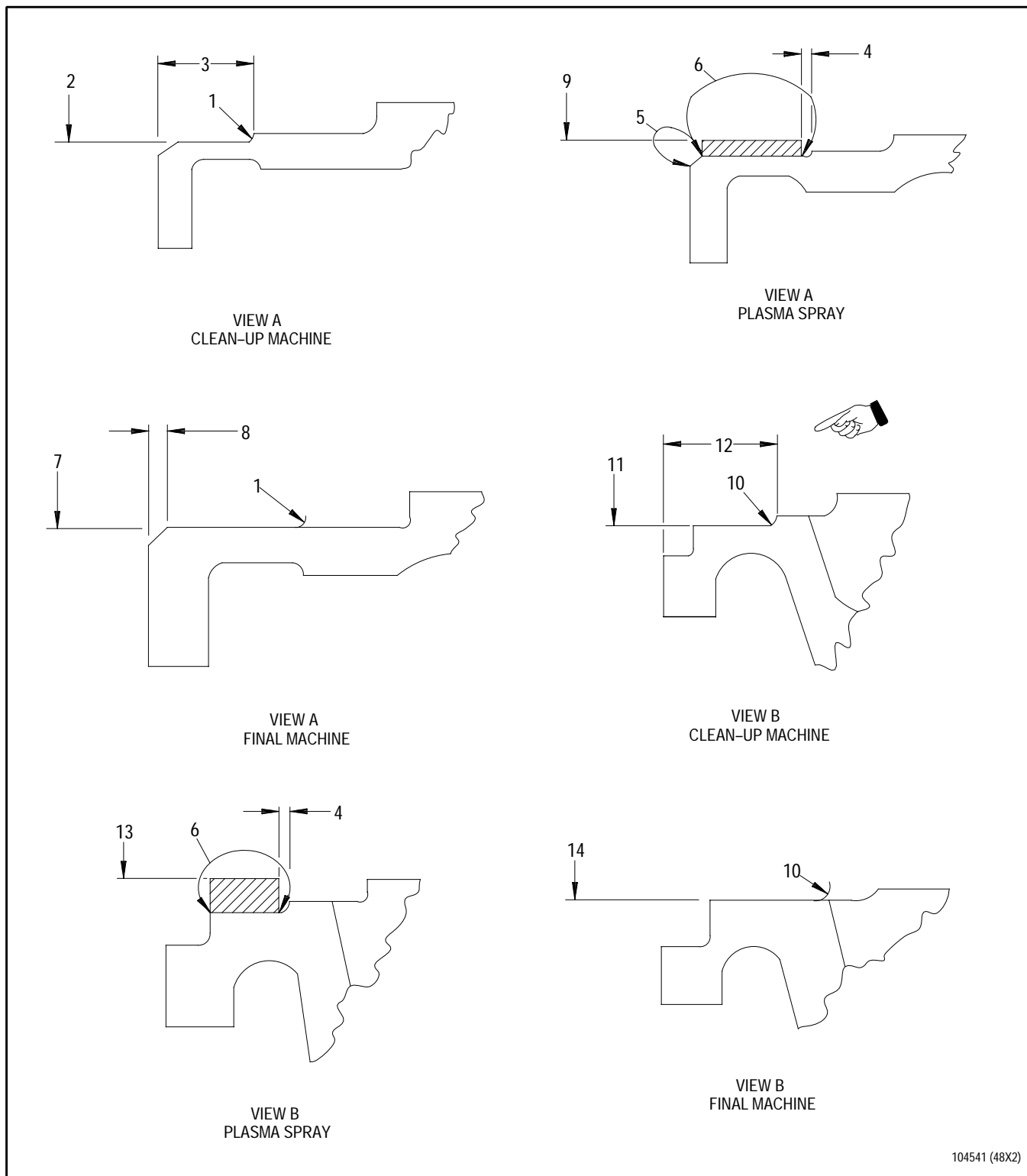


Figure 9. Compressor Intermediate Case Assembly - Plasma Spray Repair (Sheet 3 of 5)

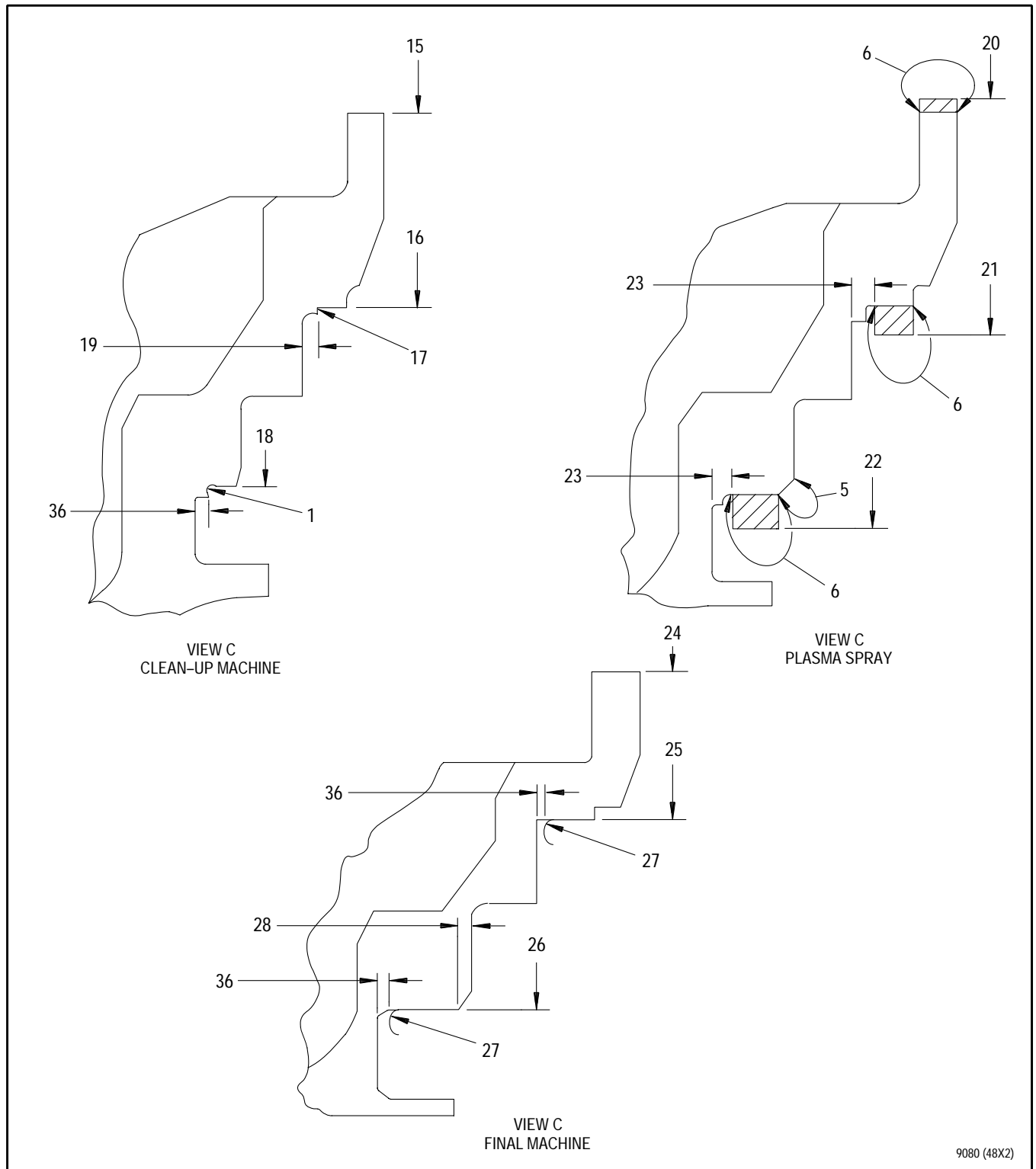
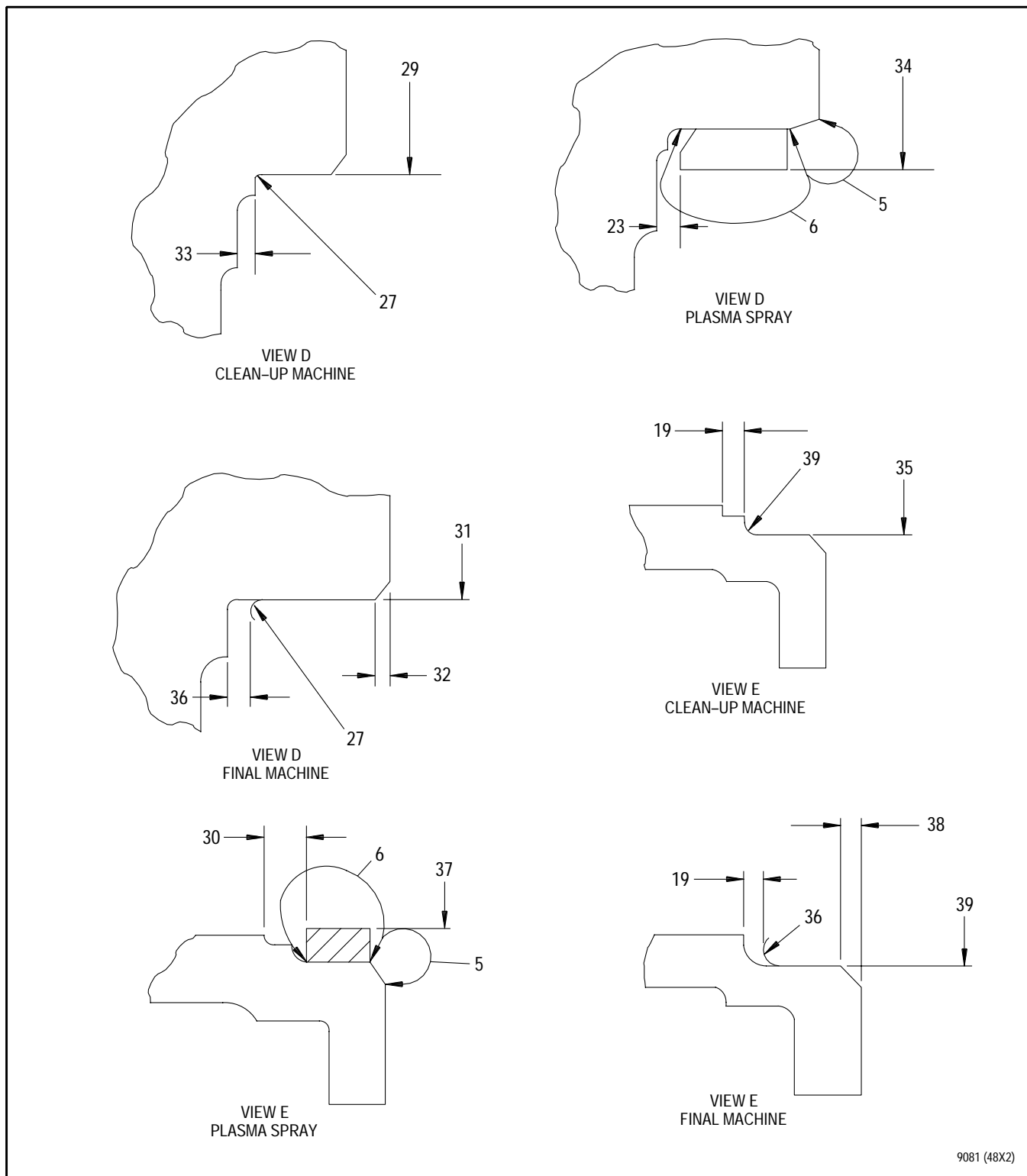


Figure 9. Compressor Intermediate Case Assembly - Plasma Spray Repair (Sheet 4 of 5)



9081 (48X2)

Figure 9. Compressor Intermediate Case Assembly - Plasma Spray Repair (Sheet 5 of 5)

Legend for figure 9

1. Modified radius 0.040 to 0.060 inch
2. 31.868 to 31.878 inch average diameter
This diameter shall be located within 0.002 inch diameter of true position
Regardless of Feature Size in relation to diameter CB Regardless of Feature Size
and Surface CA. This diameter shall also be perpendicular within 0.002 inch
Regardless of Feature Size to Surface CC.
3. 0.320 minimum, as required to clean up wear
4. 0.060 to 0.090 inch, no grit blast or plasma spray
5. Plasma spray is optional and may be incomplete
6. Plasma spray per text
7. 31.858 to 31.862 inch diameter
This diameter shall be located within 0.002 inch diameter of true position
Regardless of Feature Size in relation to diameter CB Regardless of Feature Size
and Surface CA. This diameter shall also be perpendicular within 0.002 inch
Regardless of Feature Size to Surface CC.
8. Chamfer 0.060 to 0.080 $\times 45^\circ \pm 2^\circ$
9. Plasma spray to a maximum diameter of 31.838 inches (reference)
10. Modified radius of 0.050 to 0.070 inch
11. 16.285 to 16.300 inch diameter
This diameter shall be located within 0.002 inch diameter of true position
Regardless of Feature Size in relation to diameter CB Regardless of Feature Size
and Surface CA.
12. 0.340 inch minimum, as required to clean up wear
13. Plasma spray to a maximum diameter of 16.255 (reference)
14. 16.275 to 16.279 inch diameter
This diameter shall be located within 0.002 inch diameter of true position
Regardless of Feature Size in relation to diameter CB Regardless of Feature Size
and Surface CA.
15. 12.786 to 12.796 inch diameter
This diameter shall be located within 0.001 inch diameter of true position
Regardless of Feature Size in relation to diameter CH Regardless of Feature Size
and Surface CG.
16. 14.982 to 14.992 inch diameter
This diameter shall be concentric within 0.002 inch diameter Regardless of
Feature Size in relation to diameter CF Regardless of Feature Size.
17. Modified radius 0.016 to 0.031 inch
18. 17.736 to 17.746 inch diameter
This diameter shall be concentric within 0.002 inch diameter Regardless of
Feature Size in relation to diameter EA Regardless of Feature Size.
19. 0.000 to 0.020 inch
20. Plasma spray to a maximum diameter of 12.756 inch (reference)
21. Plasma spray to a minimum diameter of 15.022 inch (reference)
22. Plasma spray to a minimum diameter of 17.776 inch (reference)
23. 0.045 to 0.065 inch, no grit blast or plasma spray
24. 12.776 to 12.780 inch diameter
This diameter shall be located within 0.001 inch diameter of true position
Regardless of Feature Size in relation to diameter CH Regardless of Feature Size
and Surface CG.

Legend for figure 9 (continued)

- 25. 14.998 to 15.002 inch diameter
This diameter shall be concentric within 0.002 inch diameter Regardless of Feature Size in relation to diameter CF Regardless of Feature Size.
- 26. 17.752 to 17.756 inch diameter
This diameter shall be concentric within 0.002 inch diameter Regardless of Feature Size in relation to diameter EA Regardless of Feature Size.
- 27. Modified radius 0.016 to 0.031 inch
- 28. Chamfer 0.060 to 0.070 × 45° ± 2°
- 29. 28.422 to 28.432 inch diameter
This diameter shall be perpendicular within 0.002 inch Regardless of Feature Size in relation to Surface DZ. This diameter shall be concentric within 0.002 inch Regardless of Feature Size in relation to diameter CB Regardless of Feature Size.
- 30. 0.070 to 0.090 inch, no grit blast or plasma spray allowed
- 31. 28.438 to 28.442 inch diameter
This diameter shall be perpendicular within 0.002 inch Regardless of Feature Size in relation to Surface DZ. This diameter shall be concentric within 0.002 inch diameter Regardless of Feature Size in relation to diameter CB Regardless of Feature Size.
- 32. Chamfer 0.050 to 0.060 × 45° ± 2°
- 33. 0.000 to 0.010 inch
- 34. Plasma spray to a minimum diameter of 28.462 inches (reference)
- 35. 33.277 to 33.285 inch average diameter
This diameter shall be perpendicular within 0.002 inch Regardless of Feature Size in relation to Surface CA. This diameter shall be located within 0.020 inch of true position at Maximum Material Condition in relation to Planes A, B, and C.
- 36. Modified radius 0.020 to 0.040 inch
- 37. Plasma spray to a maximum diameter of 33.245 inches (reference)
- 38. Chamfer 0.050 to 0.070 × 45° ± 5°
- 39. 33.265 to 33.271 inch average diameter
This diameter shall be perpendicular within 0.002 inch Regardless of Feature Size in relation to Surface CA. This diameter shall be located within 0.020 inch of true position at Maximum Material Condition in relation to Planes A, B, and C.

**10. COMPRESSOR INTERMEDIATE CASE -
SELF-LOCKING STUD REPLACEMENT.**

(See Figure 10.)

NOTE

Key stud features a hardened key that is broached into parent material at original manufacture, providing a positive mechanical lock against vibration.

a. Remove keyed stud.

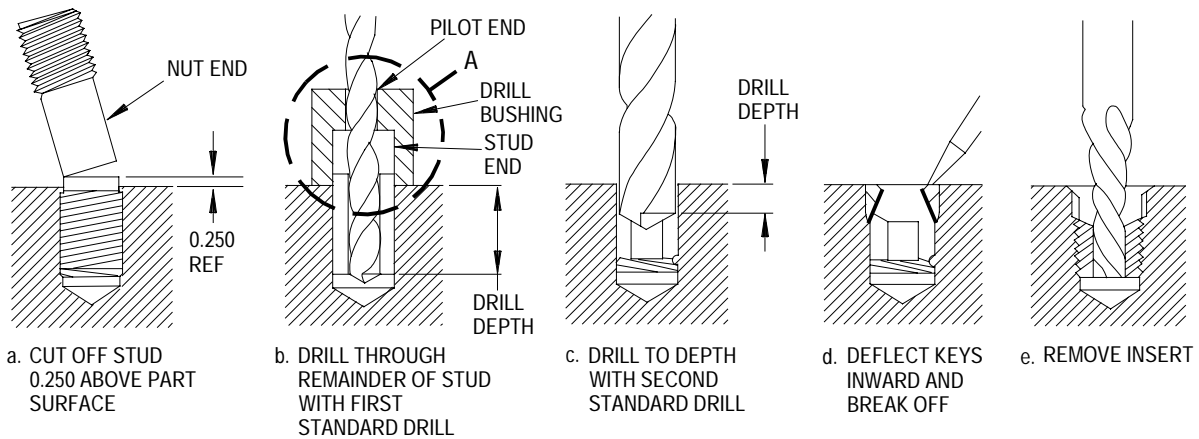
- (1) Cut off nut end of stud at distance of approximately 0.250 inch above surface of part. Discard removed portion of key stud. See figure 10, step a.
- (2) Locate center of protruding stud using locally manufactured drill bushing. See figure 10, View A and step b.

NOTE

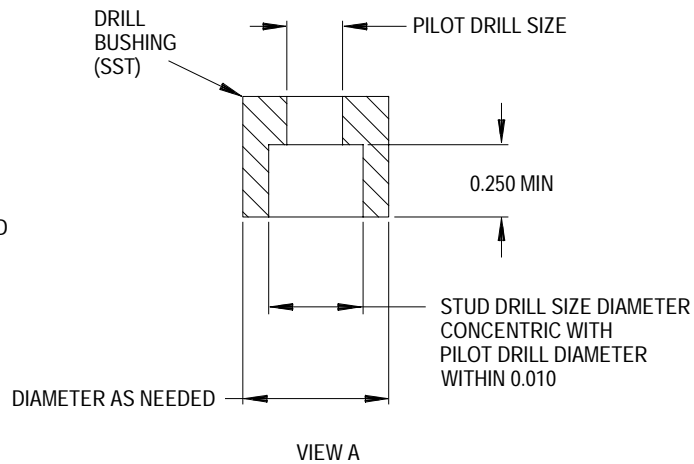
Use of cutting oil and cobalt drill are recommended for drilling operation.

- (3) Drill 0.060 inch diameter pilot hole, 0.250 inch deep in keyed stud. See figure 10, step b. Drill bit shall be held perpendicular and centered to work to ensure proper alignment of material removal between keys.
- (4) Remove stud by drilling out remaining stud material.

- (a) Center pilot hole and stud under drill bit. See figure 10, step c.
- (b) Remove material between stud keys using 0.189 inch diameter drill bit to a depth of 0.125 inch. See figure 10, step c.
- (c) Deflect keys inward and break off, using sharp point punch or equivalent. Remove keys. See figure 10, step d.
- (d) Remove stud remains, using an extractor type tool. Rotate counterclockwise to remove. See figure 10, step e.
- (5) Visually inspect stud thread hole for burrs, raised material and debris that would interfere with installation of new stud.
- (6) If required, using appropriate size tap, retap hole and remove burrs. (0.2500-28UNJF-3B MOD, minor diameter 0.2152 to 0.2245 inch, minor diameter depth 0.480 inch maximum.)
- (7) Using compressed air, blow out any debris that could interfere with installation of new keyed stud.



NOTE
ALL DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED



97866 (36X2)

Figure 10. Compressor Intermediate Case - Self-Locking Stud Replacement (Sheet 1 of 3)

b. Installation of keyed stud.

- (1) Temporarily mark part surface using Colorbrite Number 2101 pencil or equivalent where one of the keys has broached threaded hole. Refer to T.O. 2-1-111. See figure 10, Sheet 2.

- (2) Install keyed stud. Use Triadair tool number TR28009-18-200 or equivalent. See figure 10, Sheet 3.

- (3) Align stud key with mark previously made while ensuring stud end thread is flush or below part surface.

NOTE

If resistance is encountered while driving in keys, keys have not been properly aligned with broaches in threads.

- (4) Drive keys into part until top of keys are 0.000 to 0.005 inch below case surface. If resistance occurs while driving keys, remove stud and replace with new stud. See figure 10, sheet 3.

c. Inspect keyed stud after installation into case.

- (1) Keys must be flush or below part surface.

- (2) Keys cannot be bent or mushroomed. If keys are bent or mushroomed, replace with new stud.
- (3) Nut end external threads of stud must not be damaged. If keys or stud are damaged, replace with new keyed stud.

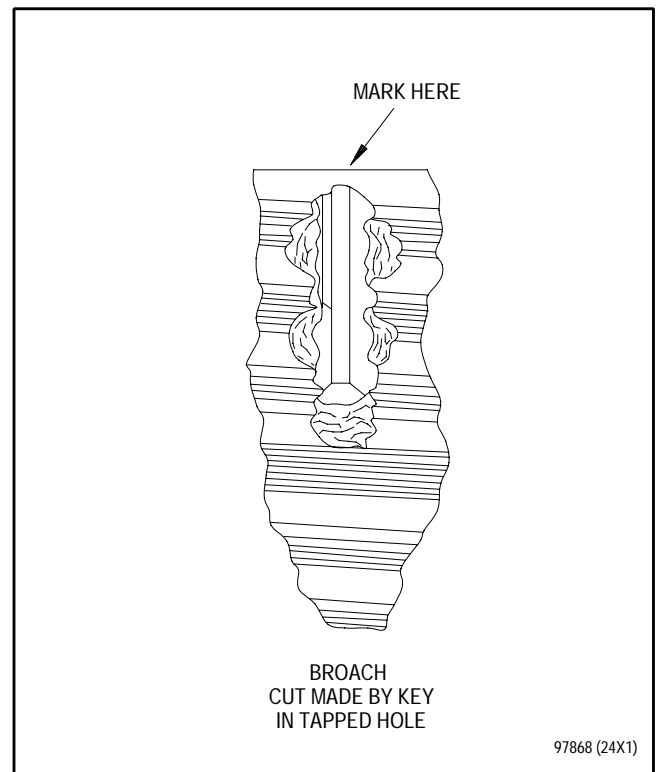


Figure 10. Compressor Intermediate Case - Self-Locking Stud Replacement (Sheet 2 of 3)

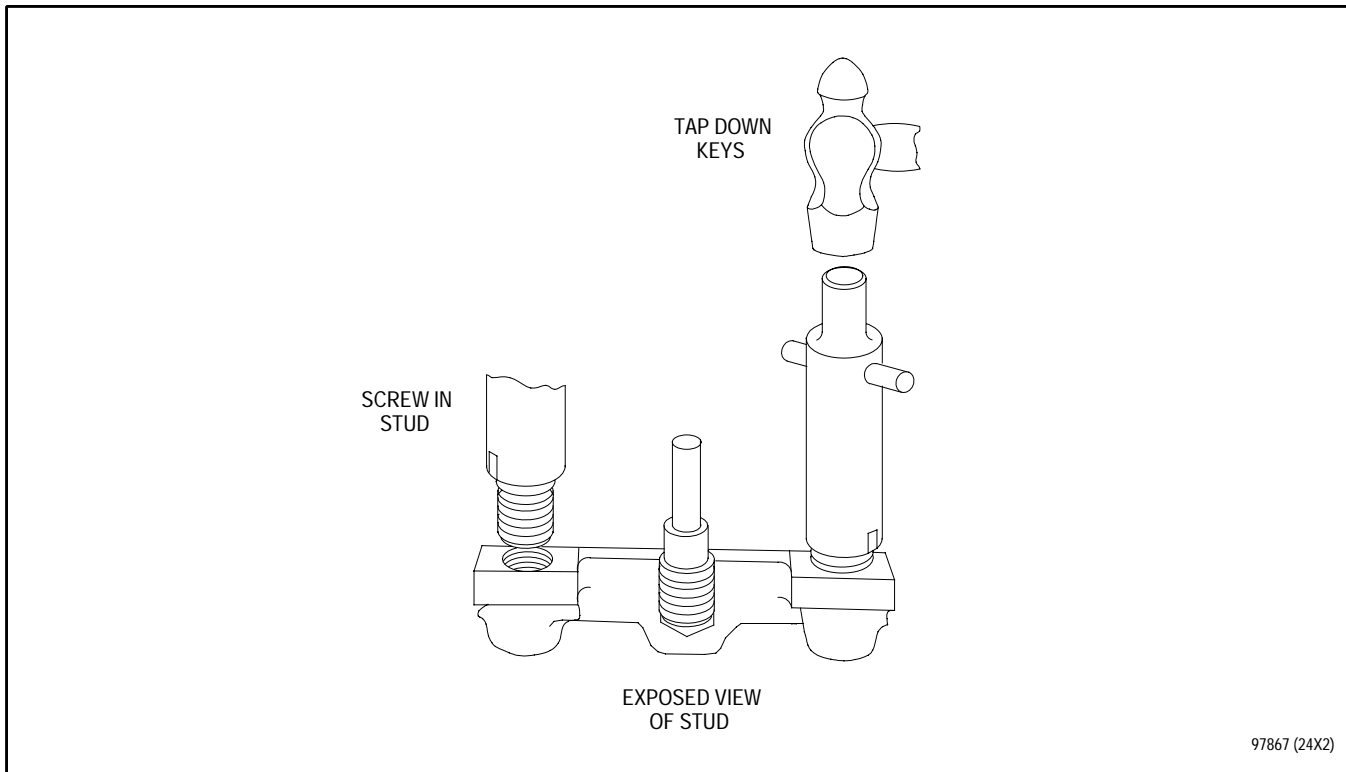


Figure 10. Compressor Intermediate Case - Self-Locking Stud Replacement (Sheet 3 of 3)

11. COMPRESSOR INTERMEDIATE CASE - SELF-LOCKING SCREW THREAD INSERT REPLACEMENT.

(See Figure 11.)

NOTE

- Key stud features a hardened key that is broached into parent material at original manufacture, providing a positive mechanical lock against vibration.
 - Use of cutting oil and cobalt drill are recommended for drilling operation.
- a. Remove keyed insert. See figure 11.
- (1) Use standard drill (drill 0.344 inch diameter x 0.188 inch deep) to remove insert material between keys. Drill bit shall be held

perpendicular and centered to work to ensure proper alignment of material removal between keys.

- (2) Deflect keys inward and break off, using a sharp point punch or equivalent. Remove keys.
- (3) Remove remaining insert using an extractor type tool.
- (4) Visually inspect insert thread hole for burrs, raised material and debris that would interfere with installation of new insert.
- (5) Using appropriate size tap (0.4375-14UNC-2B MOD, 0.396 to 0.401 inch minor diameter), retap hole and remove burrs.

- (6) Protect all open cavities from flying debris.
 - (7) Use compressed air to blow out any debris that could interfere with installation of new keyed insert.
- b. Installation of keyed insert.
See figure 11.
- (1) Temporarily mark part surface using Colorbrite Number 2101 pencil or equivalent where one of the keys has broached threaded hole. Refer to T.O. 2-1-111.
 - (2) Install keyed insert, use Tridair tool number THD428L, Microdot tool number KHT9000-4 or equivalent.
 - (3) Align insert key with mark previously made while ensuring insert is 0.010 to 0.035 inch below part surface.

NOTE

If resistance is encountered while driving in keys, keys have not been properly aligned with broaches in threads.

- (4) Drive keys into part until top of keys are 0.000 to 0.005 inch below part surface. If resistance occurs while driving keys, remove insert and replace with new insert.
- c. Inspect keyed insert after installation into case.
- (1) Keys must be flush or below part surface.
 - (2) Keys cannot be bent or mushroomed. If keys are bent or mushroomed, replace with new insert.

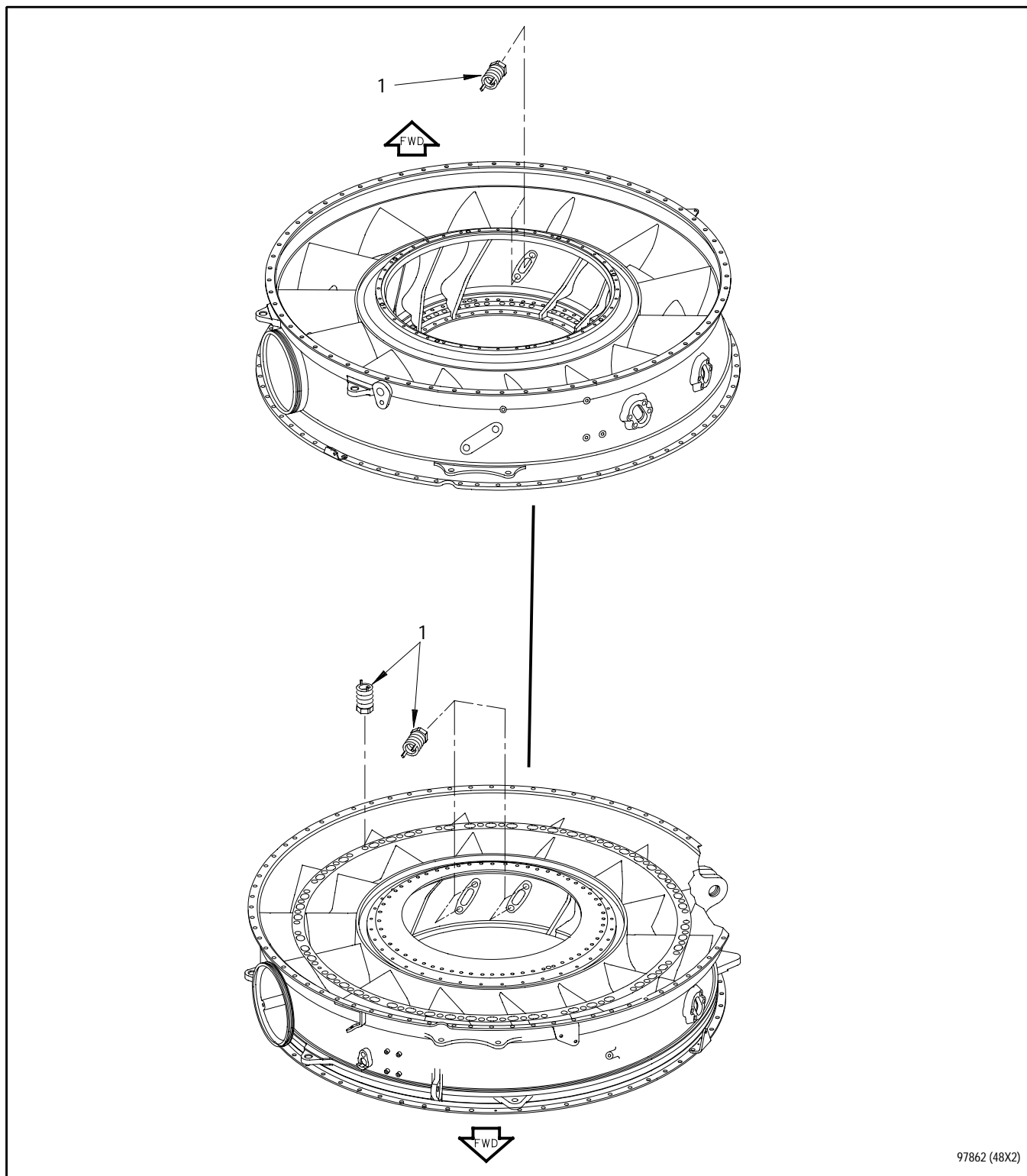


Figure 11. Compressor Intermediate Case - Self-Locking Screw Thread Insert Replacement (Sheet 1 of 2)

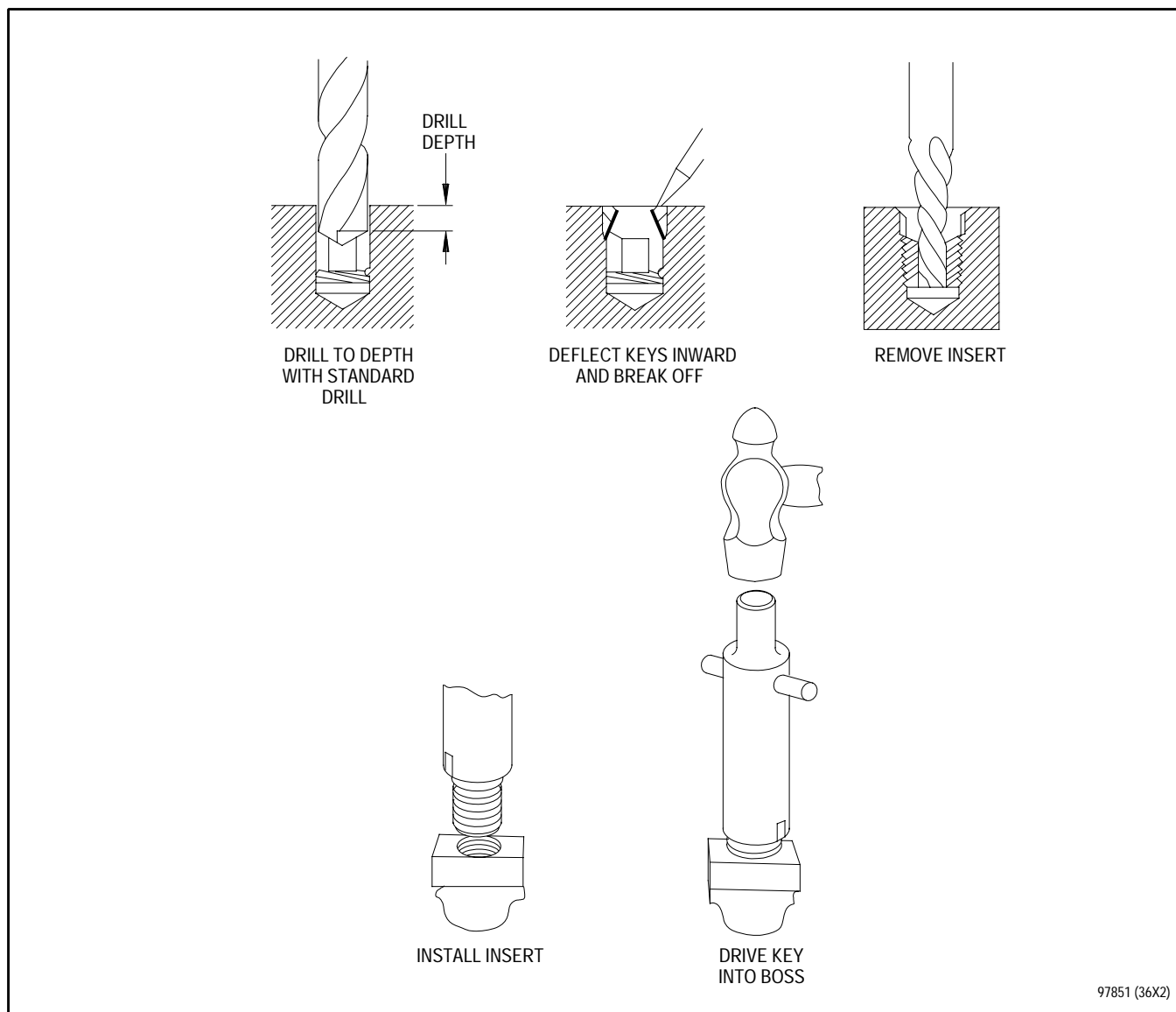


Figure 11. Compressor Intermediate Case - Self-Locking Screw Thread Insert Replacement (Sheet 2 of 2)

**12. COMPRESSOR INTERMEDIATE CASE
ASSEMBLY - INNER PLATFORM LEADING EDGE
REPAIR.**

(See Figure 12.)

- a. Install intermediate case on PWA 71322 fixture as follows:
 - (1) Turn central spindle counterclockwise to fully retract fixture jaws. Retrieve six strap clamps.
 - (2) Place intermediate case on fixture, forward side up. Tighten central spindle until jaws make light contact with rear inner snap diameter.
 - (3) Slide strap clamps over rear flange and tighten. Turn central spindle to make firm contact with rear inner snap diameter.

NOTE

Case material is PWA 1267 cast titanium alloy.

- b. Machine inner platform leading edge per Section A-A in figure 12. Grinding, if used, shall be per SPOP 530 only. Refer to T.O. 2-1-111.
- c. Fluorescent penetrant inspect local area per SPOP 70. Evaluate to SFPS-38. No cracks allowed. Refer to T.O. 2-1-111.
- d. Clean machined area per SPOP 208. Refer to T.O. 2-1-111.

- e. Mask intermediate case as follows:
 - (1) Install intermediate case on PWA 71003 fixture, forward side up and secure with four strap clamps.
 - (2) Install PWA 71004 mask on forward ID flange and PWA 71005 mask on forward OD flange.
 - (3) Apply additional masking, if required, per SPOP 36. Refer to T.O. 2-1-111.
- f. Grit blast Area G(3) per SPOP 170. Refer to T.O. 2-1-111.
- g. Remove and replace masking as required to remove any trapped grit.
- h. Plasma spray Area G(3) per PWA 53-37 to 0.024 inch minimum thickness. Refer to T.O. 2-1-111.
- i. Remove masking and install intermediate case on PWA 71322 fixture per step a.
- j. Finish machine per Section B-B in figure 12.
- k. Permanently identify with beehive symbol using shallow etch in area near part number per SPOP 401. Refer to T.O. 2-1-111.

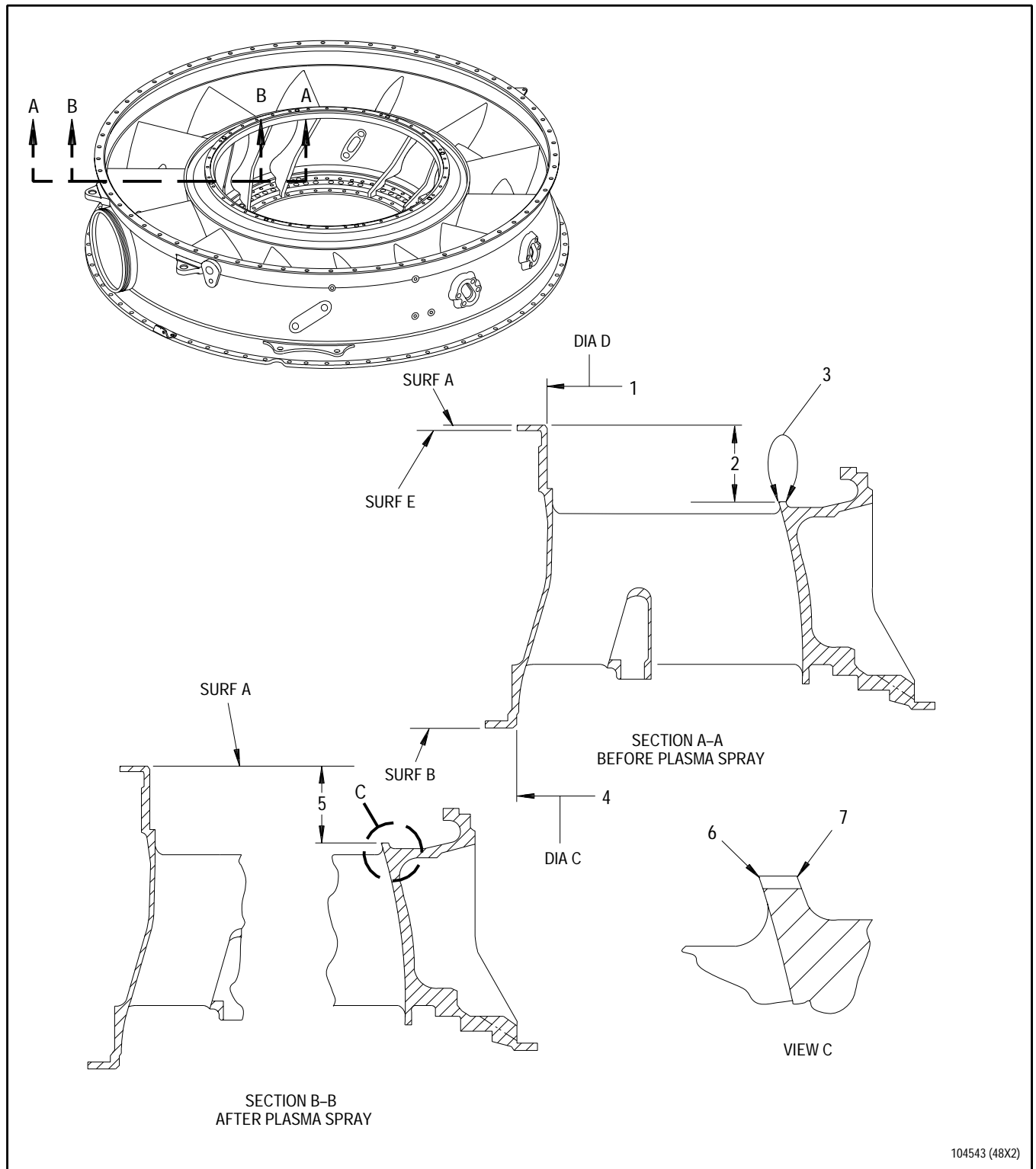


Figure 12. Compressor Intermediate Case Assembly - Inner Platform Leading Edge Repair

Legend for figure 12

NOTE

Unless otherwise specified, all dimensions apply when Surfaces A and B are flat within 0.001 inch, and Diameters C and D maintain clearance envelopes of 33.264 and 31.857 inches respectively, in free state or constrained. Constraint contact allowed only on Surfaces A, B and E, and Diameters C and D.

1. 31.860 inch Diameter D, reference
2. 1.793 to 1.803 inches
3. Area G. Grit blast and plasma spray per text.
4. 33.268 inch Diameter C, reference
5. 1.778 to 1.783 inches
6. Finish this edge 0.000 to 0.005 inch above adjacent gaspath surface
7. Break edge 0.003 to 0.015 inch.

WORK PACKAGE**TECHNICAL PROCEDURES****TUBING, DIFFUSER CASE -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 72

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2B	27	8 - 10	19	33 - 36	27
2C - 2F Added	27	11 - 32 Added	19	37 - 66 Added	27
3 - 7	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Cleaning Procedures - Cleaning, Alkaline Rust Remover and Acidic Descaler Without Phosphoric Acid, Four Step (SPOP 213) - - - - -	SWP 031 12
General Cleaning Procedures - Cleaning, Grit Blast, Dry (SPOP 218) - - - - -	SWP 031 13
General Repair Procedures - Plasma and Flamespray Coating Procedures, General - - - - -	WP 096 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Tubing, Diffuser Case - Inspection - - - - -	WP 372 00
Case Assembly, Diffuser - Repair - - - - -	WP 434 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ACETONE	O-A-51 (PMC 9008)
ALCOHOL, DENATURED	O-E-760, TYPE III
ALCOHOL, ISOPROPYL	TT-I-735 (PMC 9094)
BRAZING FILLER METAL	AMS 4772
CLOTH, EMORY OR EQUIVALENT	320 GRIT OR FINER
COATING, DRY FILM LUBRICANT	DRILUBE 805N OR EVERLUBE 811 (PWA 298)
COMPOUND, ANTIGALLING	ESNALUBE 382 (PWA 36545)
FLUX, BRAZE, HIGH TEMPERATURE	PWA 809, TYPE AWS 3B
FLUX, BRAZE	AMS 3411A, TYPE AWS 3C
GRIT, ALUMINUM OXIDE	NO. 150
GRIT, SILICON CARBIDE	NO. 90
TAPE, HEAT RESISTANT	JOCLIN 404
TAPE	FIBERFRAX
WIRE, WELDING	AMS 5680 (30347 STAINLESS STEEL)
	MIL-R-5031, CLASS 5
WIRE, WELDING	AMS 5837 (INCONEL 625)

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
LOCKWIRE	MS9226-03	AR
TAPE, INSTALLATION	2161929	AR
TAPE, INSULATION	2072968	AR

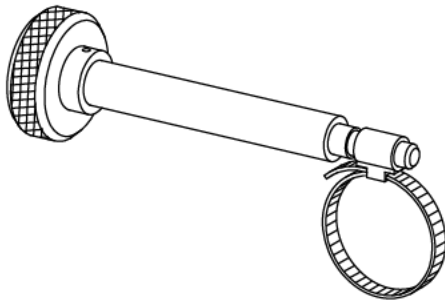
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
6	NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - RING GROOVE REPAIR	
	FIXTURE, MACHINE, NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - - - - -	PWA 71485
	FIXTURE, EXPANDER, NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - - - - -	PWA 71488
	FIXTURE, WELDING, NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - - - - -	PWA 71484
	FIXTURE, STRESS RELIEF, NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - - - - -	PWA 71481
	FIXTURE, INSPECTION, NO. 4 BEARING AIR SUPPLY TUBE ASSEMBLY - - - - -	PWA 71482
	FIXTURE, PRESSURE TEST, TUBE, AIR SUPPLY, NO. 4 BEARING SEAL - - - - -	PWA 71483
12	NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - RING OR FERRULE REPLACEMENT	
	FIXTURE, BRAZE - - - - -	PWA 71558
	PULLER - FERRULE AND NO. 4 BEARING SCAVENGE TUBE - -	PWA 55300
	PROTECTOR - NO. 4 BEARING SCAVENGE TUBE - - - - -	PWA 55303
	BRAZE PREFORM - - - - -	LM 1071
	CONTROLLER, COMBUSTION, GAS AND TEMPERATURE, NO. 4 BEARING SCAVENGE - - - - -	PWA 55308
	GAGE, CLEARANCE ENVELOPE - - - - -	PWA 71641
	FIXTURE, PRESSURE TEST, NO. 4 BEARING INTERNAL SCAVENGE TUBE - - - - -	PWA 71397
	ADAPTER - PRESSURE TEST - - - - -	PWA 53403
	WRENCH - NO. 4 BEARING OIL SCAVENGE TUBE RETAINING NUT - - - - -	PWA 52767

APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
13	NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - TRANSFER TUBES, CONNECTOR, AND SCAVENGE TUBE REPLACEMENT	
	FIXTURE, BRAZE, NO. 4 BEARING CONNECTOR TRANSFER TUBES - - - - -	PWA 71557
	FIXTURE, BRAZE, TUBE, SCAVENGE NO. 4 BEARING INTERNAL, ASSEMBLY OF - - - - -	PWA 71559
	BRAZE PREFORM - - - - -	LM 1070
	CONTROLLER, COMBUSTION, GAS AND TEMPERATURE, NO. 4 BEARING SCAVENGE - - - - -	PWA 55308
	BRAZE PREFORM - - - - -	LM 1071
	GAGE, CLEARANCE ENVELOPE - - - - -	PWA 71641
	FIXTURE, PRESSURE TEST, NO. 4 BEARING INTERNAL SCAVENGE TUBE - - - - -	PWA 71397
	ADAPTER - PRESSURE TEST - - - - -	PWA 53403
	WRENCH - NO. 4 BEARING OIL SCAVENGE TUBE RETAINING NUT - - - - -	PWA 52767
15	NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - LOOSE HEAT SHIELD REPAIR	
	CLAMP, NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE - -	LM 1054
16	NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - ANTIROTATION PIN HOLE REPAIR	
	FIXTURE, WELD, NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE CONNECTOR - - - - -	PWA 71401
	FIXTURE, MACHINING, NO. 4 BEARING INTERNAL SCAVENGE TUBE CONNECTOR - - - - -	PWA 71402
	FIXTURE, DRILL, NO. 4 BEARING INTERNAL SCAVENGE TUBE CONNECTOR - - - - -	PWA 71403

ILLUSTRATED SUPPORT EQUIPMENT



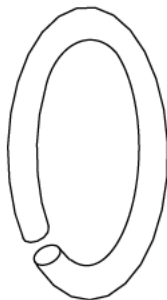
LM 1054 -C

Figure T1. LM 1054 CLAMP



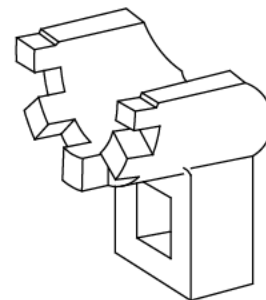
LM 1070 -C

Figure T2. LM 1070 BRAZE PREFORM



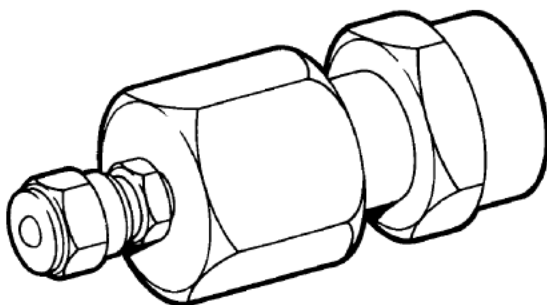
LM 1071 -C

Figure T3. LM 1071 BRAZE PREFORM



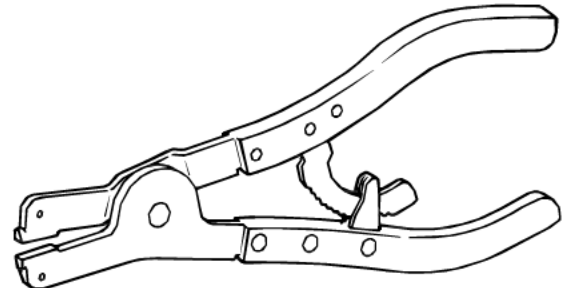
PWA 52767 -C

Figure T4. PWA 52767 WRENCH



PWA 53403 -C

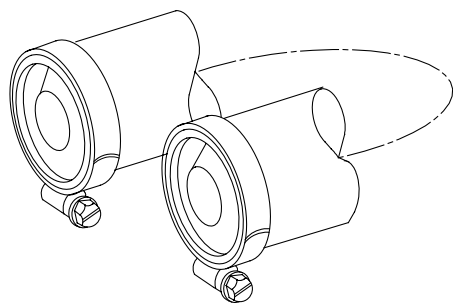
Figure T5. PWA 53403 ADAPTER



PWA 55300 -C

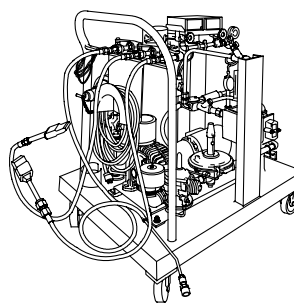
Figure T6. PWA 55300 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



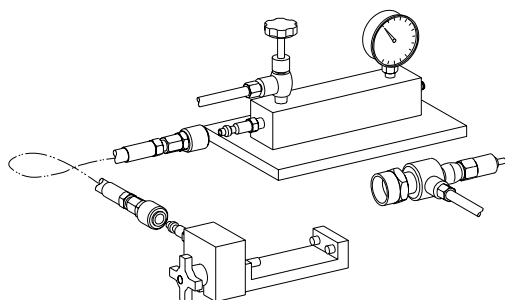
PWA 55303 -C

Figure T7. PWA 55303 PROTECTOR



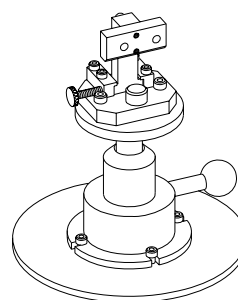
PWA 55308 -C

Figure T8. PWA 55308 CONTROLLER



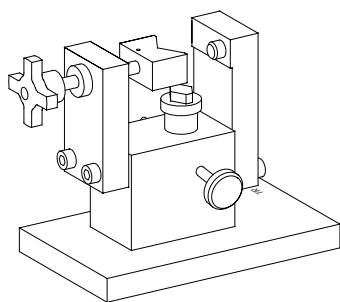
PWA 71397 -C

Figure T9. PWA 71397 FIXTURE



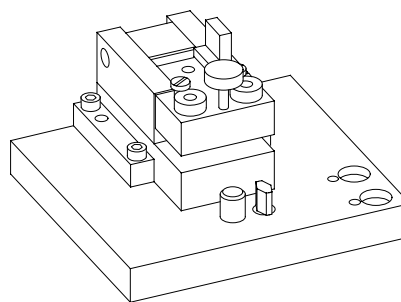
PWA 71401 -C

Figure T10. PWA 71401 FIXTURE



PWA 71402 -C

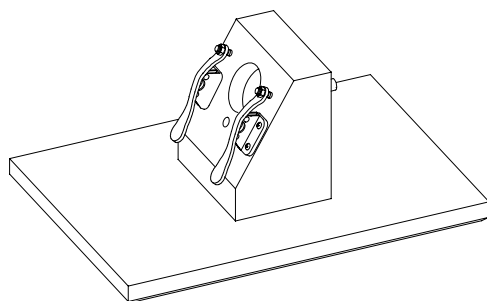
Figure T11. PWA 71402 FIXTURE



PWA 71403 -C

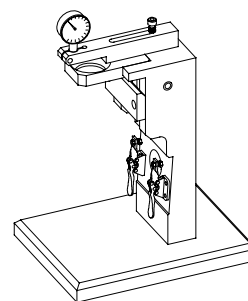
Figure T12. PWA 71403 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



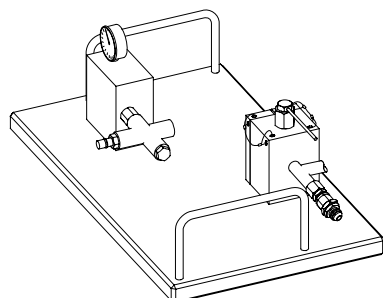
PWA 71481 -C

Figure T13. PWA 71481 FIXTURE



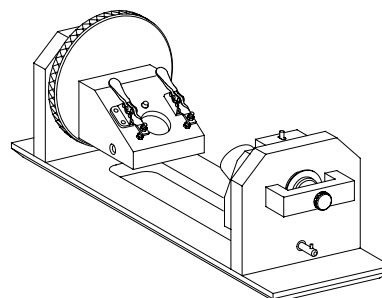
PWA 71482 -C

Figure T14. PWA 71482 FIXTURE



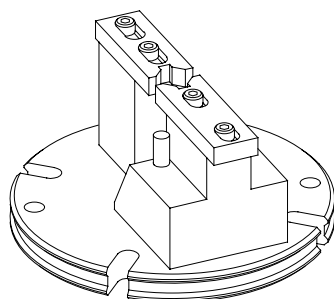
PWA 71483 -C

Figure T15. PWA 71483 FIXTURE



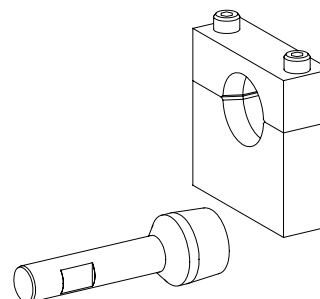
PWA 71484 -C

Figure T16. PWA 71484 FIXTURE



PWA 71485 -C

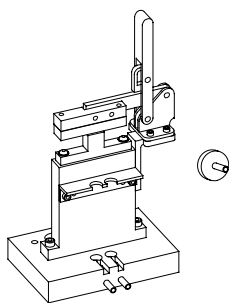
Figure T17. PWA 71485 FIXTURE



PWA 71488 -C

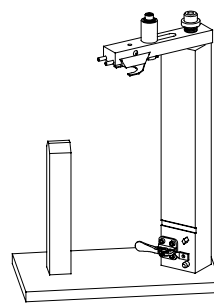
Figure T18. PWA 71488 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



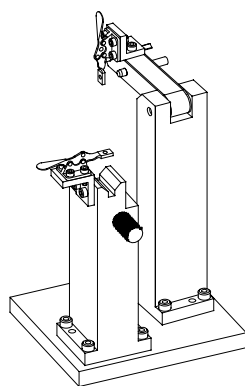
PWA 71557 -C

Figure T19. PWA 71557 FIXTURE



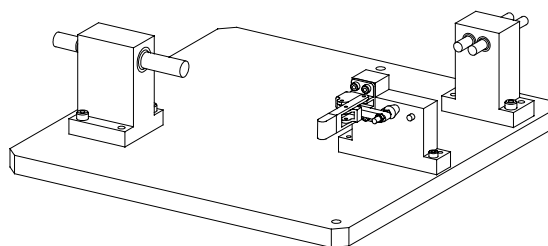
PWA 71558 -C

Figure T20. PWA 71558 FIXTURE



PWA 71559 (12X1)

Figure T21. PWA 71559 FIXTURE



PWA 71641 -C

Figure T22. PWA 71641 GAGE

1. INTRODUCTION.

- a. This work package contains instructions for repair of diffuser case tubing.

- (2) Blend shall not exceed 0.008 inch depth measured from smooth area of tube next to blend.

2. STATIC PRESSURE PROBE ASSEMBLY - BLEND REPAIR.

(See Figure 1.)

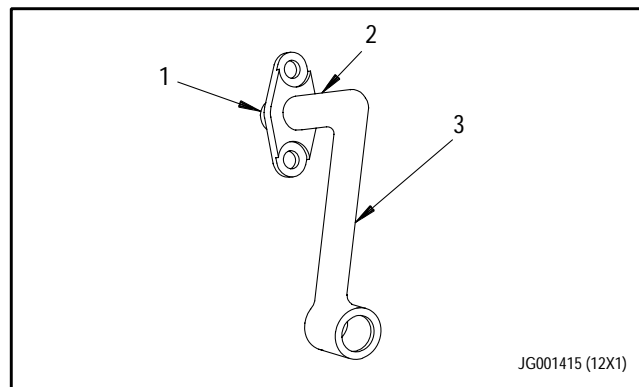
- b. Polish blend with hemp wheel.
- c. Visually inspect blends with 8X magnifying glass.

NOTE

Tube is PWA 649-2 nickel alloy.

- a. Blend repair nickel tubes of static pressure probe assembly by hand. Power grinding is not allowed. Use hard abrasive stick or fine emery paper to blend to the following limits:

- (1) Blend shall provide 0.060 inch minimum radius.



1. Tube tip
2. Tube
3. Transfer tube

Figure 1. Static Pressure Probe Assembly - Repair

3. DIFFUSER CASE TUBING - BLEND REPAIR.

(See Table 1.)

NOTE

Refer to table 1 to determine tube material and diameters.

- a. Blend repair steel and nickel tubes by hand. Power grinding is not allowed. Use hard abrasive stick or fine emery paper to blend to the following limits:

- (1) Blend shall provide 0.060 inch minimum radius.

- (2) Blend shall not exceed 0.008 inch depth measured from smooth area of tube next to blend area.

- b. Polish blend using hemp wheel.
c. Visually inspect using 8X magnifying glass.
d. Pressure check per WP 372 00.

Table 1. Diffuser Case Tubing - Material, Size, and Type System

Part Number	Nomenclature	Material	OD (Inch)	Wall Thickness (inch)	Type System
4035859	No. 4 bearing pressure manifold	Stainless steel	0.300	0.035	Oil
4070082	No. 4 bearing seal air supply tube assembly	Nickel alloy	1.000	0.035	Air
4069160	No. 4 bearing internal pressure tube assembly	Stainless steel	0.438	0.028	Oil
4074872, 4069897	No. 4 bearing internal air vent tube assembly	Nickel alloy	0.245	0.028	Air

**4. NO. 4 BEARING INTERNAL PRESSURE
TUBE ASSEMBLY - ANTIGALLING COMPOUND
APPLICATION.**

(See Figure 2.)

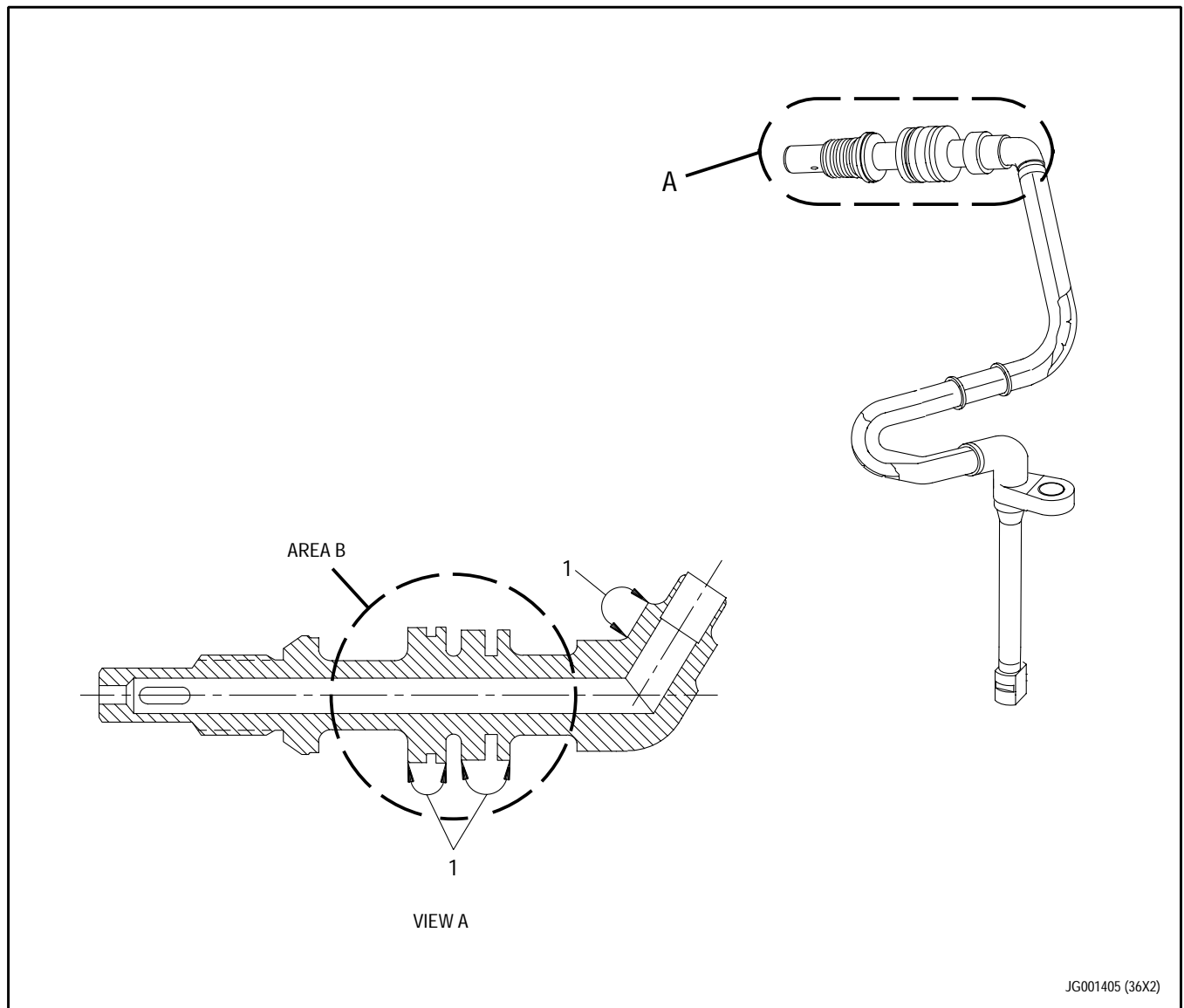
a. Remove seal rings and discard.

b. Clean Area B. Refer to
T.O. 2J-F100-53-1, SWP 031 12
(SPOP 213).

c. Apply PWA 298 antigalling
compound to area(1) shown.

d. Allow tube to dry for 30 minutes
minimum.

e. Cure as follows: heat to 180°F
±25 for 2 hours minimum; heat to
400°F ±25 for 2 hours minimum.



1. Antigalling compound application

Figure 2. No. 4 Bearing Internal Pressure Tube Assembly - Antigalling Compound Application

**5. NO. 4 BEARING INTERNAL PRESSURE
TUBE ASSEMBLY - MAGNESIUM ZIRCONITE
COATING REPLACEMENT.**

(See Figure 3.)

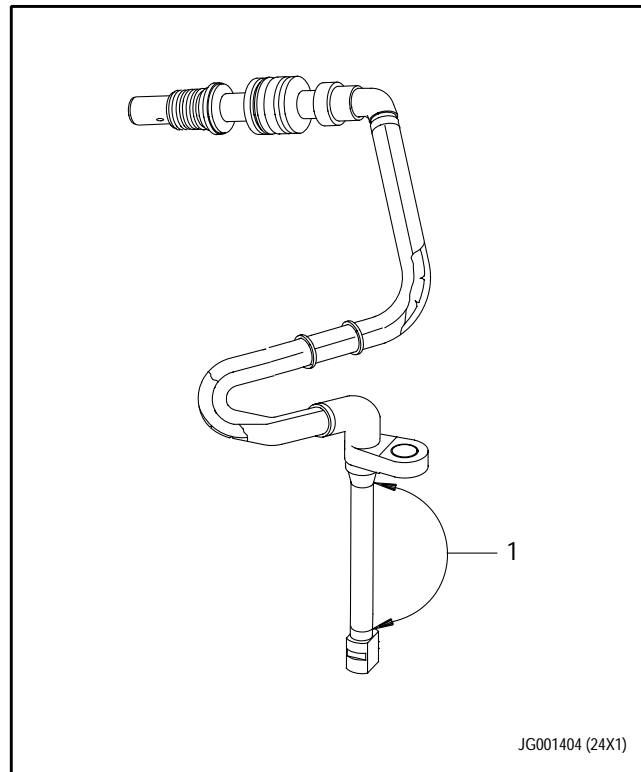
- a. Mask areas next to location being relocated.

NOTE

Cleaned surfaces shall be handled only with clean gloves.

- b. Grit blast areas to be recoated to uniform matte surface. Do not allow grit blast to dwell on base metal. Use either No. 90 silicon carbide grit or No. 15 aluminum oxide grit at 30 psi supply pressure. Refer to T.O. 2J-F100-53-1, SWP 031 13 (SPOP 213).

- c. Apply PWA 1333 magnesium zirconate coating 0.013 to 0.020 inch thick to area shown per PWA 53-33. Refer to T.O. 2J-F100-53-1, WP 096 00.



1. Apply coating per text

Figure 3. No. 4 Bearing Internal Pressure Tube Assembly - Magnesium Zirconate Coating Replacement

**6. NO. 4 BEARING AIR SUPPLY TUBE
ASSEMBLY - RING GROOVE REPAIR.**

(See Figures 4 through 10 and
Table 2.)

NOTE

Ring groove wear may be
repaired by replacing worn
detail per step a. or by
puddle weld per step b.

a. Replace worn ferrule and tube
section as follows:

(1) Install tube into PWA 71485
machining fixture as
follows:

(a) Insert locator(2, figure
4) of fixture base(1)
into lathe face plate.
Position fixture base
slots over face plate
slots, install T-bolt
assemblies into slots and
lightly fasten fixture to
face plate.

(b) Indicate base undercut
OD(3) for concentricity
within 0.001 inch FIR and
secure fixture.

(c) Rotate lathe face plate
to position angled
surface of block(7) at
6 o'clock position, or
parallel with machine
ways.

(d) Loosen two shoulder
screws(5), slide spring
loaded V-block(8)
outboard, and tighten
shoulder screws(5).

(e) Loosen two shoulder
screws(5), slide
V-Block(4) outboard and
tighten shoulder
screws(5).

(f) Loosen two hook clamps(6)
on angled surface of
block(7), and rotate
outboard.

(g) Slide elbow portion of
No. 4 bearing seal air
supply tube(12) through
V-Blocks(4 and 8) and
locate on angled surface
of block(7) with one hole
engaging over timing
pin(11). (See Sheet 2.)

(h) Rotate hook clamps(6)
inboard over elbow flange
to rest against
stops(10). Lightly
tighten clamps, allowing
slight elbow rotation.

NOTE

V-Block(8) is spring loaded and
is used to centralize the
tube(12).

(i) Loosen V-Block(8)
centralizing tube(12).
Hold against tube and
lock in position by
tightening shoulder
screws(5).

(j) Tighten hook clamps(6).

(k) Loosen V-Block(4) and
hold against tube(12).
Lock in place by
tightening shoulder
screws(5).

(l) Rotate lathe face plate
so rest button(9) can be
accessed for tool setup.

- (2) Set up parting tool per one of the following methods:
(See figure 4, Side View.)

NOTE

Final cut dimension is 1.900 inches above surface of rest button(9).

- (a) If lathe has a dial indicator gage built on the way, bring parting tool to touch rest button(9). Move 1.900 inches on dial indicator.

- (b) If lathe does not have a dial indicator gage built on the way, place a 1.900 inch gage block against rest button(9) and bring parting tool to touch gage block.

Legend for figure 4

1. Fixture base
2. Locator
3. Base undercut OD
4. V-block
5. Shoulder screws
6. Hook clamp
7. Angled face block
8. Spring loaded V-block
9. Rest button
10. Stops
11. Timing pin
12. No. 4 bearing air supply tube
13. 1.900 inches

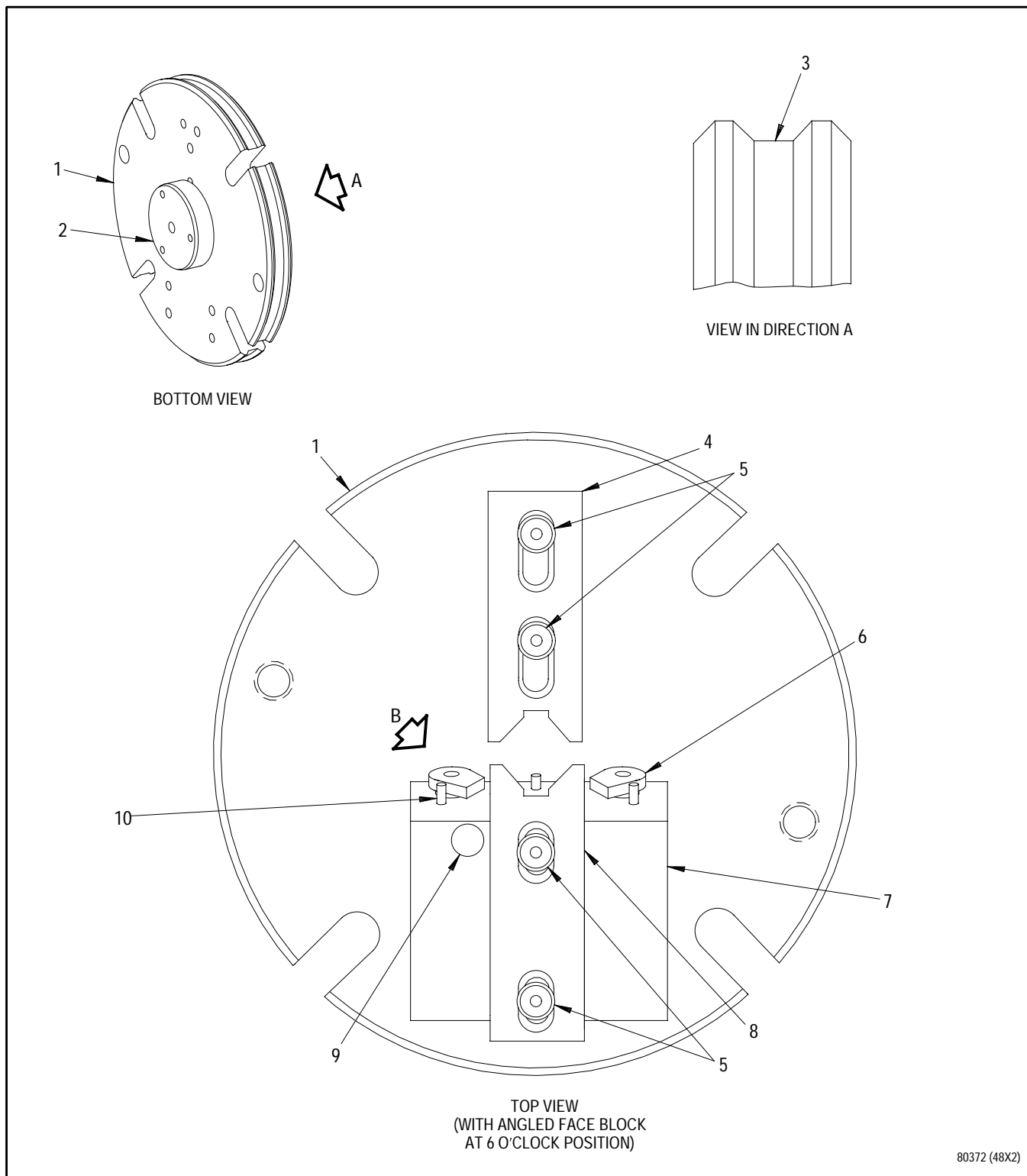


Figure 4. No. 4 Bearing Air Supply Tube Assembly - PWA 71485 Machining Fixture Installation
(Sheet 1 of 2)

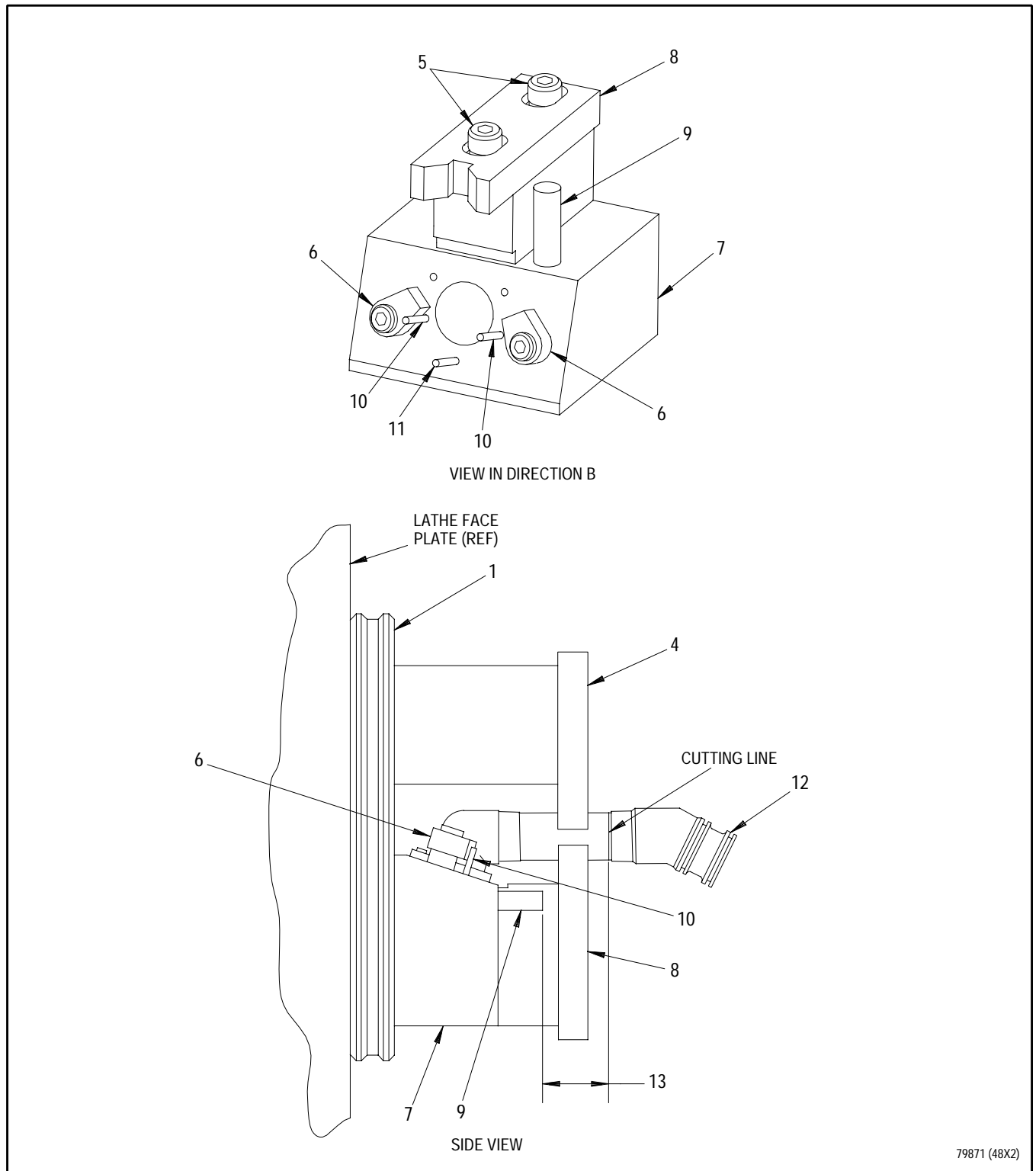


Figure 4. No. 4 Bearing Air Supply Tube Assembly - PWA 71485 Machining Fixture Installation
(Sheet 2 of 2)

NOTE

PWA 71485 fixture sets dimensions(4, 5 and 8, figure 5) for machining.

- (3) Remove worn ferrule and tube section by machining at Surface C(3) with a single point tool, per one of the following methods:

- (a) Part at finished dimension of 1.900 inches from rest button(9, figure 4).

- (b) Cut 1.000 inch away from finish dimension and face into 1.900 inch finish dimension.

- (4) Deburr end of tube.

- (5) Measure tube length from rest button(9) using a 0 to 3.0 inch depth micrometer.

- (6) Mechanically remove all evidence of braze material on tube while maintaining tube thickness(19, figure 5).

- (7) With tube(11) still installed in PWA 71485 machining fixture(12), flare tube using PWA 71488 expander to meet gap requirements of figure 6, View B as follows:

- (a) Loosen cap screws(13, figure 5) on top half of split block(14).

- (b) With side of split block marked LARGE SIDE facing away from machining fixture, slide split block over tube until face of block is flush with end of tube.

- (c) Tighten cap screws to secure.

- (d) Place tapered end of drift(15) into tube and tap end with mallet to flare tube. Remove drift by tapping or twisting at flats(16).

- (e) Remove expander by loosening cap screws.

- (f) Inspect tube flare per figure 5, View B.

- (8) Remove tube from PWA 71485 fixture as follows:

- (a) Loosen four shoulder screws(5, figure 4), slide V-Blocks(4 and 8) outboard, and secure in outboard position.

- (b) Loosen two hook clamps(6), rotate outboard to free elbow flange, and secure in outboard position.

- (c) Remove tube from fixture.

- (9) Clean existing tube section(6, figure 6) and new elbow(7) with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.

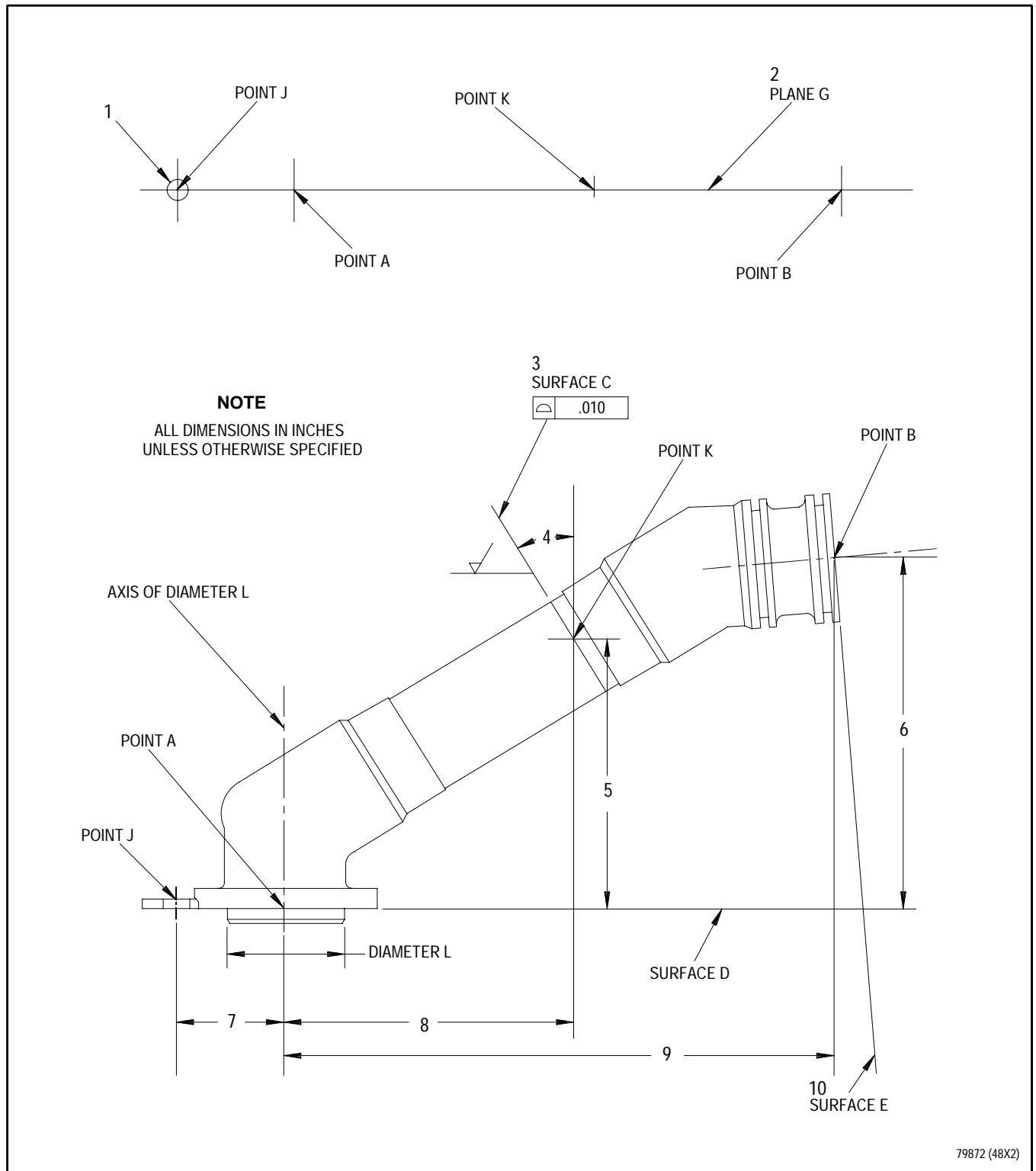
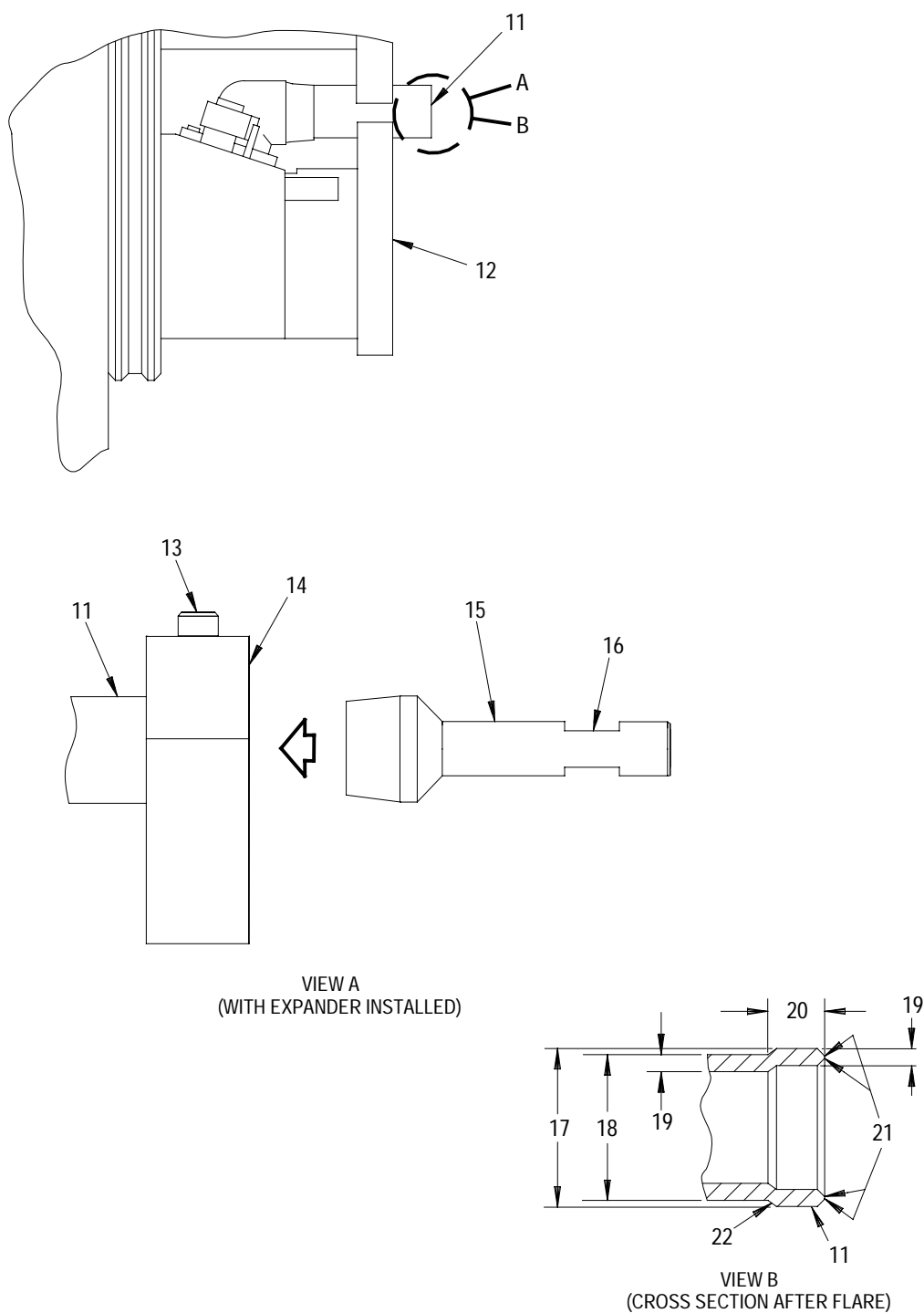


Figure 5. No. 4 Bearing Air Supply Tube Assembly - Worn Ferrule Replacement (Sheet 1 of 2)



79873 (48X2)

Figure 5. No. 4 Bearing Air Supply Tube Assembly - Worn Ferrule Replacement (Sheet 2 of 2)

Legend for figure 5**NOTE**

- Tolerance between assembly end Point A and Point B is ± 0.020 inch.
 - For feature control definitions, refer to T.O. 2-1-111.
1. 0.215 inch diameter clearance envelope related to Diameter L and Surface D
 2. Plane G is established by Point A, Point B and passes through Point J.
 3. Surface C shall lie within a zone 0.010 inch wide, equally disposed about basic profile.
 4. $30^{\circ}53'$
 5. 2.500 inches from Surface D
 6. 3.301 inches from Surface D
 7. 0.860 inch
 8. 2.808 inches from axis of Diameter L
 9. 5.205 inches from axis of Diameter L
 10. Surface shall be in true direction within 0.018 inch relative to Plane G, axis of Diameter L, and Surface D.
 11. Existing tube section
 12. PWA 71485 machining fixture
 13. Cap screw
 14. Split block (Detail of PWA 71488 expander)
 15. Drift (Detail of PWA 71488 expander)
 16. $3/8$ inch wrenching flat
 17. 1.002 to 1.007 inches to meet gap between tube and elbow.
(See figure 6, View B.)
 18. 1.000 inch diameter, reference
 19. 0.031 inch minimum thickness
 20. 0.050 inch minimum
 21. Break edge 0.000 to 0.003 inch
 22. 0.062 inch minimum modified radius

- (10) Install existing tube section(6, figure 6) and new elbow(7) into PWA 71484 welding fixture as follows:

- (a) Place fixture on work table.



Failure to secure blocks in place will affect center line of tube sections before weld and cause tube misalignment after weld.

- (b) Rotate and pin block(9) with locating pin(13).
- (c) Rotate and pin block(4) with locating pin(2). Block shall be at 6 o'clock position, or parallel with machine work surface.
- (d) Open two toggle clamps(5).
- (e) Turn hand knob(12) counterclockwise to slide block(9) rearward.
- (f) Slide locator(8) to lowest position using dowel pin(14).
- (g) Insert elbow portion of tube(6) into angled face of block(4) with one hole engaging over spring loaded locating pin(15). Lightly secure with two toggle clamps(5).
- (h) Insert new elbow(7) into locator(8). Slide locator to forward position and lock in place using dowel pin(14). Slide dowel forward and engage in L portion of block as shown in figure 6.

- (i) Slowly turn hand knob(12) clockwise to bring tube section(6) and new elbow(7) together.

NOTE

New elbow has a cam action and will center itself over existing tube section as it is slowly rotated by hand.

- (j) Rotate elbow(7) until seated over tube section(6). Secure by tightening hand knob(12).

- (k) Secure toggle clamps(5) over elbow flange.

NOTE

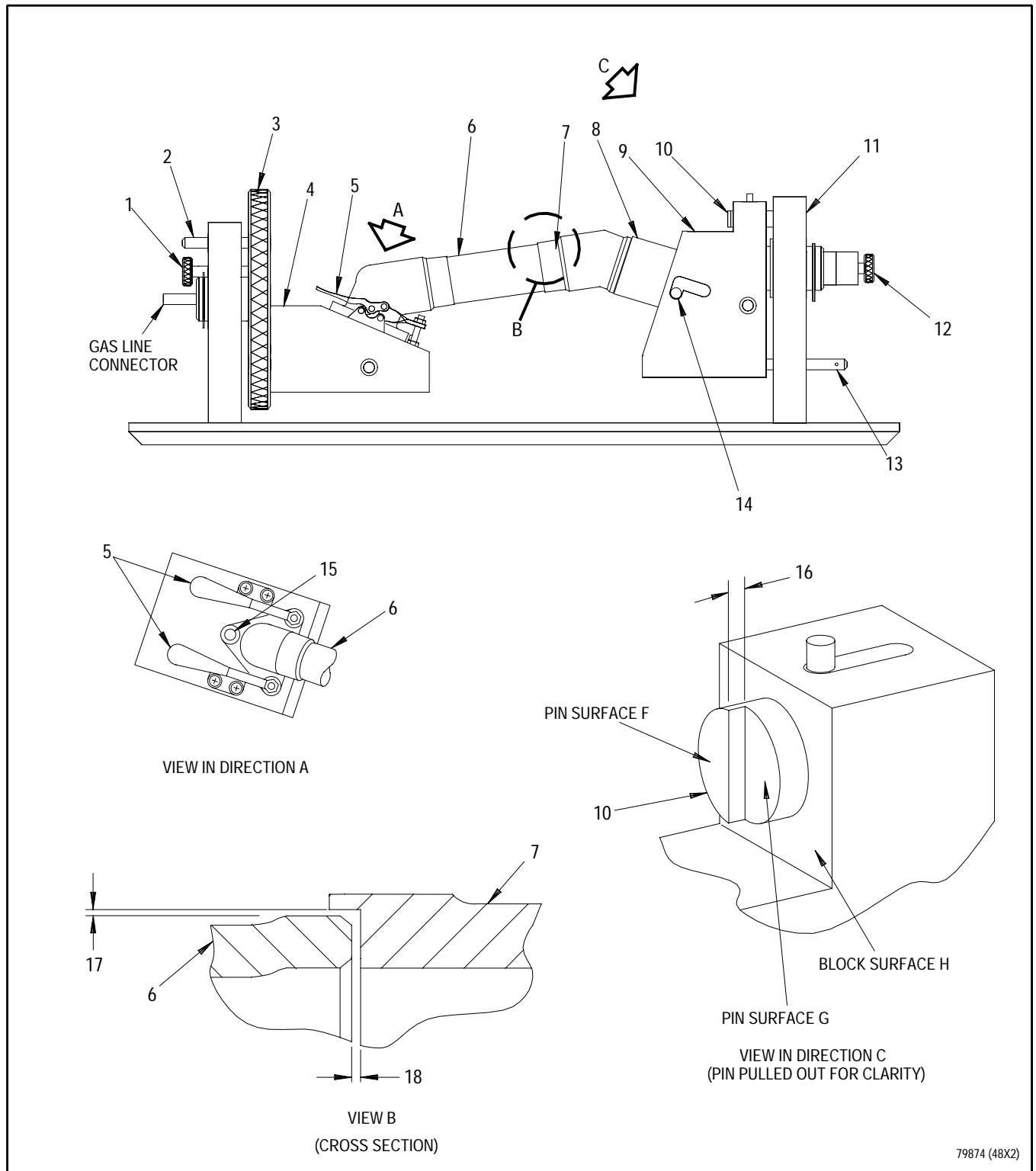
PWA 71484 fixture sets dimensions(21, 22 and 23). Gage pin(10) checks overall tube length within ± 0.020 inch.

- (11) Push gage pin(10) against support(11) to check tube assembly overall length and dimensions(21, 22 and 23). Length is acceptable if any portion of pin step(16) is within block(9); or pin Surface F or Surface G is flush with block Surface H. (See View in direction C.)

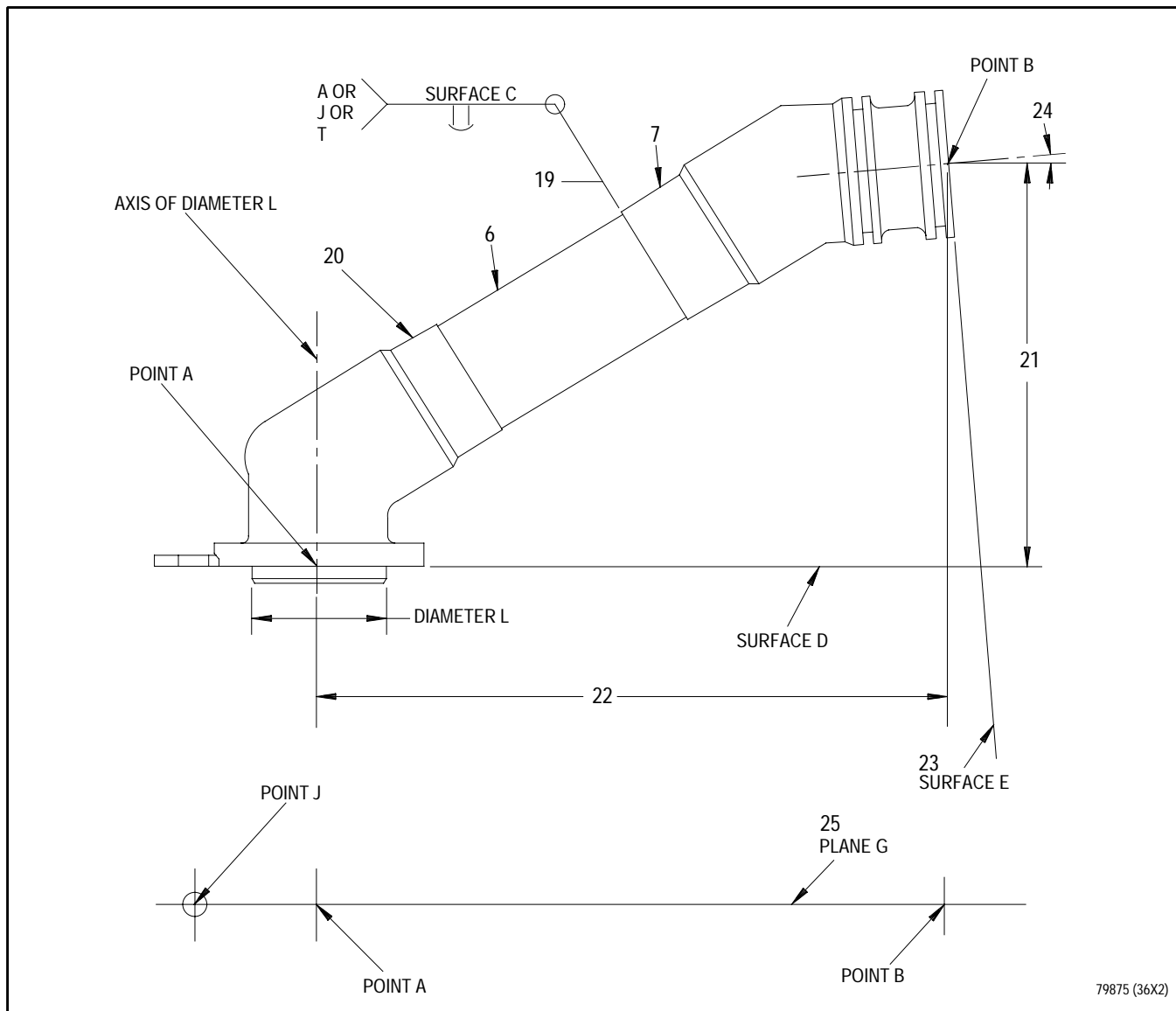
- (12) If dimensions are acceptable, proceed to step (13). If dimensions are not acceptable, proceed as follows:

- (a) With tube section(6) tightly clamped, trim at Surface C, as required.
- (b) Flare tube(6) per step (7).
- (c) Break edges per figure 5, View B.

- (13) Solvent clean tube(6, figure 6) per SPOP 209, Method D. Refer to T.O. 2-1-111.



**Figure 6. No. 4 Bearing Air Supply Tube Assembly - PWA 71484 Welding Fixture Installation
(Sheet 1 of 2)**



79875 (36X2)

**Figure 6. No. 4 Bearing Air Supply Tube Assembly - PWA 71484 Welding Fixture Installation
(Sheet 2 of 2)**

Legend for figure 6

1. Hand knob
2. Locating pin
3. Disk
4. Angled face block
5. Toggle clamp
6. Existing tube section
7. New elbow PN 4083184. Includes 0.020 inch weld shrinkage allowance.
8. Locator
9. Block
10. Gage pin
11. Support
12. Hand knob
13. Locating pin
14. Dowel pin, shown in locked position.
15. Spring loaded locating pin
16. 0.030 inch reference, pin step
17. 0.0035 inch maximum diametrical gap before welding
18. 0.002 inch maximum gap
19. Orbital, or machine, or manual Tungsten Arc Inert Gas (TIG) weld. No finishing permitted and no filler metal required.
20. Braze location. Temperature shall not exceed 1200°F (649°C).
21. 3.311 inches from Surface D before welding. Includes weld shrinkage allowance.
22. 5.223 inches from axis of Diameter L before welding. Includes weld shrinkage allowance.
23. Surface shall be in true direction within 0.018 inch relative to Plane G, axis of Diameter L, and Surface D.
24. 4°0'
25. Plane G is established by Point A, Point B and passes through Point J.

- (14) Just before welding, clean existing tube, new elbow and welding fixture using isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.



Failure to prevent temperature of adjacent braze joint(20) from exceeding specified limit during welding can cause damage to braze joint.

NOTE

- It is permissible to weld elbow to tube by orbital welding per step (15), or Gas Tungsten Arc weld per step (16).
 - Parent material of tube is AMS 5581 nickel alloy.
 - Parent material of elbow is AMS 5666 nickel alloy.
- (15) Place orbital welder around weld joint and weld elbow to tube. Refer to T.O. 2-1-111. Do not exceed 1200°F (649°C) at adjacent braze location(20).
- (16) Machine or manual Gas Tungsten Arc weld as follows: (Refer to T.O. 2-1-111.)
- (a) Attach gas supply hose to gas line connector.
(See figure 6.)
 - (b) Tack weld elbow to tube, three places.
 - (c) Remove locating pins(2 and 13) from blocks(4 and 9) respectively.

- (d) Rotate disk(3) to position tube assembly as required for ease of welding and lock in position by tightening hand knob(1).

- (e) Gas Tungsten Arc weld elbow to tube. Do not exceed 1200°F (649°C) at adjacent braze location(20).

- (17) Remove tube assembly from PWA 71484 welding fixture as follows:

- (a) Remove locating pins(2 and 13).
- (b) Open toggle clamps(5) and retract locator(8).
- (c) Remove tube.

- (18) Install tube assembly into PWA 71481 stress relief fixture as follows:

- (a) Place fixture on machine work table and open toggle clamps(3, figure 7).
- (b) Holding tube assembly in vertical position, locate elbow(7) on angled face of block(1) with one hole engaging over locating pin(2).
- (c) Close toggle clamps(3) over elbow flange to secure tube assembly.

- (19) Local stress relief weld joint with tube assembly enclosed in a suitable protective atmosphere as follows:

NOTE

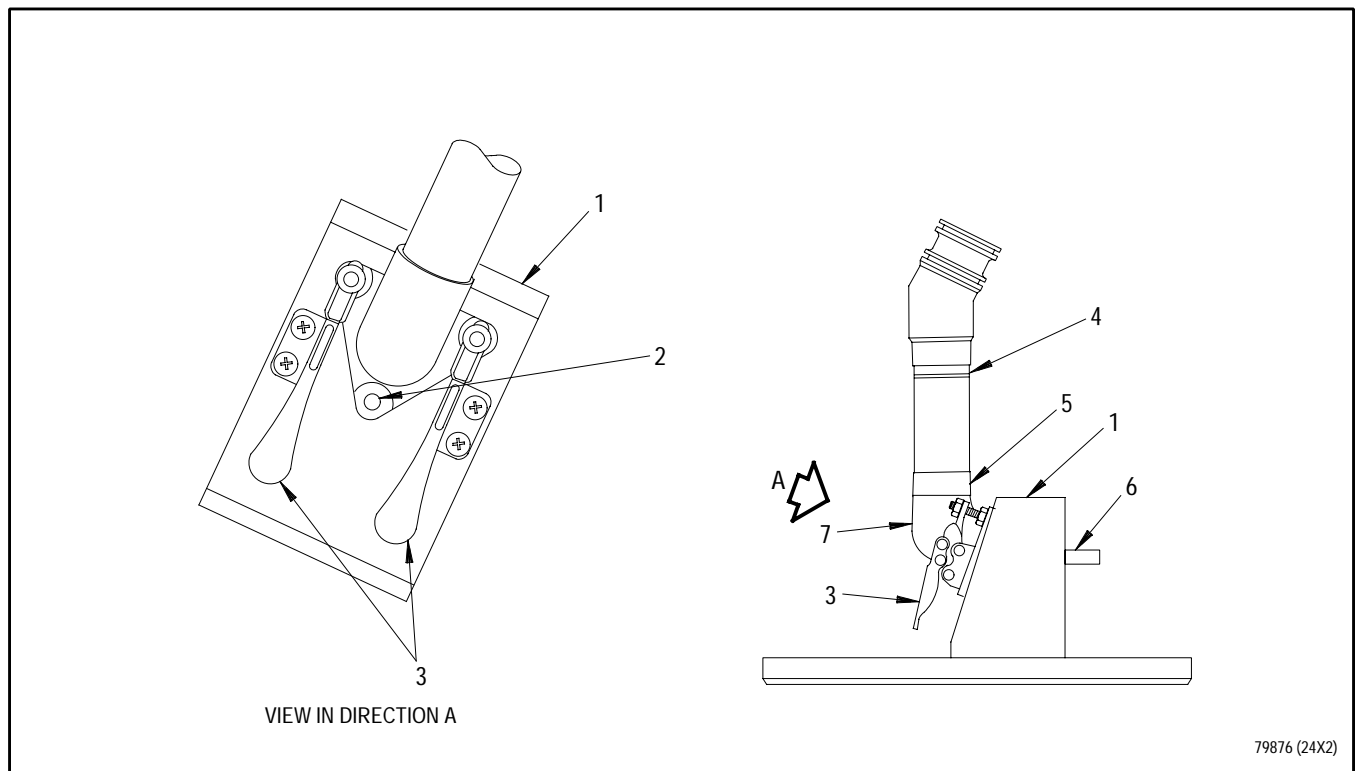
It is recommended to supply argon gas through tube assembly during stress relief operation to help cool tube areas not being normalized.

- (a) Insert argon gas supply tube over port(6).



Failure to prevent temperature of adjacent braze joint(5) from exceeding specified limit during stress relief can cause damage to braze joint.

- (b) Place induction wires around weld joint(4), supply gas flow and stress relief. Do not exceed 1200°F (649°C) at adjacent braze joint(5). Refer to T.O. 2-1-111, SPOP 482.



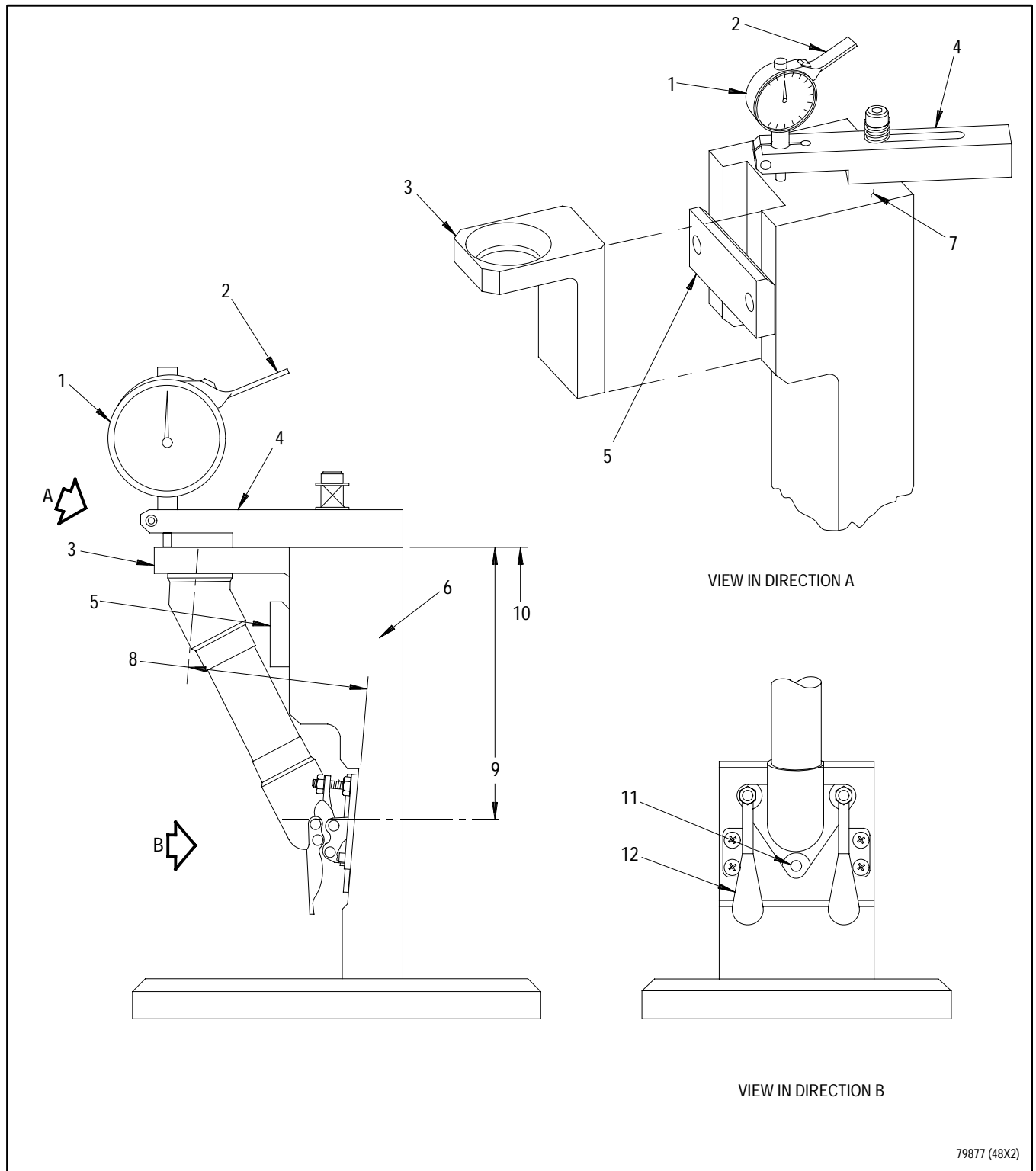
1. Angled face block
2. Locating pin
3. Toggle clamps
4. Weld joint
5. Braze location. Temperature shall not exceed 1200°F (649°C).
6. Port
7. Elbow

Figure 7. No. 4 Bearing Air Supply Tube Assembly - PWA 71481 Stress Relief Fixture Installation

- (20) Remove tube assembly from fixture by opening toggle clamps(3).
- (21) Clean weld area with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.
- (22) Locally fluorescent penetrant inspect weld per SPOP 70 to SFPS 38. Refer to T.O. 2-1-111. No cracks allowed.
 - (a) If cracks exist, repair per step (23).
 - (b) If no cracks present, proceed to step (24).
- (23) Repair cracks as follows:
 - (a) Route out cracks.
 - (b) Clean weld area with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.
 - (c) Weld using Manual Gas Tungsten Arc (GTAW-MA) using AMS 5837 welding wire. Refer to T.O. 2-1-111.
 - (d) Local stress relief per steps (18) through (20).
 - (e) Clean weld area with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.
 - (f) Locally fluorescent penetrant inspect weld per step (22).

NOTE

- PWA 71482 inspection fixture is used to check tube height and true direction of ferrule.
 - Fixture may also be used to check tube assembly with damaged outside diameter, before removal of ferrule, by using same setup as below, but using follower and plug (print details 1 and 2).
- (24) Install tube assembly into PWA 71482 inspection fixture as follows:
 - (a) Open two toggle clamps(12, figure 8).
 - (b) Hold dial indicator lever(2) and slide indicator holder(4) away from slot in main support(6). Release lever.
 - (c) Position elbow portion of tube assembly into lower part of main support(6) with one hole engaging over spring loaded locating pin(11). Close toggle clamps(12) to secure tube.
 - (25) Inspect dimensions (8, 9 and 10) as follows:
 - (a) Slide yoke(3) into slot of main support(6) over tube to check dimension(8). If yoke slides over ferrule and rests on plate(5), tube location, relative to dimension(8), is correct.
 - (b) Remove yoke(3).



Legend for figure 8

1. Dial indicator
2. Dial indicator lever
3. Yoke
4. Indicator holder
5. Plate
6. Main support
7. Datum surface
8. 3.301 inches
9. 5.205 inches, ± 0.020 inch end point tolerance
10. Surface shall be in true direction within ± 0.018 inch in relation to Plane G, axis of Diameter L, and Surface D. (See figure 6, Sheet 2.)
11. Spring loaded locating pin
12. Toggle clamp

(c) Set dial indicator(1) to zero while indicating to datum surface(7).

NOTE

Two separate readings are required: height and true direction.

(d) Hold dial indicator lever(2), slide dial indicator(1) over face of tube assembly and release lever.

(e) To measure height(9), take four measurements, 90 degrees apart, on tube face. Record readings.

(f) Compute average of four readings. Average shall be within ± 0.020 inch.

(g) To measure true direction(10), take four measurements, 90 degrees apart, on tube face. Record readings.

(h) Calculate difference between maximum and minimum readings to obtain total deviation. Deviation shall not exceed ± 0.018 inch.

(i) Hold dial indicator lever(2), slide indicator holder(4) away from tube face, and release lever on datum surface(7).

(26) Remove tube assembly from fixture by opening toggle clamps(12).

(27) If maximum temperature at braze location(5, figure 7) exceeded 1200°F (649°C) during weld or stress relief cycles, leak test tube assembly per step c.

(28) Radiographic inspect weld using single wall and 2% penetrameter sensitivity techniques. Refer to T.O. 2-1-111, SXRS 319. If part fails inspection, perform steps (23) through (28).

(29) Visually inspect weld for discoloration and depressed imperfections as follows:

(a) Discolorations on weld joints and heat affected zones considered normal for material involved are acceptable.

(b) Imperfection limits within fusion zone, not on, or extending into fusion line, are listed in table 2.

Table 2. No. 4 Bearing Seal Air Supply Tube Assembly - Weld Fusion Zone Inspection Limits

Depressed Imperfection	Maximum Size (inches)	Quantity		Minimum Separation (inches)
		Per Inch of Weld	Per 10 Inches of Weld	
Linear and nonlinear	0.010	Unlimited	Unlimited	Clearly separated
Nonlinear	Over 0.010 to 0.060	3	6	Clearly separated
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Linear indications are not permitted within clusters.</p>				
Clusters	0.125 diameter	1	3	-
Linear; except cracks	Over 0.010 to 0.090 long	1	3	0.500

- b. Weld repair worn grooves as follows: (See figure 9.)

NOTE

Parent material is AMS 5666 (Inconel 625) nickel alloy.

- (1) Machine worn ring grooves to premachine dimensions per figure 9, View B.
- (2) Solvent clean tube per SPOP 209, Method D. Refer to T.O. 2-1-111.
- (3) Clean area to be welded with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.



Failure to follow proper weld procedure may cause temperature at adjacent tube braze joints to exceed specified limit and cause damage to braze joints.

NOTE

- Excessive weld on outer side of groove land is acceptable.
 - A 1.000 to 2.000 inch OD micrometer can be used to check weld buildup.
- (4) Weld build up grooves by intermittently puddle welding to dimension(15) using either Tungsten Inert Gas weld with AMS 5837 welding wire, or plasma needle arc weld. Weld groove in short sections on alternate sides of tube until groove is welded all around. Do not exceed 1200°F (649°C) at adjacent braze locations(3). If necessary, apply weld to areas(17) to maintain dimensions(9) and (21). Refer to T.O. 2-1-111.



Failure to follow proper stress relief procedure may cause temperature at adjacent tube braze joints to exceed specified limit and cause damage to braze joints.

- (5) Local stress relief welded area with tube assembly enclosed in a suitable protective atmosphere. Do not exceed 1200°F (649°C) at adjacent braze location(3). Refer to T.O. 2-1-111, SPOP 482.
- (6) Finish machine welded areas as follows:
 - (a) Surface F of tube ferrule to dimensions(5), (6), (9) and (10).
 - (b) Surface G, reference dimension(21).
 - (c) Ferrule ID to dimension(30).
 - (d) Ferrule OD to dimension(11).
 - (e) New grooves per View B.
- (7) Deburr tube.
- (8) Clean machined area with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.
- (9) Fluorescent penetrant inspect repaired area per SPOP 70. Refer to T.O. 2-1-111. No cracks allowed. If acceptable, proceed to step (10). If cracks exist, weld repair as follows:
 - (a) Route out cracks.
 - (b) Clean area to be welded with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.

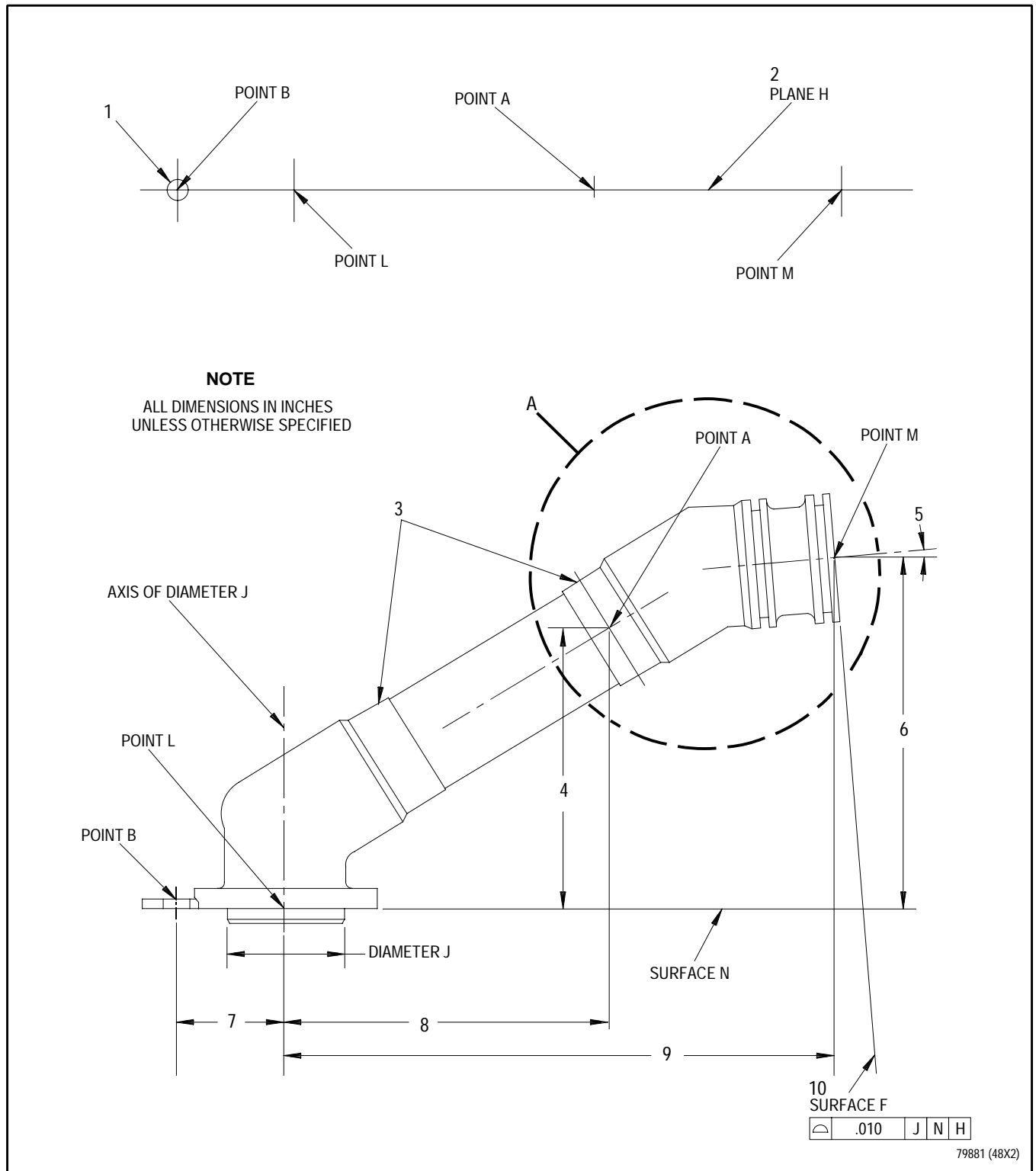


Figure 9. No. 4 Bearing Air Supply Tube Assembly - Ring Groove Weld Repair (Sheet 1 of 2)

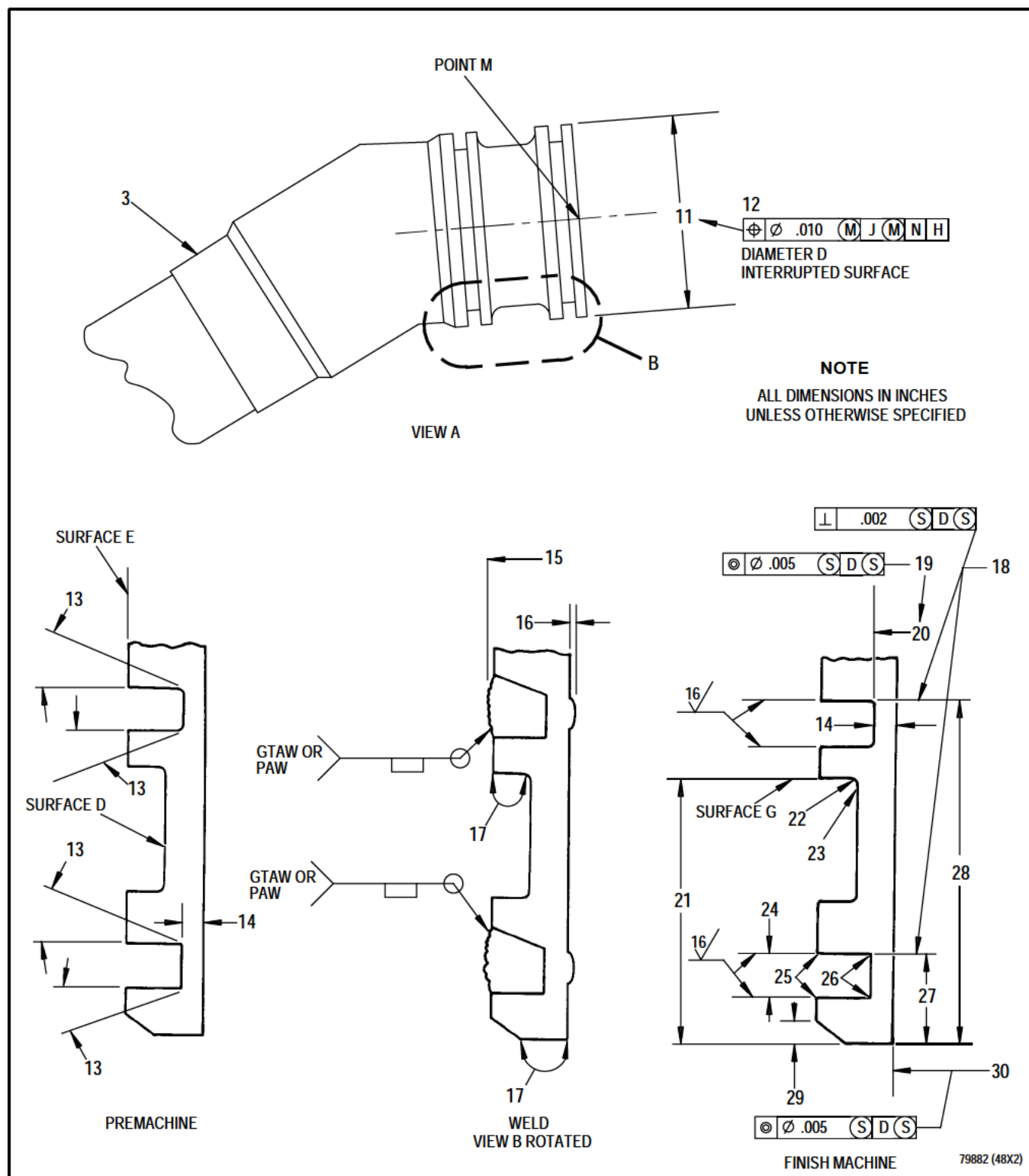


Figure 9. No. 4 Bearing Air Supply Tube Assembly - Ring Groove Weld Repair (Sheet 2 of 2)

Legend for figure 9**NOTE**

- Points B, L, A and M are located on axis of tube assembly
 - Unless otherwise specified, edge break shall be 0.003 to 0.015 inch.
 - For feature control definition, refer to T.O. 2-1-111.
1. 0.215 inch diameter clearance envelope related to Diameter J and Surface N.
 2. Plane H is established by Point L, Point A and passes through Point B.
 3. Elbow braze locations. Maximum temperature shall not exceed 1200°F (649°C).
 4. 2.710 inches from Surface N
 5. 4°0'
 6. 3.301 inches from Surface N
 7. 0.860 inch
 8. 3.159 inches from axis of Diameter J
 9. 5.205 inches from axis of Diameter J
 10. This surface shall lie within a 0.010 inch wide zone related to Diameter J, Surface N and Plane H.
 11. 1.210 to 1.212 inches diameter
 12. This diameter shall be located within 0.005 inch diameter of true position in relation to Diameter J, Surface N and Plane H. Tolerance applies when this diameter and Diameter J are at maximum condition.
 13. 45° maximum. Machine chamfer to minimum angle that permits wear removal on one or both sides of groove, 2 places.
 14. 0.028 inch minimum wall thickness, 2 places
 15. 1.328 inches diameter, 2 places, reference
 16. 0.020 inch maximum weld protrusion, both grooves
 17. Weld build-up permitted if necessary to obtain Surface F and dimension(21)
 18. This surface shall be perpendicular to Diameter D Regardless of Feature Size within 0.002 inch.
 19. This diameter shall be concentric with Diameter D within 0.005 inch diameter Regardless of Feature Size.
 20. 1.002 to 1.012 inches diameter, 2 places
 21. 0.595 to 0.605 inch
 22. 0.047 to 0.078 inch modified radius, if required
 23. 0.000 mismatch permissible
 24. 0.079 to 0.081 inch, 2 places
 25. Break sharp edge 0.001 to 0.005 inch, 2 places.
 26. 0.005 to 0.015 inch modified radius, 2 places
 27. 0.145 to 0.155 inch
 28. 0.745 to 0.755 inch
 29. Chamfer 0.020 to 0.040 inch X 45° ± 5°.
 30. 0.900 to 0.920 inch diameter

- (c) Weld using Manual Gas Tungsten Arc (GTAW-MA) using PWA 5837 welding wire. Refer to T.O. 2-1-111.



Failure to follow proper stress relief procedure may cause temperature at adjacent tube braze joints to exceed specified limit and cause damage to braze joints.

- (d) Local stress relief welded area with tube assembly enclosed in a suitable protective atmosphere. Do not exceed 1200°F (649°C) at adjacent braze location(3). Refer to T.O. 2-1-111, SPOP 482.
- (e) Finish machine welded area per step (6).
- (f) Deburr tube.
- (g) Clean machined area with isopropyl alcohol per SPOP 208, Method A. Refer to T.O. 2-1-111.
- (h) Fluorescent penetrant inspect repaired area per SPOP 70. Refer to T.O. 2-1-111. No cracks allowed. If cracks exist, repeat steps (a) through (h).
- (10) Dimensionally inspect tube per figure 9.
- (11) If maximum temperature at braze locations(3) exceeded 1200°F (649°C) during weld or stress relief cycles, leak test braze joints per step c.

NOTE

Leak test is required only if temperature at tube assembly braze joints exceeded 1200°F (649°C) during weld or stress relief cycles.

- c. Leak test braze joints using PWA 71483 pressure test fixture as follows:

- (1) Install tube assembly into PWA 71483 pressure test fixture as follows: (See figure 10.)

- (a) Place fixture on work table and loosen bleed valve(4) on top of adjustable manifold(12).
- (b) Place and secure water inlet line quick disconnect on hose connector(6) of ball valve(7).
- (c) Loosen and remove three screws(1) from manifold block(3).
- (d) Remove two clamp set segments(8) by loosening, but not removing, four flange nuts(9).
- (e) Slide ferrule end of tube assembly over pilot diameter(11) of adjustable manifold(12), ensuring tube fits over packing.
- (f) Swing tube to position elbow ID over pilot diameter of manifold block(3). Insert until seated over packing and against block face.
- (g) Secure tube to manifold block(3) by tightening three screws(1) over elbow flange.

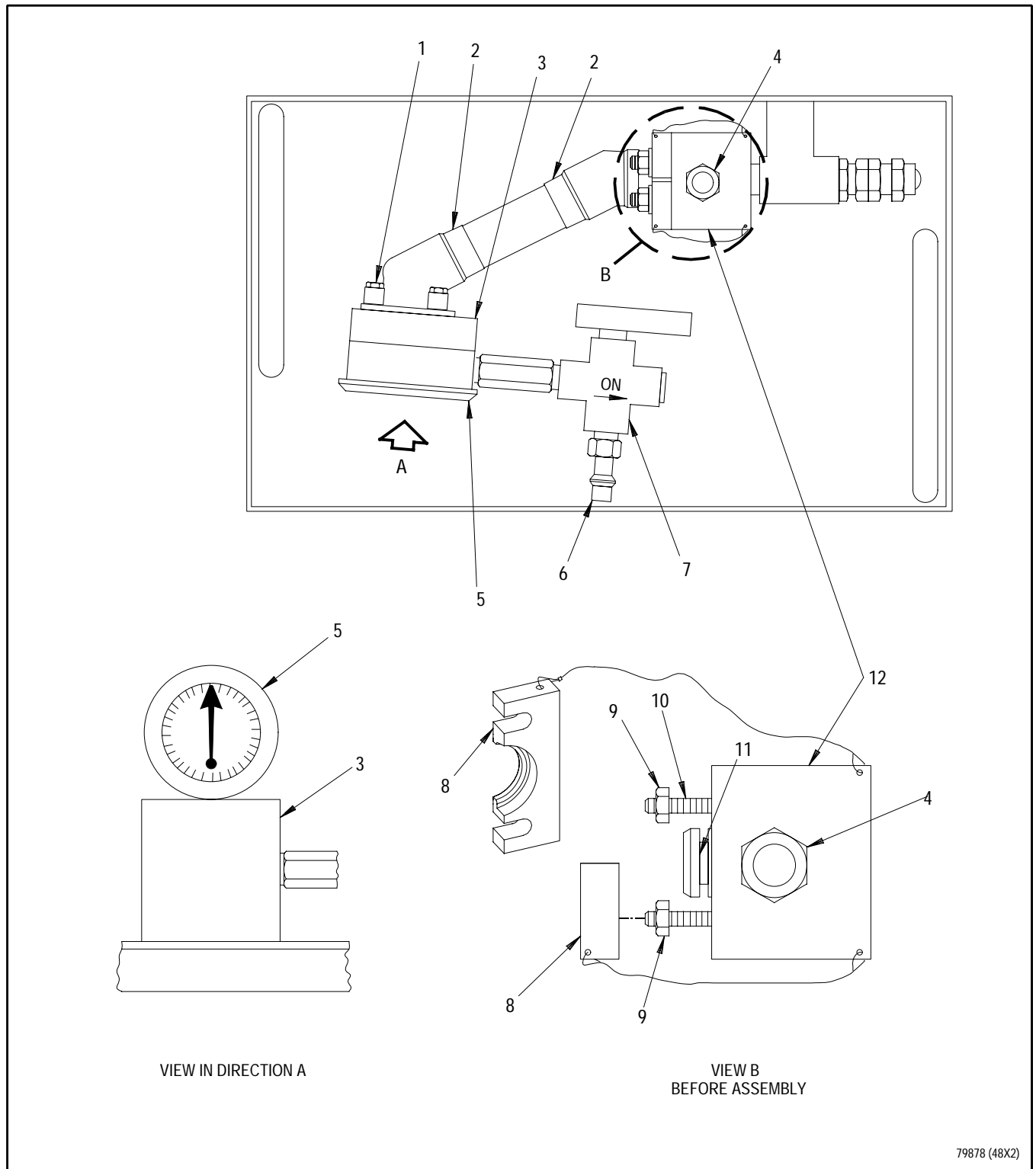


Figure 10. No. 4 Bearing Air Supply Tube Assembly - PWA 71483 Leak Test Fixture Installation

Legend for figure 10

1. Screw
2. Braze location
3. Manifold block
4. Bleed valve
5. Pressure gage
6. Hose connector
7. ON/OFF ball valve
8. Clamp set segment
9. Flange nut
10. Socket set screw
11. Pilot diameter
12. Adjustable manifold

(h) Position slots of one clamp set segment(8) over socket set screws(10), and tube assembly. Engage flange of clamp segment into second ferrule groove. Secure by tightening two flange nuts(9). This will draw face of adjustable manifold(12) against face of tube assembly.

(i) Slide second clamp set segment(8) over tube and secure using two flange nuts(9).

(2) Leak test braze joints(2) as follows:

WARNING

Failure to ensure bleed valve is open during initial bleed off operation may result in damage to tube assembly and injury to personnel.

(a) Ensure bleed valve(4) is open. Open ball valve(7) and start water flow to fixture. When water is observed flowing out of bleed valve(4), close bleed valve.

WARNING

Failure to place protective cover over fixture may cause injury to personnel.

(b) Place protective cover over fixture. Slowly pressurize tube to 1000 psig. Refer to T.O. 2-1-111. No leaks allowed.

(c) Shut off pressure source and ensure pressure decays to zero. Remove quick disconnect water supply line and close ball valve(7).

(d) Remove three screws(1). Loosen four flange nuts(9) and remove clamp set segments(8).

(e) Remove tube from fixture.

(f) Replace screws(1) and clamp segments(8) to respective manifolds.

7. NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - NICKEL PLATING ENDS OF TRANSFER TUBES OF ASSEMBLED TUBE.

(See Figure 11.)

NOTE

Step a. applies to previously used tubes. Step b. applies to new tubes.

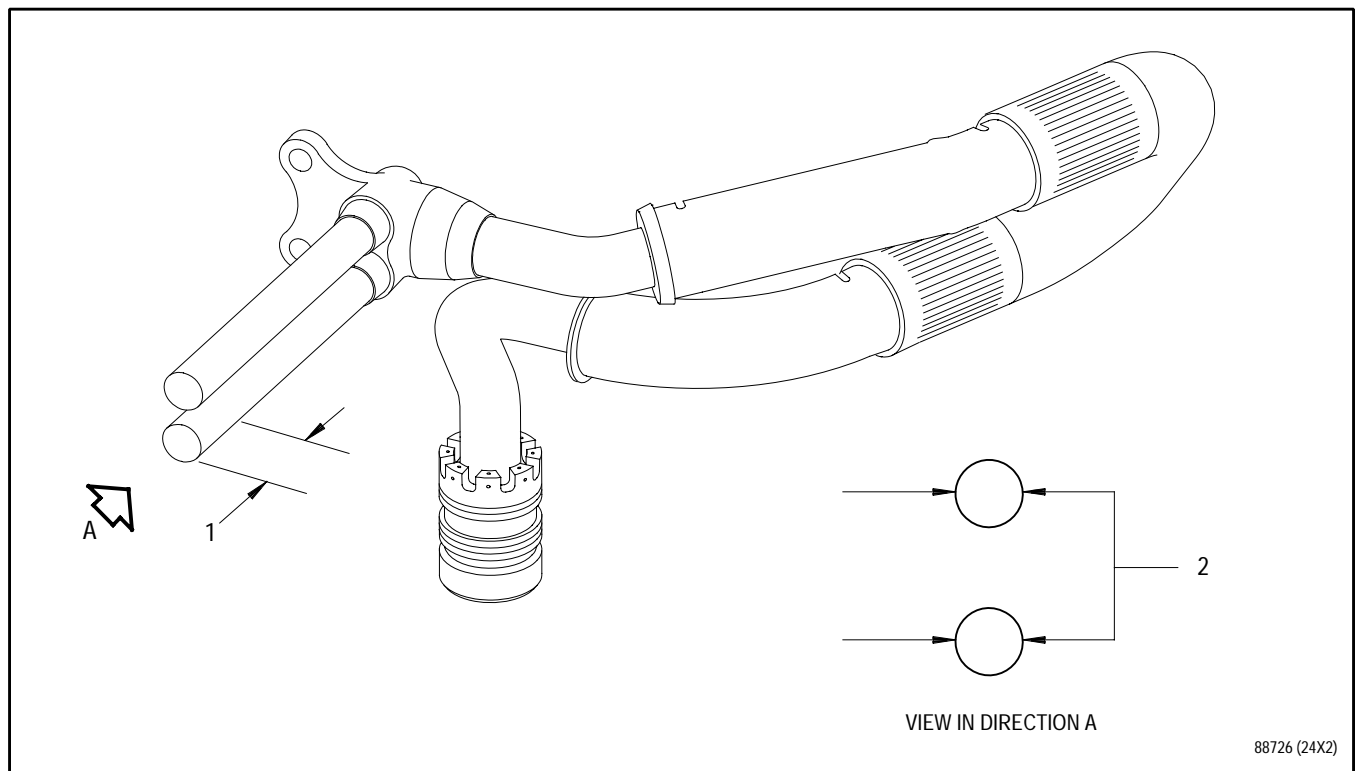
a. Clean and nickel plate previously used transfer tubes of No. 4 bearing left internal scavenge tube assembly as follows:

- (1) Heat transfer tubes in furnace 885° to 915°F (474° to 491°C) for 2 hours to remove oil residue.
- (2) Brush internal passages with fiber brush.



Submerging tube will cause contamination to insulation material under heat shields.

- (3) Flush internal passage of tube with hot water to remove residual braze flux. Do not submerge tube.
- (4) Mask existing thermal barrier coating, including edges, per SPOP 36. Refer to T.O. 2-1-111.
- (5) Chemically strip braze material from tube ends per SPOP 305, except do not vapor degrease. Immerse only tube portion(1, figure 11). Refer to T.O. 2-1-111.



1. 0.770 inch minimum for stripping and nickel plating
2. 0.4860 to 0.4875 inch average dimension. May be 0.003 inch out of round over this tolerance.

Figure 11. No. 4 Bearing Left Internal Scavenge Tube Assembly Transfer Tubes - Nickel Plating

- (6) Inspect transfer tubes dimension(2) for out-of-round condition. If measurement is 0.4760 to 0.4975 inch, transfer tube is reparable by rerounding to dimensional requirements of figure 11.
- (7) Local fluorescent penetrant inspect repaired area. Refer to T.O. 2-1-111, SPOP 70. No cracks allowed.
- (8) Nickel plate ends of transfer tubes 0.0001 to 0.0003 inch thick for 0.770 inch minimum distance, per SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111. Ensure heat shield insulation remains dry at all times. Do not preserve in oil. Bag tube to prevent contamination.
- (9) Remove masking materials.



Use of heat source other than specified may result in damage to existing braze joints or nickel plate.

- (10) Diffusion treat nickel plating by induction heating plated surfaces to 1825°±50°F (995°±30°C) and hold for minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blisters are present, repeat steps a.(4) through a.(10).
- b. Clean and nickel plate new transfer tubes of No. 4 bearing left internal scavenge tube assembly as follows:
 - (1) Wipe ends of transfer tubes with denatured alcohol or acetone to clean.

- (2) Nickel plate ends of transfer tubes 0.0001 to 0.0003 inch thick for 0.770 inch minimum distance, per SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111. Ensure heat shield insulation remains dry at all times. Do not preserve in oil. Bag tube to prevent contamination.



Use of heat source other than specified may result in damage to existing braze joints or nickel plate.

- (3) Diffusion treat nickel plating by induction heating plated surfaces to 1825°±50°F (995°±30°C) and hold minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blisters are present, repeat steps a.(4), a.(5), and steps b.(1) through b.(3).

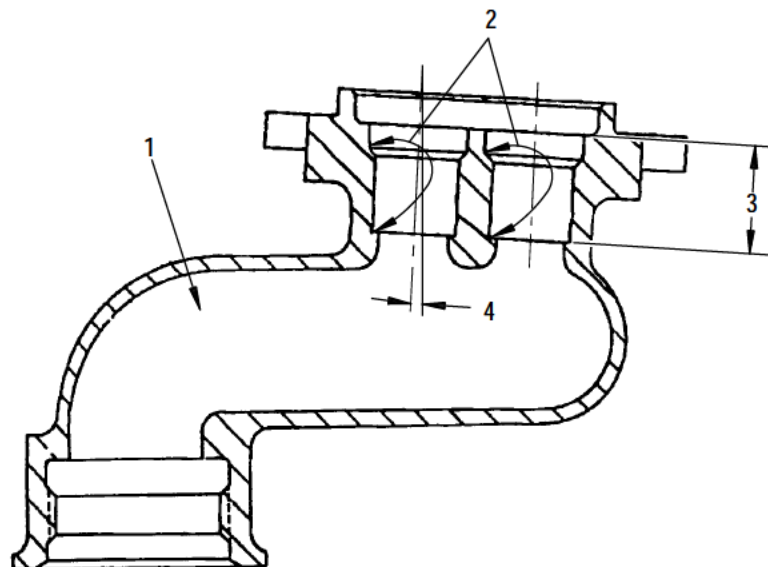
8. NO. 4 BEARING CONNECTOR (Typical PN 4069179) - NICKEL PLATING.

(See Figure 12.)

NOTE

- Steps a. through d. apply only to previously used connectors. New connectors require plating per steps e. through g. only.
- a. Heat connector in furnace 885° to 915°F (474° to 491°C) for 2 hours to remove oil residue.
 - b. Brush internal passages with fiber brush.

- c. Flush internal passages of connector per SPOP 208. Refer to T.O. 2-1-111.
- d. Chemically strip braze material from area(2, figure 12) per SPOP 305, except do not vapor degrease. Refer to T.O. 2-1-111.
- e. Nickel plate stripped areas to full depth and 0.0001 to 0.0003 inch thickness per SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111.
- f. Diffusion treat nickel plating by induction heating plated surfaces to $1825^{\circ}\pm 50^{\circ}\text{F}$ ($995^{\circ}\pm 30^{\circ}\text{C}$) and hold minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blisters are present, repeat steps d. through f.
- g. Bag connector and retain for reuse.



88727 (24X2)

- 1. Plating optional inside connector
- 2. Strip and plate per text.
- 3. 0.650 inch minimum, or full depth
- 4. 4°

Figure 12. No. 4 Bearing Connector (Typical PN 4069179) - Nickel Plating

9. TUBING HEAT SHIELDS - REPLACEMENT.

(See Figure 13.)

NOTE

Tubing heat shields may be replaced on tubes installed in diffuser case or after removal from diffuser case.

- a. Remove wire securing unserviceable heat shield.
- b. If tube assembly has not been removed from diffuser case, protect case from contact before removing heat shields. Remove heat shield by cutting at welds, being careful not to damage tube or case.
- c. Remove installation tape and thermal insulation tape.
- d. Inspect exposed area of tube per WP 372 00.
- e. Wind thermal insulation tape for entire length of tube under heat shield as shown. Maintain 0.000 to 0.060 inch gap in straight sections of tube and outside of bends around bends.
- f. Wind installation tape one turn minimum to secure ends of thermal insulation tape. Do not allow installation tape to touch tube.
- g. Install new heat shield and lockwire both ends of heat shield. Use lockwire specified for each tube. Lockwire shall have three full turns at both ends of heat shield. Press all lockwire twisted ends against heat shield.
- h. If No. 4 bearing left internal scavenge tube assembly has not been removed from diffuser case, weld heat shield flange seams as follows:
 - (1) Place Fiberfrax heat-resistant blanket between tube assembly and diffuser case to prevent weld splatter on diffuser case wall.
 - (2) Plasma arc weld or inert gas fusion weld flange seam edges per figure 13. Refer to T.O. 2-1-111. Do not resistance weld.
- i. If No. 4 bearing left internal scavenge tube assembly is removed from diffuser case, resistance weld heat shield flange seams per figure 13. Refer to T.O. 2-1-111. Plasma arc weld or inert gas fusion weld per step h.(2) may be used as an alternate.
- j. Fold heat shield flanges as shown in figure 13.

Legend for figure 13

1. After welding, fold flanges as shown. Where heat shield is located on tube bend, flanges (before folding) shall be approximately perpendicular to plane of bend, and direction of folds shall be toward center of bend. Direction of flanges and folds on straight is optional.
2. 0.000 to 0.060 inch, both sides
3. 0.030 to 0.065 inch diameter, both sides
4. 0.000 to 0.020 inch
5. Where twist angle between 2 adjacent bends is greater than 165°, heat shield flange may be cut to allow heat shield to be folded toward center of bend.

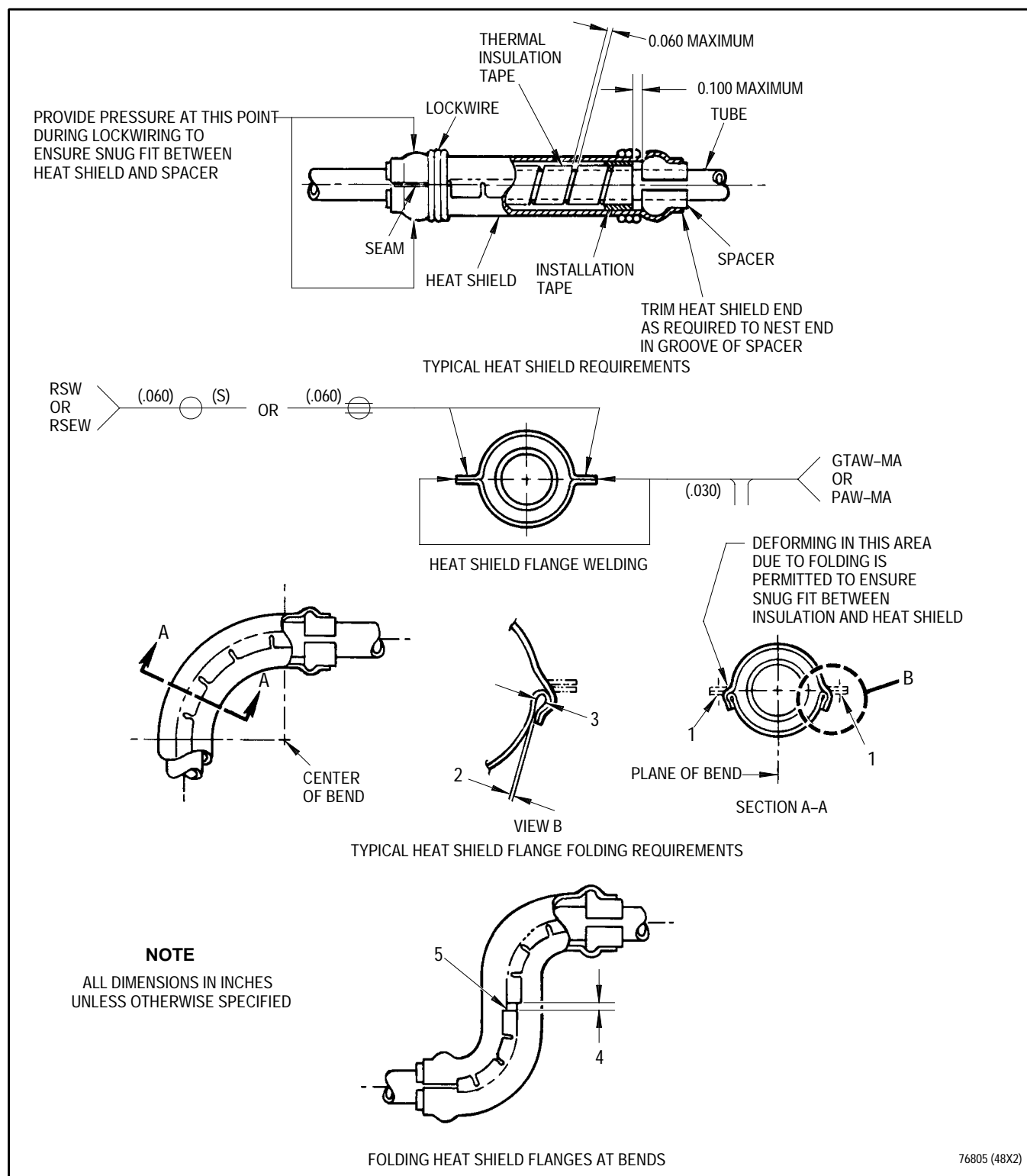


Figure 13. Tubing Heat Shields - Replacement

**10. NO. 4 BEARING LEFT INTERNAL
SCAVENGE TUBE ASSEMBLY - THERMAL HEAT
BARRIER COATING REPLACEMENT.**

(See Figure 14.)

- a. Mask areas adjacent to location being repaired.



- Allowing grit blast to dwell on parent metal will damage tube assembly.
 - Handling cleaned surfaces without clean gloves will damage surface.
- b. Grit blast areas to be recoated to uniform matte surface. Refer to T.O. 2-1-111, SPOP 218. Use No. 90 silicon carbide grit or No. 150 aluminum oxide grit at 30 psi supply pressure. Do not allow grit blast to dwell on parent metal. Handle cleaned surfaces with clean gloves.

- c. Apply PWA 53-33 thermal heat barrier coating 0.008 to 0.012 inch thick to areas shown except in Area B. Undercoat and plasma thickness may exceed maximum limits but combined thickness shall not exceed 0.020 inch. Refer to T.O. 2-1-111.
- d. Nickel plate transfer tubes per paragraph 7.

Legend for figure 14

1. Apply coating per text
2. 0.060 inch
3. 0.090 inch
4. 0.905 to 1.030 inches, 2 places
5. 4.708 to 4.842 inches, 2 places
6. 2.025 to 2.525 inches
7. No. 4 bearing left internal scavenge tube assembly (typical PN 4081460-01)

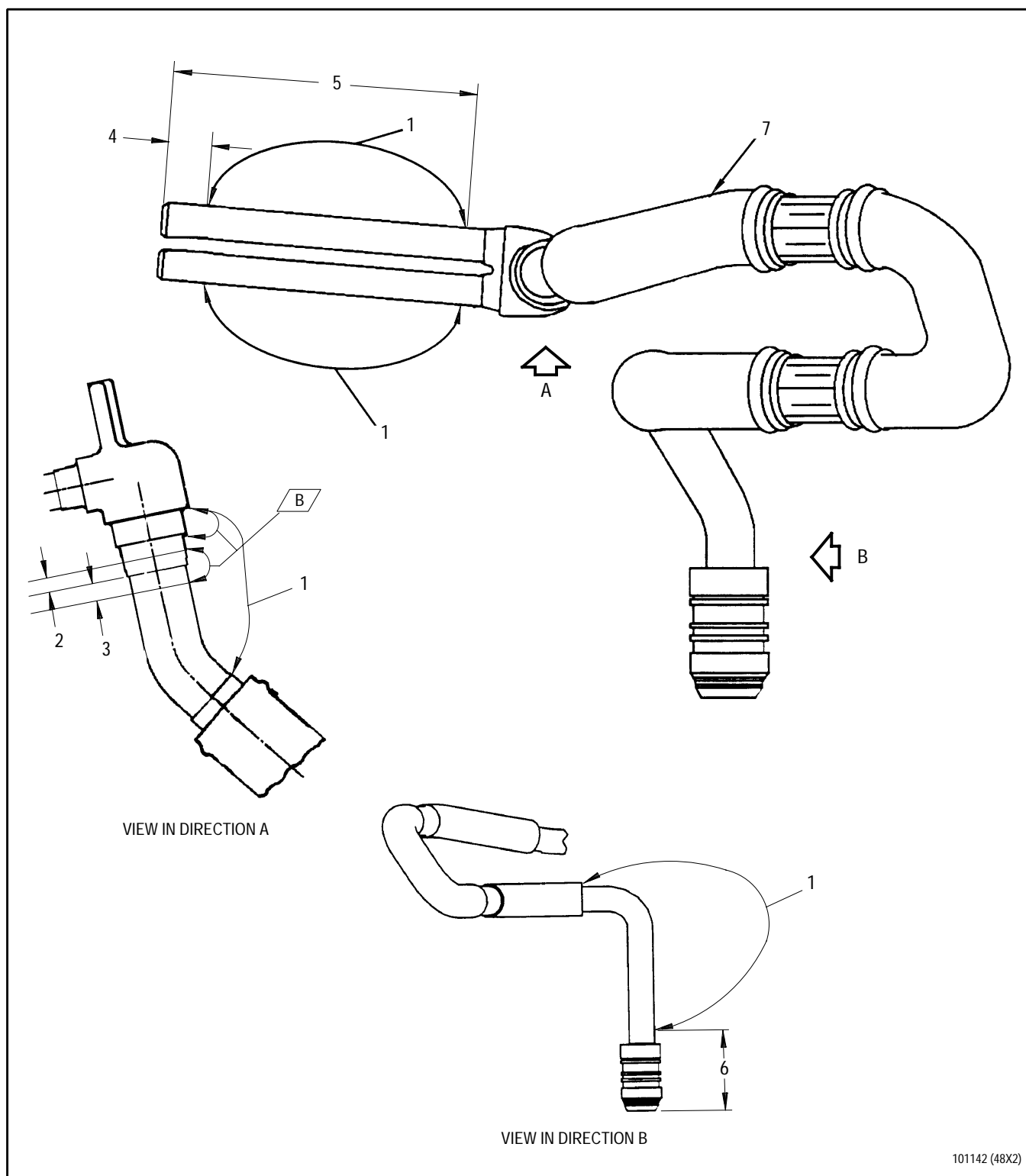
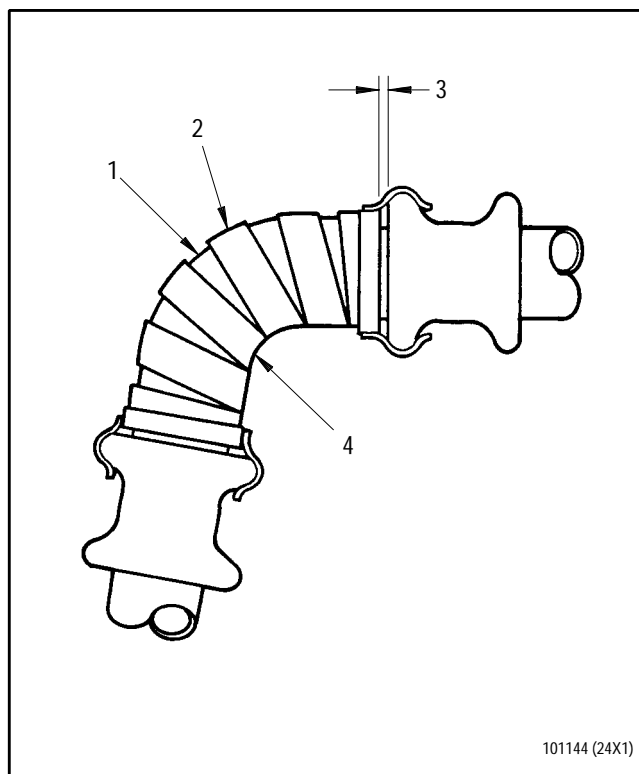


Figure 14. No. 4 Bearing Left Internal Scavenge Tube Assembly - Thermal Heat Barrier Coating Replacement

**11. NO. 4 BEARING LEFT INTERNAL
SCAVENGE TUBE ASSEMBLY -
SPACER AND SLEEVE REPLACEMENT.**

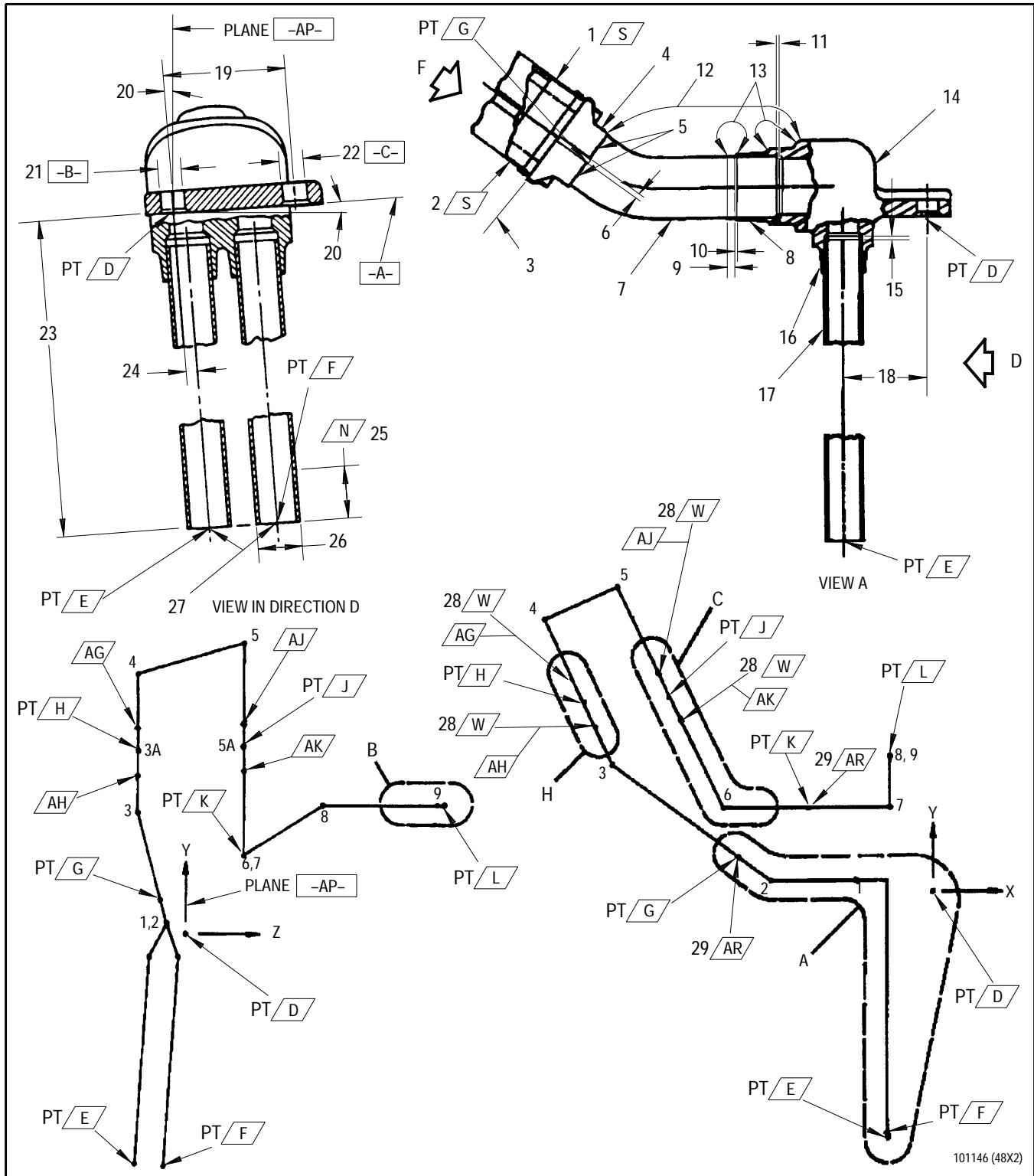
(See Figures 15 and 16.)

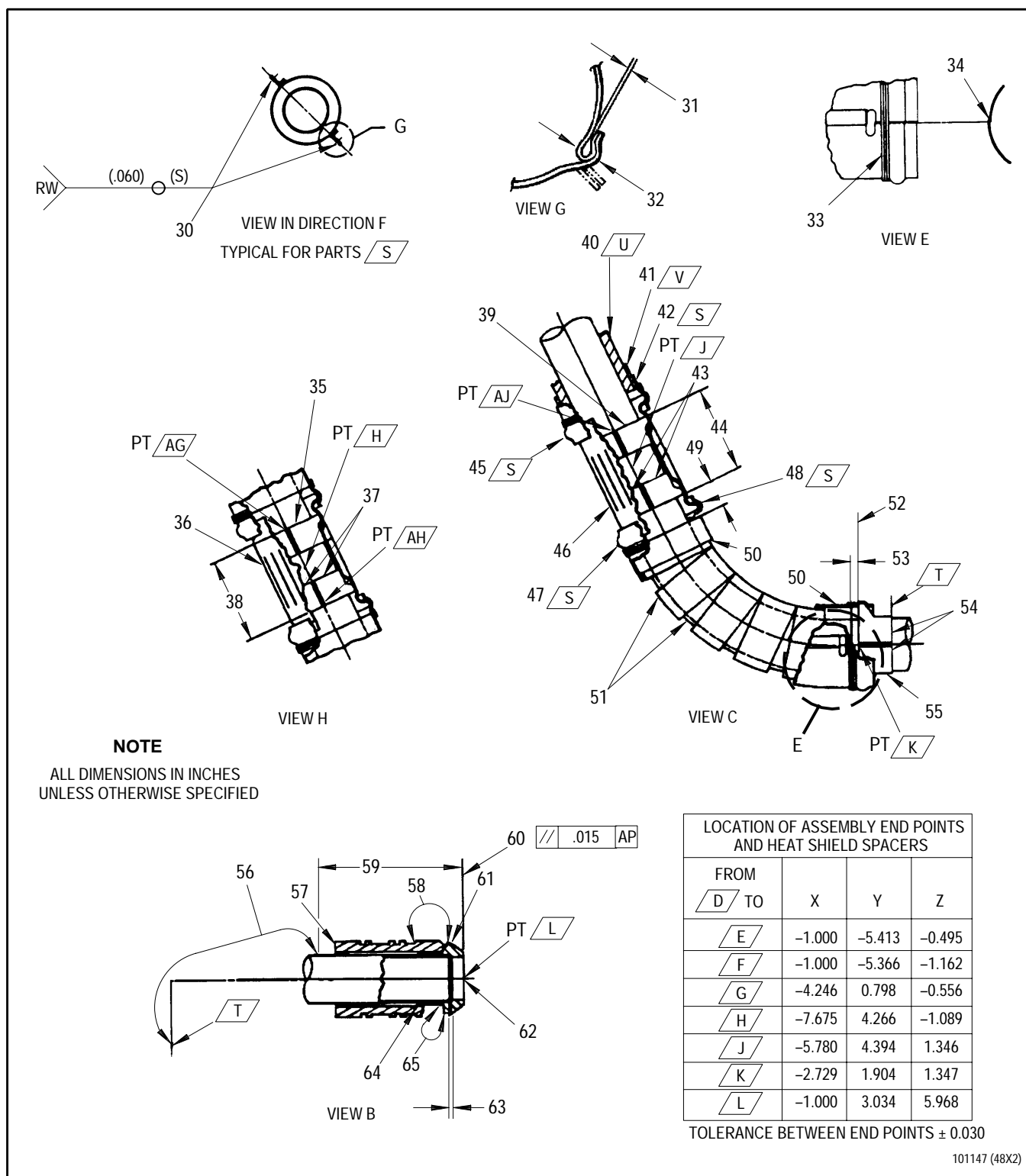
- a. Remove heat shields and tape per paragraph 9.
- b. Remove damaged spacers or sleeves and replace as follows:
 - (1) Pack heat-resistant material (Fiberfrax or equivalent) around ferrule and connector to prevent inadvertent removal.
 - (2) Remove sleeve or spacer by heat melting silver braze.
 - (3) Install new sleeve or spacer (see figure 16). Braze per AMS 2664. Refer to T.O. 2-1-111.
 - (4) Remove heat resistant material.
 - (5) Inspect brazed area. Refer to T.O. 2-1-111.
 - (6) Steam clean OD and ID of braze joint.
 - (7) Perform halide ion test per AMS 2664 on braze joint OD and ID. If halide residue remains, steam clean again and retest until clean sample is obtained. Refer to T.O. 2-1-111.
- c. Install tape and heat shields and lockwire per paragraph 9 and figures 15 and 16.
- d. Nickel plate transfer tubes per paragraph 7.



1. First layer of thermal tape shall be wrapped tightly and uniformly so straights have no overlap.
2. Second layer thermal tape shall be wrapped similarly to first layer but in opposite direction. Gaps on first layer shall be covered. Overlap on inside wrap permitted but shall not exceed 1/3 tape width.
3. 0.100 inch, maximum, typical both ends
4. Tube assembly shall be secured with 2 full wraps of thermal tape. Each layer shall have bias-cut ends providing a smooth, no-overlap wrap at ends.

Figure 15. No. 4 Bearing Left Internal Scavenge Tube Thermal Tape - Installation





**Figure 16. No. 4 Bearing Left Internal Scavenge Tube Assembly -
Heat Shield, Spacer, and Sleeve Replacement (Sheet 2 of 2)**

Legend for figure 16

1. Heat shield (typical PN 4069636)
2. Heat shield (typical PN 4069629)
3. In line with point G, within 0.060 inch total
4. Spacer (typical PN ST2180-12), 2 required
5. Braze per text. Use minimum amount of braze alloy, 30% minimum joining allowed.
6. Approximately equal both sides, 6 places. Angular relation to other features not important.
7. Tube (typical PN 4081460-02)
8. Braze per text.
9. 0.090 inch
10. 0.060 inch
11. 0.060 inch, maximum
12. Coat all around per PWA 53-33, 0.008 to 0.012 inch thick where shown.
13. Undercoat and plasma coating thickness may exceed maximum limits but combined thickness shall not exceed 0.020 inch.
14. Connector (typical PN 4069627)
15. 0.080 inch, maximum, 2 places
16. Braze per text, 2 places
17. Tube (typical PN 4069628), 2 required
18. 1.000 inch, reference
19. 1.200 inches
20. 4°, reference
21. 0.256 inch diameter clearance envelope
22. 0.256 inch diameter clearance envelope
23. 5.415 to 5.455 inches
24. 0.115 inch, reference
25. 0.450 inch, minimum, 2 places
26. 0.499 inch diameter clearance envelope for Distance N, relative to Datums -A-, -B-, and -C-, 2 places
27. Shall not leak when passage joining parts is exposed to 270 to 330 psig water.
28. Tube shall be insulated with 2 layers of thermal material Part U where shown.
29. Tube shall be insulated with 2 layers of thermal material Part U where shown.
30. After welding, fold flanges as shown. See paragraph 9.
31. 0.000 to 0.060 inch
32. 0.030 to 0.065 inch diameter
33. Lockwire (typical PN MS9226-03) as required, 8 places. Press all safety wire twisted ends against tube heat shield.

Legend for figure 16 (continued)

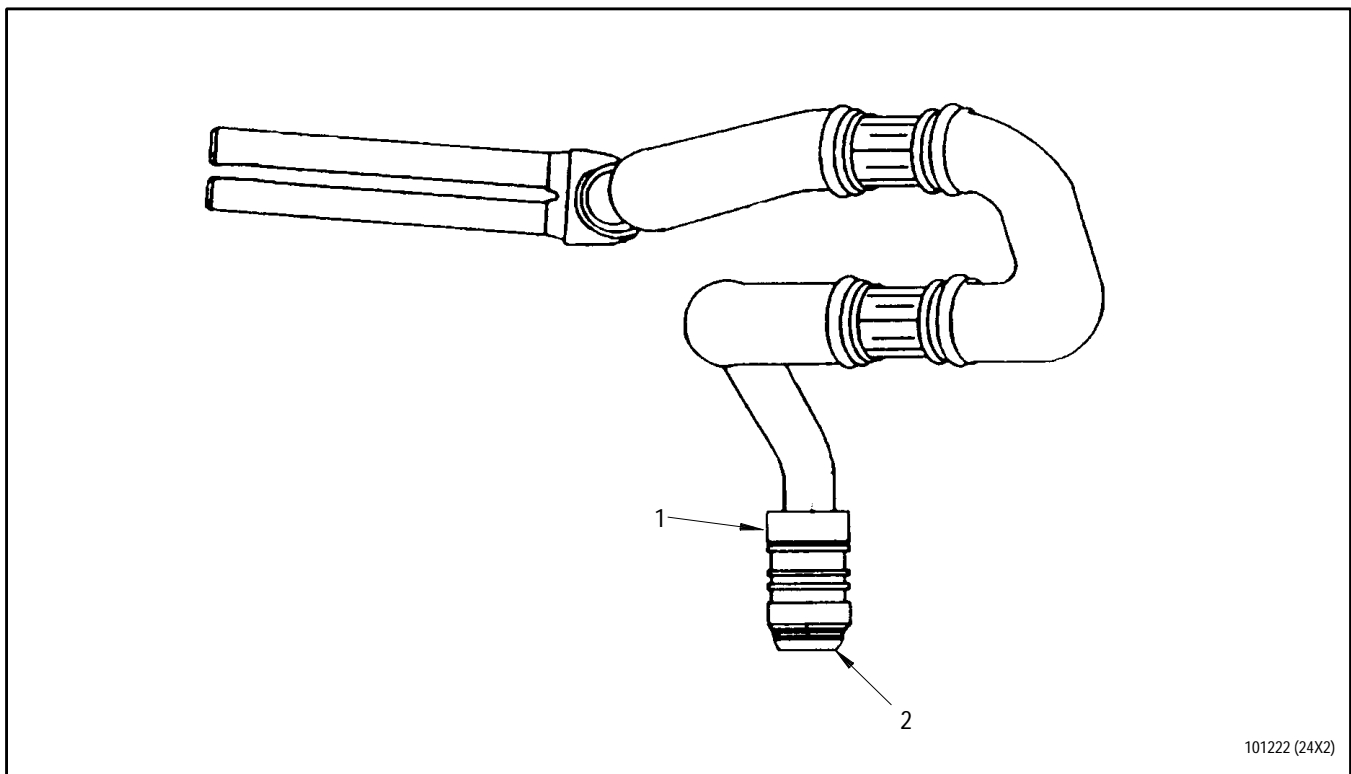
34. Overlap permissible typical all locations for Parts S.
35. Spacer (typical PN ST2182-12), 4 required
36. Sleeve (typical PN 4069632), 2 required
37. Braze per text, 2 places. Use minimum amount of braze alloy, 30% minimum joining allowed.
38. 1.170 to 1.190 inches, located along tube axis in relation to Point H within 0.060 inch total.
39. Spacer (typical PN ST2182-12), 4 required
40. Insulation tape (typical PN 2072968), as required
41. Installation tape (typical PN 2161929), as required
42. Heat shield (typical PN 4069638)
43. Braze per text, 2 places. Use minimum amount of braze alloy, 30% minimum joining allowed.
44. 1.170 to 1.190 inches, located along tube axis in relation to Point J within 0.060 inch total.
45. Heat shield (typical PN 4069630)
46. Sleeve (typical PN 4069632), 2 required
47. Heat shield (typical PN 4072993)
48. Heat shield (typical PN 4072992)
49. 0.439 inch, maximum, at Location W for Parts U and V
50. Installation tape (typical PN 2161929)
51. Insulation tape (typical PN 2072968)
52. This surface is in line with Point K within 0.060 inch total.
53. 0.100 inch, maximum, at Location AR for Parts U and V
54. Braze per text. Use minimum amount of braze alloy, 30% minimum joining allowed.
55. Spacer (typical PN ST2180-12), 2 required
56. Coat per PWA 53-33, 0.008 to 0.012 inch thick where shown.
57. Ring (typical PN 4053767)
58. After coating, treat per PWA 36545-3 where shown.
59. 2.025 to 2.525 inches
60. This surface to be parallel with Plane -AP- within 0.015 inch.
61. Ferrule (typical PN 4036617)
62. Shall not leak when passage joining parts is exposed to 270 to 330 psig water.
63. 0.060 inch, maximum
64. Braze per text.
65. After coating, treat per PWA 36545-3 where shown.

**12. NO. 4 BEARING LEFT INTERNAL
SCAVENGE TUBE ASSEMBLY -
RING OR FERRULE REPLACEMENT.**

(See Figures 17 through 20 and Figure 26.)

a. Debraze ferrule as follows:

- (1) Slide ring (typical PN 4053767) away from end of tube to expose ferrule (typical PN 4036617) and ferrule braze joint. Wire ring in place.
- (2) Apply PWA 809 (Type AWS 3B) high temperature braze flux to outside surfaces of braze joint to protect from oxidation.
- (3) Secure tube in PWA 71558 fixture and apply heat to joint. When evidence of braze melt appears at joint, turn off induction coil power.
- (4) Immediately insert PWA 55300 puller into ferrule, ratchet to expand puller, and use uniform pressure to pull ferrule from tube. Retain ferrule for reuse if serviceable.
- (5) Remove externally threaded ring.



1. Ring, externally threaded (typical PN 4053767)
2. Ferrule (typical PN 4036617)

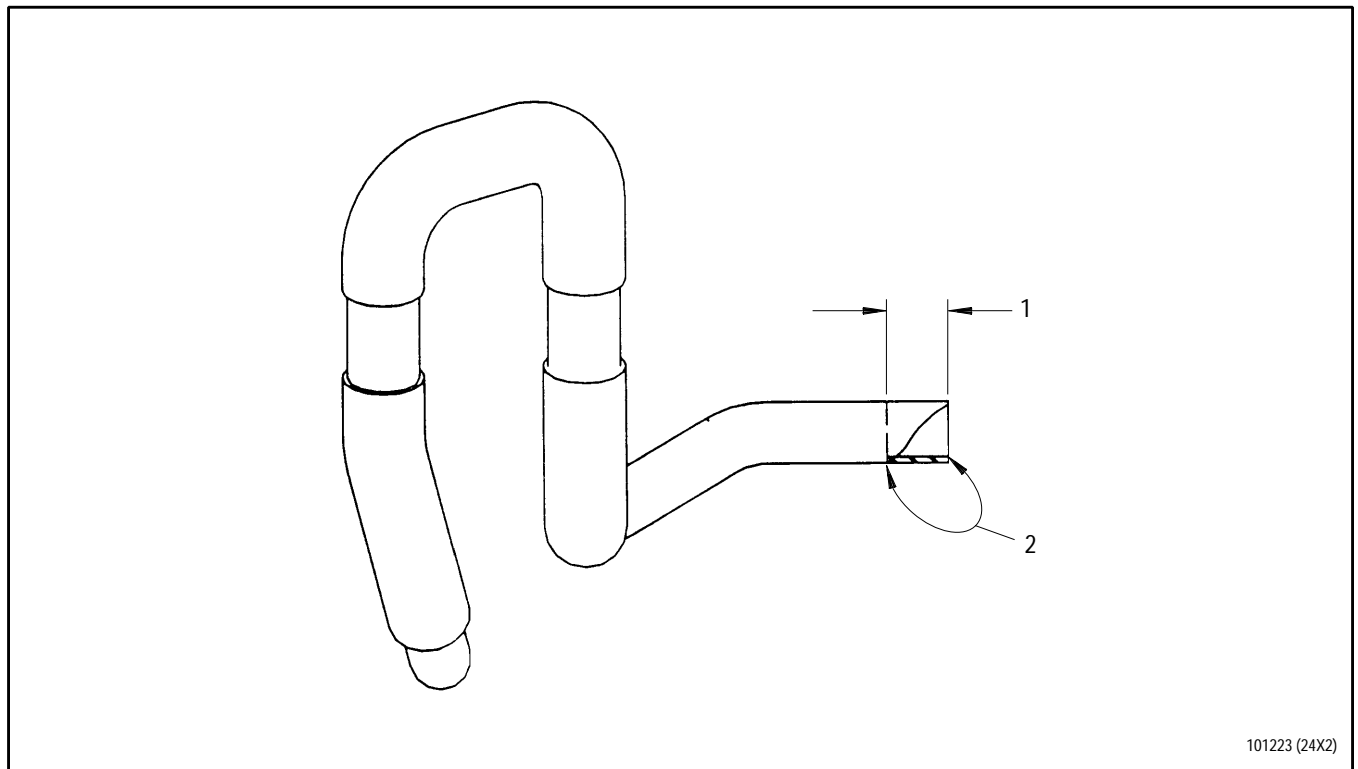
Figure 17. No. 4 Bearing Left Internal Scavenge Tube Assembly - Ring or Ferrule Replacement

- b. Install PWA 55303 protector over heat shield portion of tube.



Submerging tube will contaminate insulation material under heat shield.

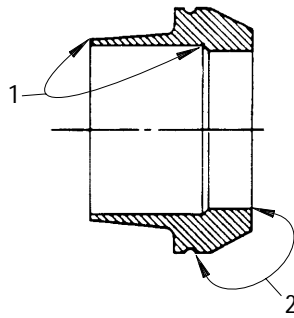
- c. Clean and flush ID of tube per SPOP 208. Do not submerge tube. Refer to T.O. 2-1-111. Clean ferrule.
- d. Remove PWA 55303 protector from tube.
- e. Mask tube assembly with electroplater's tape and wax per SPOP 36. Refer to T.O. 2-1-111.
- f. Chemically strip end of tube to remove braze residue for 0.750 inch minimum. Refer to T.O. 2-1-111, SPOP 305, except do not vapor degrease. See figure 18.
- g. Nickel plate end of tube 0.0001 to 0.0003 inch thick for 0.750 inch minimum distance per SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111. See figure 18. Ensure heat shield insulation remains dry at all times.
- h. If reusing ferrule (typical PN 4036617), chemically strip per SPOP 305 to remove braze residue except do not vapor degrease. Refer to T.O. 2-1-111. See figure 19.



101223 (24X2)

1. 0.750 inch, minimum
2. Strip and nickel plate this area per text.

Figure 18. Tube Assembly - Stripping and Replating



101224 (12X2)

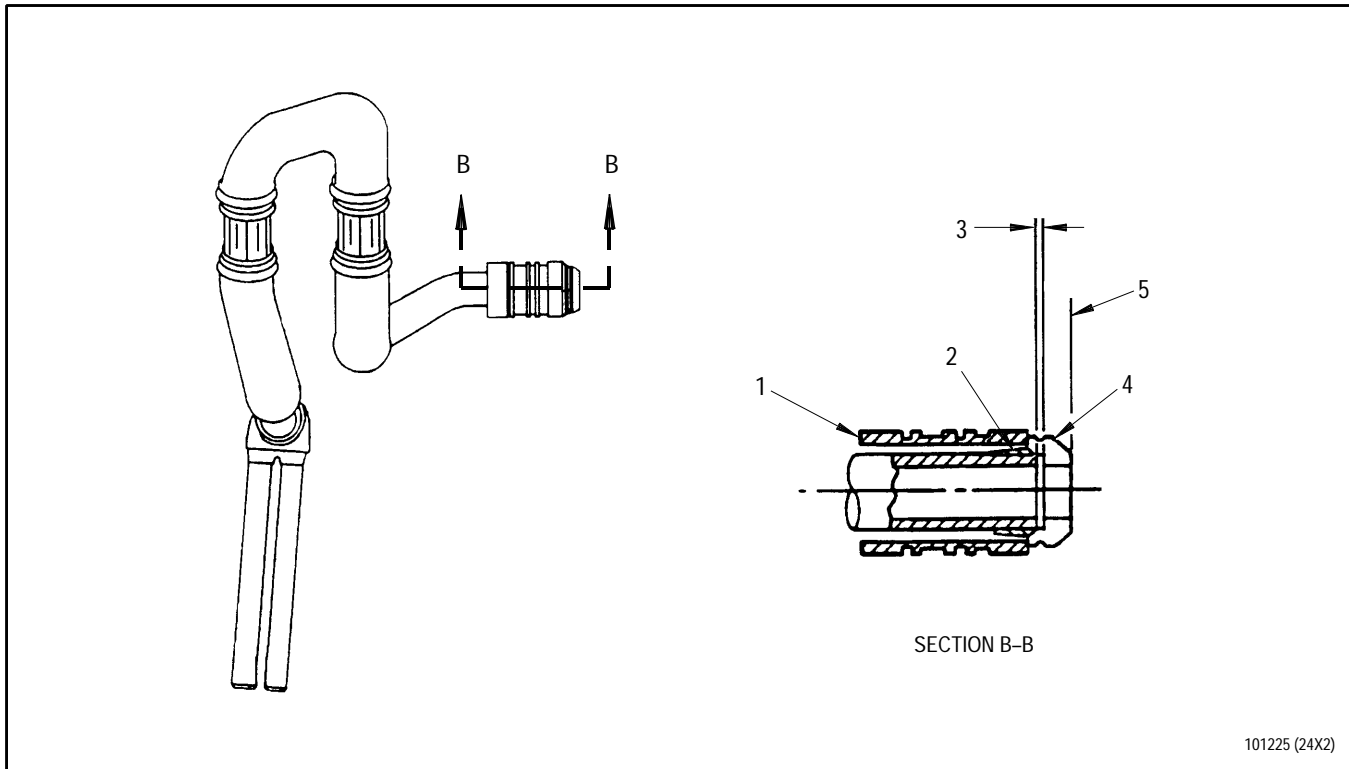
1. Strip and nickel plate this area per text.
Plating optional in other areas.
2. No plating allowed.

Figure 19. Ferrule - Stripping and Replating

- i. Nickel plate ferrule 0.0001 to 0.0003 inch thick in areas shown in figure 19. Refer to T.O. 2-1-111, SPOP 26, except do not vapor degrease.
 - j. Remove masking materials.
- CAUTION**
- Use of heat source other than specified may result in damage to existing braze joints or nickel plate.
- k. Diffusion treat nickel plating by induction heating plated surfaces to $1825^{\circ}\pm 50^{\circ}\text{F}$ ($995^{\circ}\pm 30^{\circ}\text{C}$) and hold for minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blistering are present, repeat steps f. through k.
 - l. Remove scale and visible oxides using 320 grit or finer emory cloth or equivalent.
 - m. Install ring on scavenge tube with wrenching teeth toward heat shield. Wire ring in place to keep away from braze joint.
 - n. Check fit between ferrule and tube. Fit shall be 0.002 to 0.006 inch loose on diameter. If fit is improper, select a ferrule with correct fit.
 - o. Fabricate braze ring using 0.045 to 0.064 inch diameter wire. Use AMS 4772 brazing filler metal or LM 1071 braze preform for brazing with flux.
 - p. Wipe tube, ferrule, and braze ring with isopropyl alcohol. Use alcohol-soaked tissue to handle parts to avoid contamination.
 - q. Make braze flux mix of two parts PWA 809 (Type AWS 3B) and one part AMS 3411A (Type AWS 3C) thoroughly mixed.

- r. Apply braze flux mix to surfaces to be brazed and assemble tube, braze ring, and ferrule. See figure 20.
- s. Apply PWA 809 (Type AWS 3B) high temperature braze flux to outside surfaces of braze joint to protect from oxidation.
- t. Braze ferrule per one of the following options. See figure 20.
 - (1) Perform option I, induction braze, as follows:
 - (a) Place tube through center of induction coil and clamp scavenge tube to PWA 71558 fixture.
 - (b) Position induction coil around joint to be brazed.
 - (c) Install argon vent plug/weight (detail of PWA 71558) over ferrule.
 - (d) Induction silver braze joint per AMS 2664 using vacuum or argon atmosphere. Observe joint for appearance of braze material. Refer to T.O. 2-1-111.
 - (2) Perform option II, torch braze using PWA 55308 combustion controller, as follows:
 - (a) Clamp scavenge tube to PWA 71558 fixture with ferrule to be brazed positioned between burner nozzles. Connect hoses No. 2 and 3 of PWA 55308 combustion controller to burner nozzles. Adjust nozzles one half inch from ferrule to be brazed.
 - (b) Start PWA 55308 combustion controller per WP 434 00.
 - (c) Hook up and start argon flow through tube from end furthest from braze joint. Open burners and silver braze joint per AMS 2664. Refer to T.O. 2-1-111. Observe joint for appearance of braze material.
 - (d) Shut down combustion controller per WP 434 00 and allow parts to cool before handling.
- u. Inspect end point locations of tube assembly using PWA 71641 gage.
- v. Radiographic inspect braze joint for braze coverage. Refer to T.O. 2-1-111.
- w. Install PWA 55303 protector over heat shield portion of tube.
- x. Steam clean brazed area and ID of tube to remove braze flux.
- y. Perform halide ion test per AMS 2664 on braze joint OD and ID. If halide residue remains, steam clean again and retest until clean sample is obtained. Refer to T.O. 2-1-111. Bernite Flux Detection Kit GA1065-2 may be used.
- z. Remove PWA 55303 protector.

- aa. Install tube assembly into PWA 71397 fixture.
- ab. Install PWA 53403 pressure test adapter onto spanner nut of scavenge tube assembly and tighten securely, using PWA 52767 wrench.
- ac. Flow water slowly through scavenge tube assembly to purge air by releasing bleed valve until water comes out.
- ad. Pressure test at 275 to 325 psi using water. Refer to T.O. 2-1-111. Hold pressure test for minimum of 5 minutes. Use bleed to relieve pressure after test. Repair any leaks as necessary.
- ae. Apply PWA 36545 antigalling compound per paragraph 14.
- af. Nickel plate transfer tubes per paragraph 7.



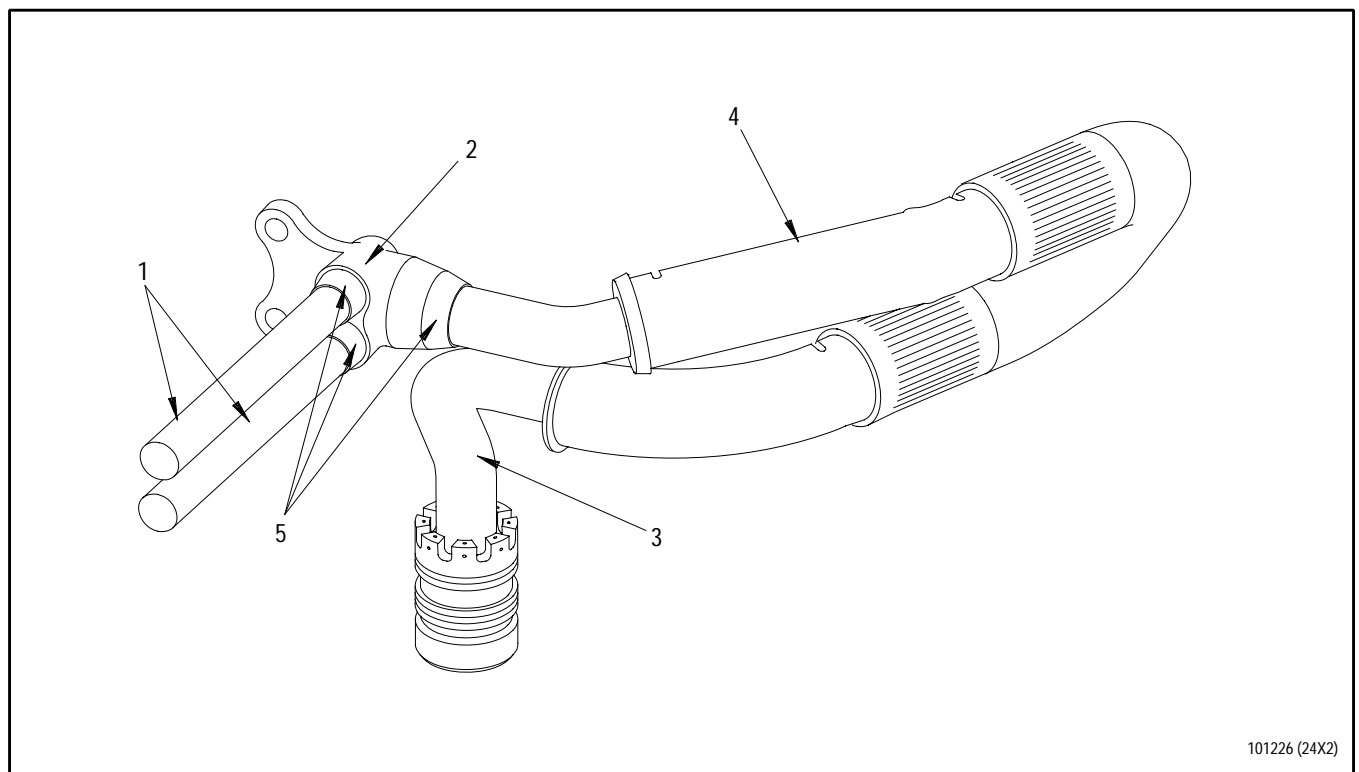
- 1. Ring (typical PN 4053767)
- 2. Braze per text
- 3. 0.060 inch, maximum
- 4. Ferrule (typical PN 4036617)
- 5. See paragraph 13, figure 26, for positional requirements.

Figure 20. No. 4 Bearing Left Internal Scavenge Tube Assembly - Ring and Ferrule Replacement

13. NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - TRANSFER TUBES, CONNECTOR, AND SCAVENGE TUBE REPLACEMENT.

(See Figures 21 through 25 and figure 26.)

- a. Remove heat shields per paragraph 9.
- b. Debraze transfer tubes(1, figure 21) and connector(2) from No. 4 bearing left internal scavenge tube assembly(3) as follows:
 - (1) Apply PWA 809 (Type AWS 3B) high temperature braze flux to outside surfaces of braze joint to protect from oxidation.
 - (2) Secure tube assembly in PWA 71557 and PWA 71559 fixtures with induction coils centered around joints to be debrazed.
 - (3) Apply heat to joints. When evidence of braze melt appears at joint, turn off induction coil power.
 - (4) Immediately disassemble transfer tubes(1) and connector(2) from tube assembly(3).



1. Transfer tube (typical PN 4069628)
2. Connector (typical PN 4069627)
3. No. 4 bearing left internal scavenge tube assembly (typical PN 4081460-01)
4. Heat shield, typical
5. Braze joint

**Figure 21. No. 4 Bearing Left Internal Scavenge Tube -
Transfer Tubes, Connector, and Scavenge Tube Replacement**

c. Prepare and nickel plate transfer tubes and connector as follows:

- (1) Heat transfer tubes in furnace 885° to 915°F (474° to 491°C) for 2 hours to remove oil residue.
- (2) Brush tubes internally with fiber brush.
- (3) Flush inside passages of tubes per SPOP 208. Refer to T.O. 2-1-111.
- (4) Mask existing thermal barrier coating, including edges, per SPOP 36. Refer to T.O. 2-1-111.
- (5) Chemically strip braze material from both ends of tube per SPOP 305, except do not vapor degrease. Refer to T.O. 2-1-111. See figure 22.
- (6) Nickel plate stripped area on both ends of tube 0.0001 to 0.0003 inch thick for minimum length shown in figure 22. Use SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111.
- (7) Remove masking materials.
- (8) If reusing connector, chemically strip to remove braze material per SPOP 305, except do not vapor degrease. Refer to T.O. 2-1-111.

- (9) Nickel plate connector three places 0.0001 to 0.0003 inch thick per SPOP 26, except do not vapor degrease. See figure 23. Refer to T.O. 2-1-111.

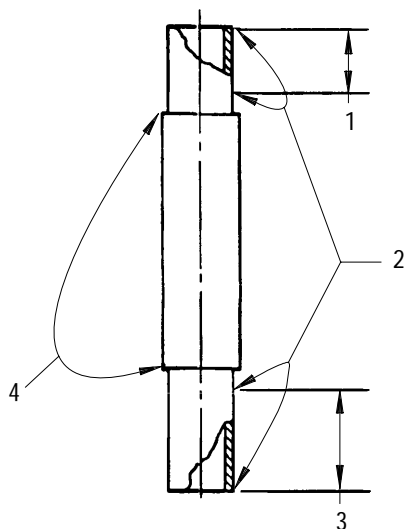


Use of heat source other than specified may result in damage to existing braze joints or nickel plate.

- (10) Diffusion treat nickel plating by induction heating plated surfaces to 1825°±50°F (995°±30°C) and hold minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blisters are present, repeat steps c.(5) through c.(10).

d. Assemble transfer tube details as follows (see figure 26):

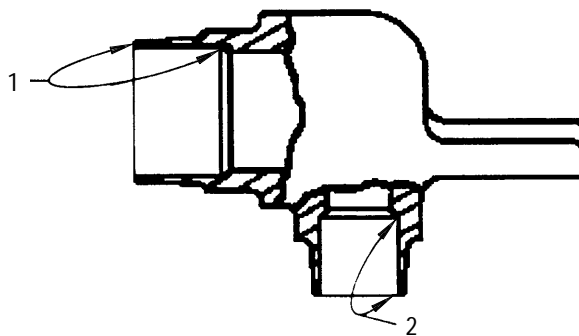
- (1) Remove scale and visible oxides from nickel plating using 320 grit or finer emory cloth or equivalent.
- (2) Wrap ceramic coated section of tubes with Fiberfrax tape and JOCLIN 404 heat resistant tape. See figure 24.
- (3) Make braze rings of AMS 4772, 0.045 inch diameter wire, or use LM 1070 braze preform.



101227 (24X2)

1. 0.460 inch, minimum
2. Strip and nickel plate this area per text
3. 0.770 inch, minimum
4. Mask existing thermal barrier coating per text

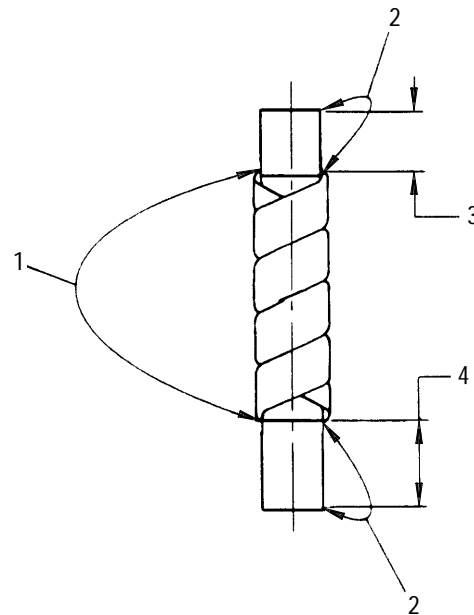
Figure 22. Transfer Tubes (Typical PN 4069628) - Stripping and Replating



101228 (12X2)

1. Strip and/or nickel plate all around per text.
Other areas optional.
2. Strip and/or nickel plate all around per text, 2 places.
Other areas optional.

Figure 23. Connector (Typical PN 4069627) - Nickel Plating



101229 (24X2)

1. Wrap with Fiberfrax and heat resistant tape.
2. Uncoated area, reference
3. 0.600 inch, reference
4. 0.910 inch, reference

Figure 24. Transfer Tubes - Wrapping

- (4) Wipe all joints and braze rings with isopropyl alcohol. Use alcohol-soaked tissue to handle parts to avoid contamination.
- (5) Install braze rings into two holes in connector.
- (6) Make braze flux mix of two parts PWA 809 (Type AWS 3B) and one part AMS 3411A (Type AWS 3C) thoroughly mixed.
- (7) Apply braze flux mix to surfaces to be brazed and assemble tubes and connector. Insert end of transfer tubes with shorter axial length of nickel plate(1, figure 22) into connector holes.
- (8) Apply PWA 809 (Type AWS 3B) high temperature braze flux to outside surface of braze joints to protect from oxidation.

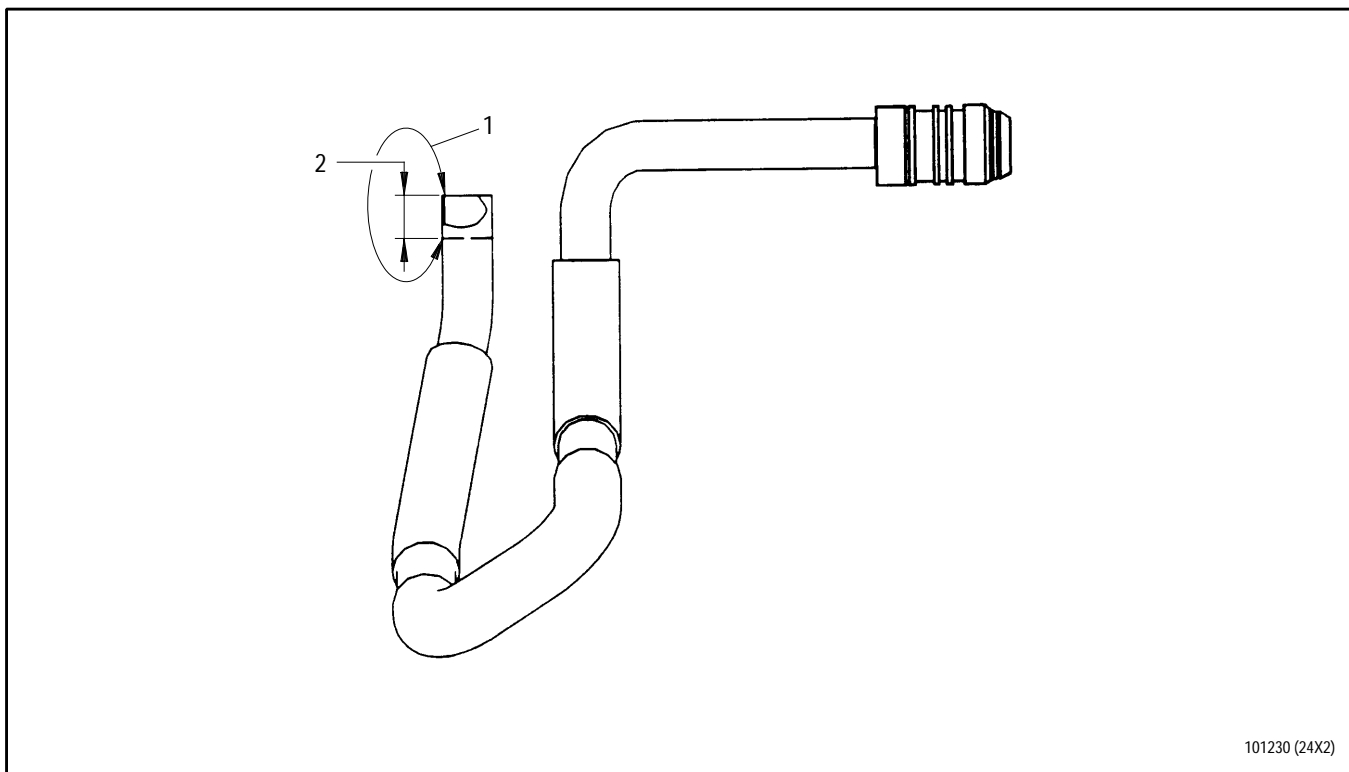
- e. Braze tube details and connector per one of the following options. See figure 26.
- (1) Perform option I, induction braze, as follows:
- (a) Place tube through center of induction coils and install transfer tubes into PWA 71557 fixture.
 - (b) Position induction coils around joints to be brazed.
 - (c) Induction silver braze joints per AMS 2664 using vacuum or argon atmosphere. Observe joints for appearance of braze material. Refer to T.O. 2-1-111.
- (2) Perform option II, torch braze using PWA 55308 combustion controller, as follows:
- (a) Install transfer tubes into PWA 71557 fixture with joint to be brazed positioned between burner nozzles. Connect hoses No. 2 and 3 of PWA 55308 combustion controller to burner nozzles. Adjust nozzles one half inch from braze joint.
 - (b) Start PWA 55308 combustion controller per WP 434 00.
 - (c) Hook up and start argon flow through tube from end furthest from braze joint. Open burners and silver braze joint per AMS 2664. Refer to T.O. 2-1-111. Observe joint for appearance of braze material.
- (d) Shut down combustion controller per WP 434 00 and allow parts to cool before handling.
- f. Steam clean OD and ID of connector to remove braze flux.
- g. Radiographic inspect braze joint for braze coverage. Refer to T.O. 2-1-111.
- h. Perform halide ion test per AMS 2664 on braze joint OD and ID. If halide residue remains, steam clean again and retest until clean sample is obtained. Refer to T.O. 2-1-111. Bernite Flux Detection Kit GA1065-2 may be used.
- i. Bag part to prevent contamination.
- j. Prepare and nickel plate scavenge tube assembly as follows:
- (1) Heat tube assembly in furnace 885° to 915°F (474° to 491°C) for 2 hours to remove oil residue.
 - (2) Flush tube assembly internally per SPOP 208. Refer to T.O. 2-1-111.

- (3) Mask tube assembly with tape and wax per SPOP 36. Refer to T.O. 2-1-111.
- (4) Strip braze material from 5/8 to 3/4 inch minimum on end of tube assembly per SPOP 305, except do not vapor degrease. Refer to T.O. 2-1-111. See figure 25.
- (5) Nickel plate stripped area of scavenge tube assembly 0.0001 to 0.0003 inch thick per SPOP 26, except do not vapor degrease. Refer to T.O. 2-1-111. See figure 25. Ensure heat shield insulation remains dry at all times.
- (6) Remove masking materials.



Use of heat source other than specified may result in damage to existing braze joints or nickel plate.

- (7) Diffusion treat nickel plating by induction heating plated surfaces to 1825°±50°F (995°±30°C) and hold minimum of 10 seconds and maximum of 5 minutes. Do not use furnace or torch as a heat source. Plate should show no signs of cracking or blistering after diffusion treatment. If cracks or blisters are present, repeat steps j.(4) through j.(7).



101230 (24X2)

1. Strip and nickel plate this area per text.
2. 0.625 to 0.750 inch

Figure 25. No. 4 Bearing Left Internal Scavenge Tube - Stripping and Replating

- k. Prepare and assemble scavenge tube assembly and connector as follows:
 - (1) Remove scale and visible oxides from nickel plating using 320 grit or finer emory cloth or equivalent.
 - (2) Make braze ring of AMS 4772, 0.045 inch diameter wire, or LM 1071 braze preform.
 - (3) Wipe connector(2, figure 21), scavenge tube assembly(3) end, and braze ring with isopropyl alcohol. Use alcohol-soaked tissue to handle parts to avoid contamination.
 - (4) Make braze flux mix of two parts PWA 809 (Type AWS 3B) and one part AMS 3411A (Type AWS 3C) thoroughly mixed.
 - (5) Apply braze flux mix to surfaces of connector(2) and scavenge tube assembly(3).
 - (6) Assemble connector, scavenge tube assembly, and braze ring. See figure 26.
 - (7) Apply PWA 809 (Type AWS 3B) high temperature braze flux to outside surface of braze joints to protect from oxidation.
- l. Braze scavenge tube assembly per one of the following options. See figure 26.
 - (1) Perform option I, induction braze, as follows:
 - (a) Place assembled tube through center of induction coils and clamp scavenge tube to PWA 71559 fixture.
 - (b) Position induction coils around joint to be brazed.
 - (c) Induction silver braze joint per AMS 2664 using vacuum or argon atmosphere. Observe joint for appearance of braze material. Refer to T.O. 2-1-111.
 - (d) Remove tube assembly from PWA 71559 fixture.
- (2) Perform option II, torch braze using PWA 55308 combustion controller, as follows:
 - (a) Clamp scavenge tube to PWA 71559 fixture with joint to be brazed positioned between burner nozzles. Connect hoses No. 2 and 3 of PWA 55308 combustion controller to burner nozzles. Adjust nozzles one half inch from braze joint.
 - (b) Start PWA 55308 combustion controller per WP 434 00.
 - (c) Hook up argon gas at threaded nut end of tube and start argon flow. Open burners and silver braze joint per AMS 2664. Refer to T.O. 2-1-111. Observe joint for appearance of braze material.
 - (d) Shut down combustion controller per WP 434 00 and allow parts to cool before handling.
 - (e) Remove tube assembly from PWA 71559 fixture.

- m. Inspect end point locations of tube assembly using PWA 71641 gage.
- n. Radiographic inspect brazed areas of scavenge tube for braze coverage. Refer to T.O. 2-1-111.
- o. Steam clean brazed area and flush ID of tube to remove braze flux.
- p. Perform halide ion test per AMS 2664 on braze joint OD and ID. If halide residue remains, steam clean again and retest until clean sample is obtained. Refer to T.O. 2-1-111. Bernite Flux Detection Kit GA1065-2 may be used.
- q. Install tube assembly into PWA 71397 fixture.
- r. Install PWA 53403 pressure test adapter onto spanner nut of scavenge tube assembly and tighten securely, using PWA 52767 wrench.
- s. Flow water slowly through scavenge tube assembly to purge air by releasing bleed valve until water comes out.
- t. Pressure test at 275 to 325 psi using water. Refer to T.O. 2-1-111. Hold pressure test for minimum of 5 minutes. Use bleed to relieve pressure after test. Repair any leaks as necessary.
- u. Grit blast and coat per paragraph 10.
- v. Install heat shields per paragraph 9.
- w. Apply PWA 36545 antigalling compound per paragraph 14.

Legend for figure 26

- 1. Transfer tubes (typical PN 4069628)
- 2. This end uncoated for distance of 0.910 inch. Opposite end uncoated for distance of 0.600 inch, reference.
- 3. 0.080 inch maximum gap, 2 places
- 4. 1.200 inches
- 5. 4°
- 6. 0.256 inch diameter clearance envelope
- 7. 5.415 to 5.455 inches from Datum -A-
- 8. 0.499 inch diameter clearance envelope for Distance N related to Datums -A-, -B-, and -C-
- 9. Braze per text
- 10. Tube assembly
- 11. 0.060 inch, maximum gap
- 12. 0.874 inch diameter clearance envelope related to Datums -A-, -B-, and -C-, over distance between Point 8 and Point 9.
- 13. This surface must be parallel within 0.015 inch wide zone related to Datum -AP-.
- 14. 0.450 inch, minimum, 2 places

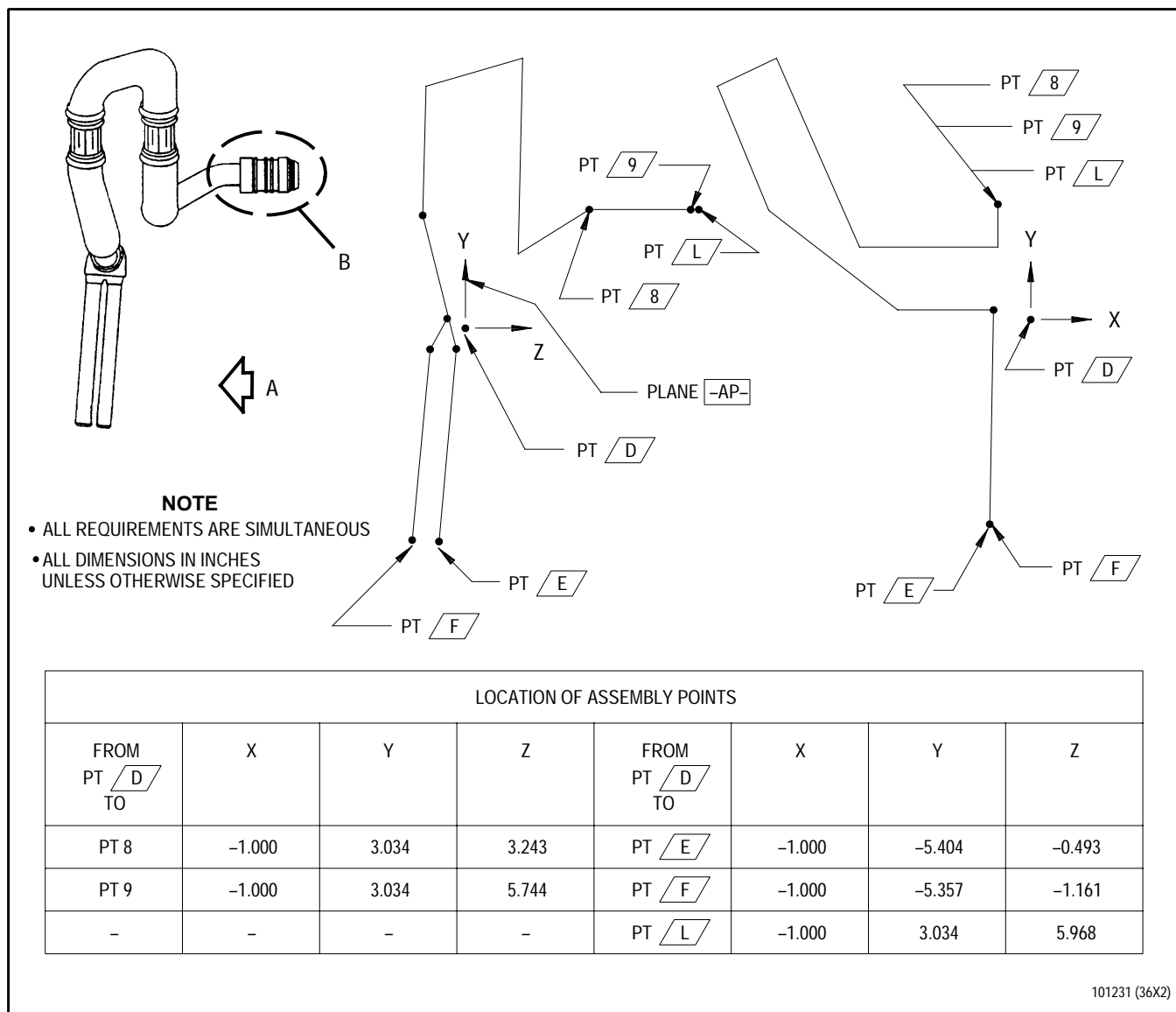


Figure 26. No. 4 Bearing Left Internal Scavenge Tube Assembly - Assembly and Brazing Positional Requirements (Sheet 1 of 2)

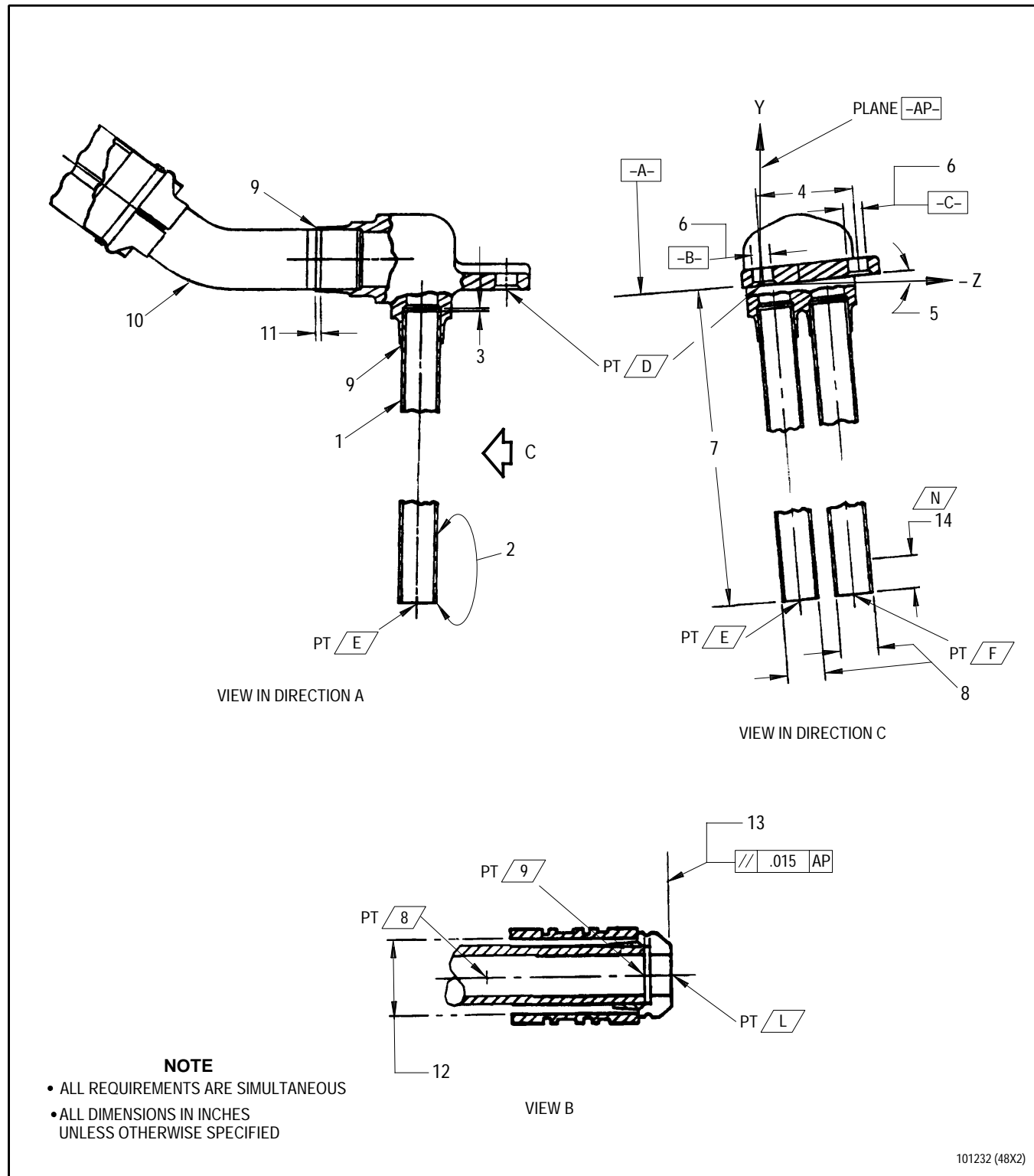


Figure 26. No. 4 Bearing Left Internal Scavenge Tube Assembly - Assembly and Brazing Positional Requirements (Sheet 2 of 2)

(See Figure 27.)

-
- The drawing consists of two parts. On the left is a perspective view of a mechanical assembly. It features a curved pipe with two vertical sections, connected to a horizontal pipe. This horizontal pipe is joined to a flange-like component, which is further connected to a vertical pipe. On the right is a cross-sectional view labeled 'SECTION A-A'. This view shows the internal structure of the assembly, with hatching used to differentiate components. A dashed horizontal line indicates the section line. Callouts '1' and '2' are used to identify specific parts: '1' points to the upper flange and the main body, while '2' points to the lower flange and the internal structure. The text 'SECTION A-A' is centered below the cross-section.

- Figure 27. No. 4 Bearing Left Internal Scavenge Tube Assembly - Antigalling Compound Application**

**15. NO. 4 BEARING LEFT INTERNAL
SCAVENGE TUBE ASSEMBLY - LOOSE HEAT
SHIELD REPAIR.**

(See Figure 28.)

- a. Replace heat shields where insulation is not visible or where deterioration is present.

- b. Repair heat shields where insulation is intact as follows:

(1) Remove wire retaining heat shields.

(2) Place LM 1054 clamp over end of heat shield at standoff ridge. See figure 28.

(3) Turn handle to tighten clamp.

(4) Rewire heat shield.

(5) Replace lockwire at all locations where required using PN MS9226-03 lockwire.

- c. If No. 4 bearing left scavenge tube assembly has been removed from diffuser case, nickel plate transfer tubes per paragraph 7.

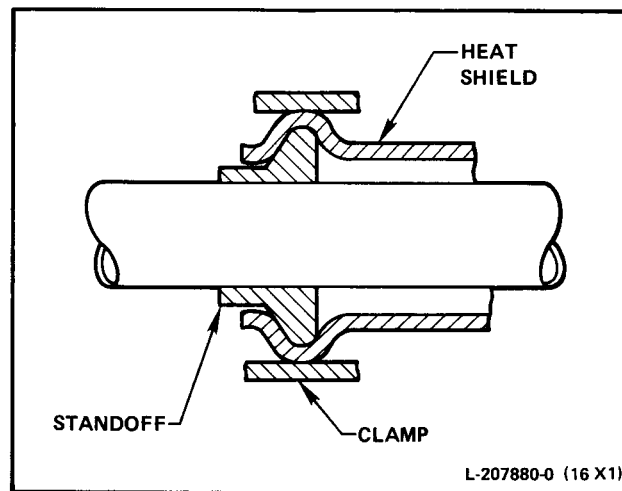


Figure 28. No. 4 Bearing Left Internal Scavenge Tube Assembly - Loose Heat Shield Repair

16. NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE ASSEMBLY - ANTIROTATION PIN HOLE REPAIR.

(See Figures 29 through 32.)



Liquid contamination of heat shield insulation will damage insulation.

- a. Debraze and remove transfer tubes(3, figure 29) and tube connector(2) from tube assembly(1) per paragraph 13. Protect heat shield insulation from liquid contamination.
- b. Prepare and nickel plate transfer tubes and tube assembly per paragraph 13. Bag for reuse.

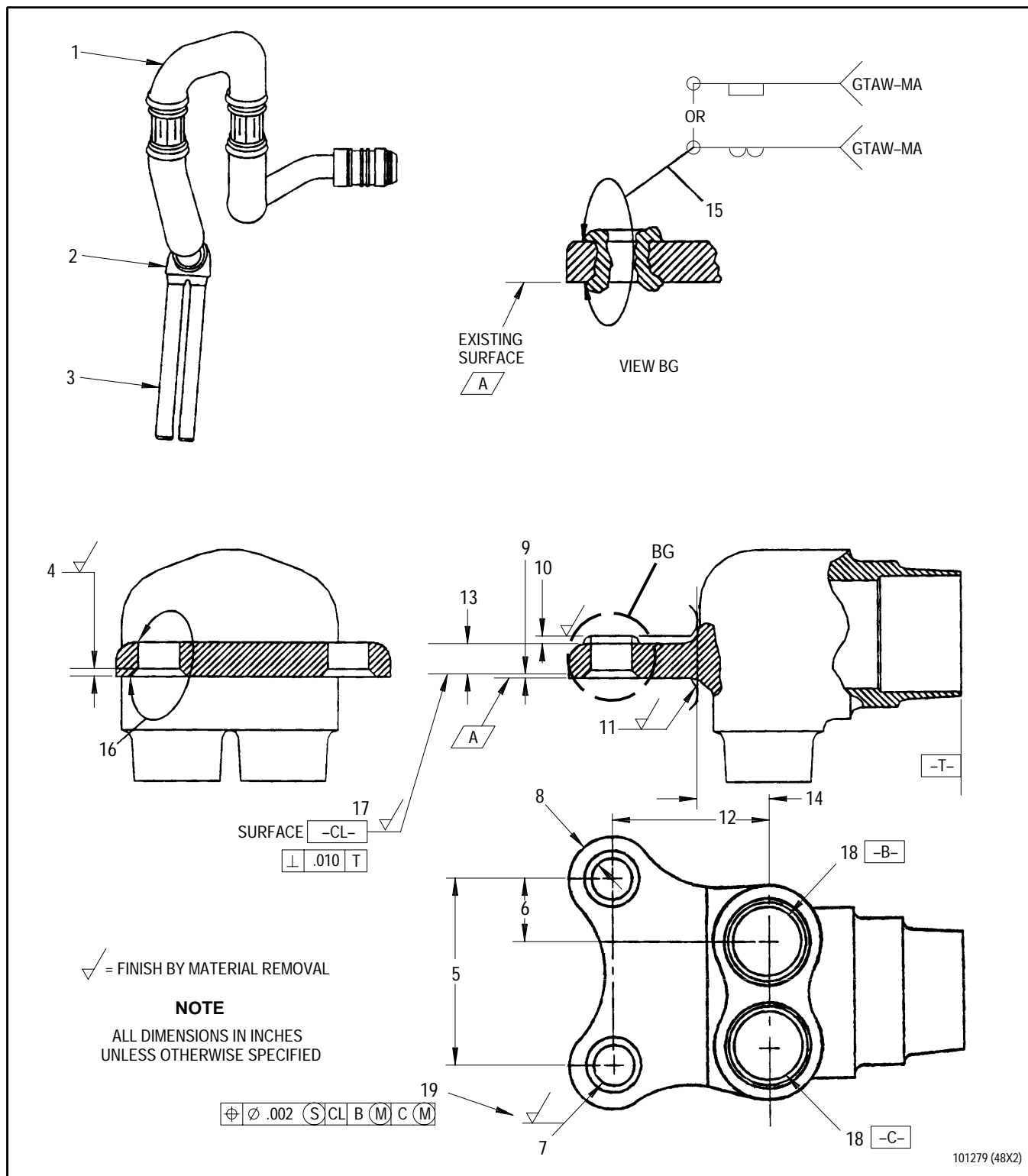
c. Clean tube connector as follows:

- (1) Heat tube connector to 900°F (482°C) for 2 hours to remove oil residue.
- (2) Flush tube connector per SPOP 208. Refer to T.O. 2-1-111.
- (3) Chemically strip entire tube connector. Refer to T.O. 2-1-111, SPOP 305, except do not vapor degrease.

d. Mechanically clean area to be welded.

Legend for figure 29

1. Tube assembly (typical PN 4081460-01)
2. Tube connector (typical PN 4069627)
3. Transfer tube (typical PN 4069628), 2 required
4. Chamfer 0.040 to 0.060 inch by 45°±2°, 2 places
5. 1.200 inches
6. 0.335 inch
7. 0.258 to 0.262 inch diameter, 2 holes
8. 0.125 inch, minimum, 2 places
9. 0.000 to 0.010 inch from Surface A. Remove minimum amount of material.
10. 0.000 to 0.050 inch
11. 0.109 to 0.141 inch, modified radius
12. 1.000 inch
13. 0.200 inch, minimum
14. 0.380 to 0.400 inch
15. Weld per text, 2 places
16. Apply antigalling compound per text, 2 places
17. This surface must be perpendicular within 0.010 inch in relation to Datum -T-.
18. 0.258 inch diameter at Maximum Material Condition, reference.
19. This diameter must be located within true position of 0.002 inch diameter, regardless of feature size, in relation to Datums -CL-, -B-, and -C-. Tolerance applies when Datums -B- and -C- are at Maximum Material Condition.



**Figure 29. No. 4 Bearing Left Internal Scavenge Tube Assembly -
Antirotation Pin Hole Repair**

e. Build up antirotation holes by welding as follows:

- (1) Install tube connector into PWA 71401 fixture. See figure 30.
- (2) Manual gas tungsten arc (TIG) weld using AMS 5680 welding wire. Parent material is AMS 5646. Refer to T.O. 2-1-111.

f. Fluorescent penetrant inspect weld area for cracks only. Refer to T.O. 2-1-111. No cracks allowed.

g. Machine tube connector as follows:

- (1) Install tube connector into PWA 71402 fixture. See figure 31.
- (2) Finish machine weld surface to dimensions(9, 10, and 11, figure 29) as shown.
- (3) Install tube connector into PWA 71403 fixture. See figure 32.
- (4) Machine holes to dimensions shown in figure 29.

h. Fluorescent penetrant inspect for cracks only. Refer to T.O. 2-1-111. No cracks allowed.

i. Heat treat. Refer to T.O. 2-1-111, Cycle 22, except use protective atmosphere.

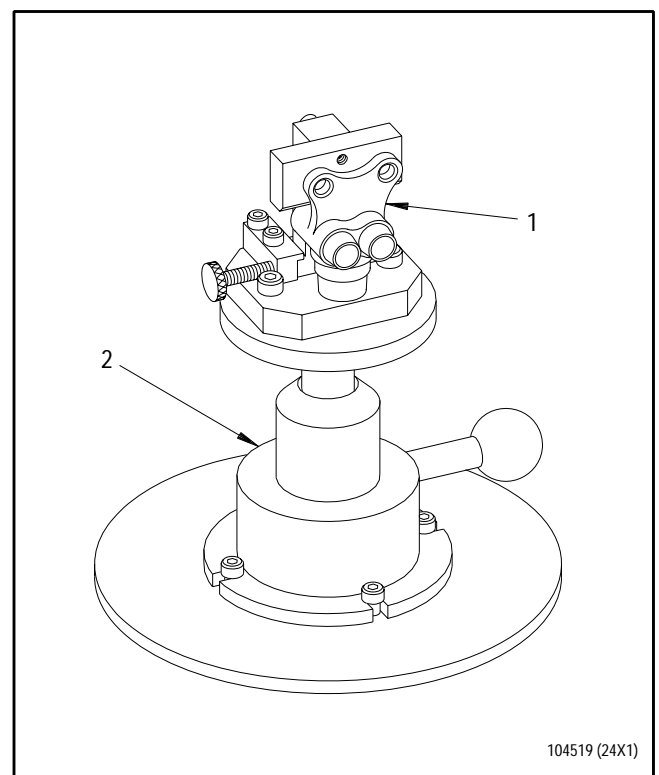
j. Clean and nickel plate connector per paragraph 13.



Liquid contamination of heat shield insulation will damage insulation.

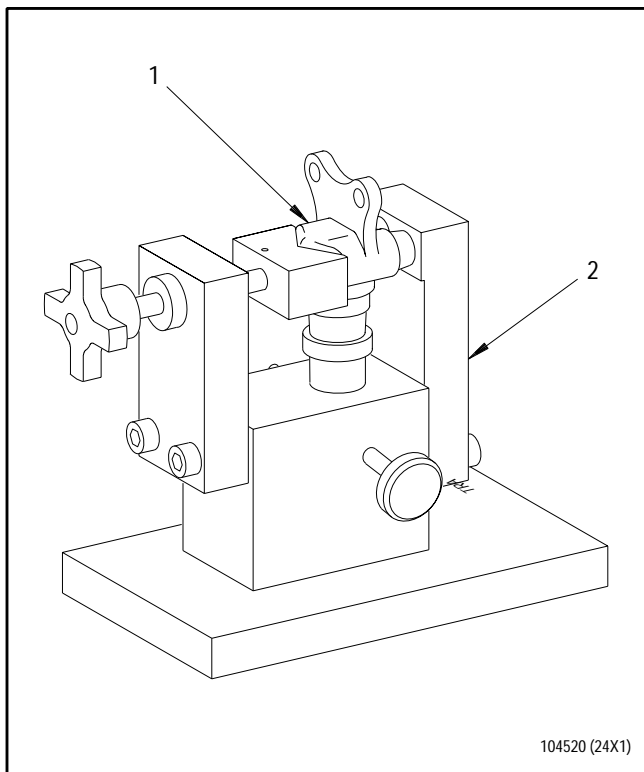
k. Braze transfer tubes, tube connector, and tube assembly per paragraph 13. Protect heat shield insulation from liquid contamination.

l. Apply antigalling compound to area(16, figure 29). Refer to T.O. 2-1-111, SPOP 748.



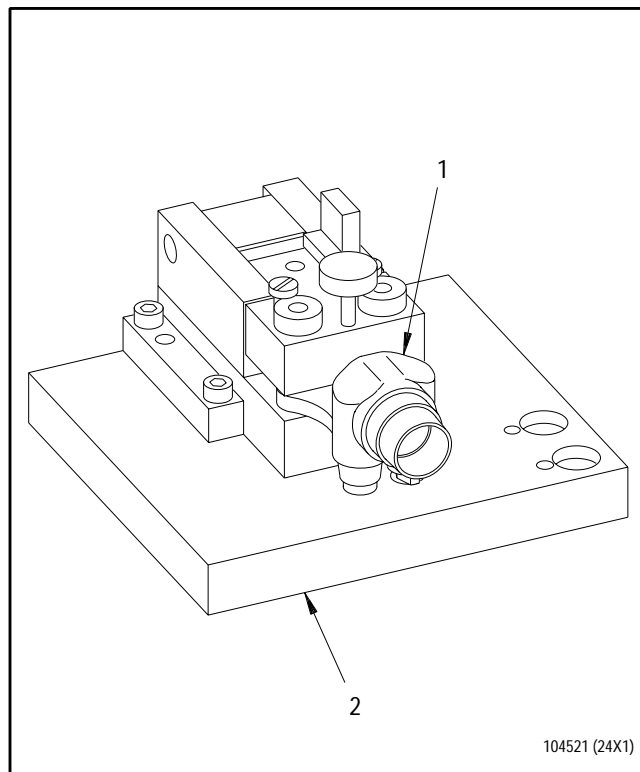
1. Tube connector
2. PWA 71401 fixture

Figure 30. Tube Connector - Installation Into PWA 71401 Fixture



- 1. Tube connector
- 2. PWA 71402 fixture

Figure 31. Tube Connector - Installation Into PWA 71402 Fixture



- 1. Tube connector
- 2. PWA 71403 fixture

Figure 32. Tube Connector - Installation Into PWA 71403 Fixture

WORK PACKAGE**TECHNICAL PROCEDURES****BLADES, COMPRESSOR ROTOR,
FOURTH THROUGH THIRTEENTH STAGE -****REPAIR****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	6 Blank	26	10	26
2	26	7	0	11	19
3	0	8	26	12	29
4 - 5	26	9	0	13 - 14	26

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Qualified Repair Source List (QRSL) - Core Engine Module - - - - -	WP 603 00
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Rotor Assembly, Rear Compressor - Disassembly - - - - -	WP 035 00
Core Engine Module Parts - Cleaning - - - - -	WP 201 00
Blades, Compressor Rotor, Fourth Through Thirteenth Stage and Fourth Through Seventh Stage Blade Locks - Inspection - - - - -	WP 374 00
Blades, Compressor Rotor, Fourth Through Thirteenth Stage and Fourth Through Seventh Stage Blade Locks - Inspection After Volcanic Ash Ingestion - - - - -	SWP 374 01
Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Application of Adhesive Sealant PWA 36056 - - - -	WP 627 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS**Nomenclature****Specification/Vendor Part Number**

COMPOUND, ANTIGALLING (PWA 36545)
SHOT, CAST STEEL

ESNALUBE 382
MIL-S-13165, SAE 70

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 4th through 13th stage compressor rotor blades.

2. FOURTH THROUGH THIRTEENTH STAGE COMPRESSOR ROTOR BLADES - BLEND REPAIR.

(See Figures 1 through 5.)



- Filing, stoning, and polishing of compressor blades shall be done lengthwise to blade and never across it. This to ensure that no scratches, however minute, run across blade edge. Elimination of damage in blade shall be performed by local hand or small rotary file blending of damaged area only. Surface finish shall be comparable to a new blade. Do not grind.
- Any damage on inner half of airfoil shall be treated with extreme caution.

NOTE

- Polishing is permitted on all surfaces of rear compressor blades, provided above cautions are observed and coatings are not removed. Polishing is defined as no metal removal and no break in demarcation line.
 - Do not attempt to remove damage by straightening.
 - Fourth through seventh stage blades are titanium alloy; eighth through thirteenth stage blades are nickel alloy.
- a. Blend limits are as follows:
- (1) Maximum of 2 blend repairs permitted per blade.
 - (2) Maximum of 30% of total number of blades in any stage may be blended except nicks and dents which do not exceed amounts specified in WP 374 00 and SWP 374 01 are acceptable in any quantity.

- (3) Damage on blade leading and trailing edge shall be separated by amounts specified in WP 374 00 and SWP 374 01.

- (4) Well-rounded damage to leading and trailing edges and airfoil surface which can be seen on opposite side of blade is acceptable provided damage is in outer half of blade and indentations do not exceed amounts specified in WP 374 00 and SWP 374 01.

- a1. Use hand or small rotary file to blend all damage per limits of referenced figures and the following:

- (1) Length of blends shall be a minimum of four times depth of blend and may extend at full depth into blade tip.
- (2) All blends shall be separated by at least 1/4 inch.
- (3) All surfaces shall be smooth and repairs well-blended.
- (4) Do not reduce airfoil cross-sectional width while blending; round off edges of blended surface, but do not extend beyond maximum limits.

- b. Buffing of large areas of airfoil to remove contamination is acceptable provided:

- (1) It is restricted to outer half of airfoil only.
- (2) Stainless steel or chrome base polishing rouge is used.

Figure 1. Deleted.

Figure 2. Deleted.

Figure 2 deleted from page 6.

- c. After blending and buffing, inspect airfoil thickness at tips of blade using a pin micrometer. (See figures 3 and 4.) Sharp edges shall be rounded up to these minimum values.



When inspecting a disk and blade assembly, do not allow fluorescent penetrant to contact blade root sealant.

- d. Fluorescent penetrant inspect all blend repaired areas. If blades are inspected while still in disk, carefully apply penetrant locally. Refer to T.O. 2J-F100-9. No cracks allowed.

- e. If any fluorescent penetrant contacts blade root sealant, remove, clean, and seal disk and blade assembly. Refer to T.O. 2J-F100-53-7, WP 035 00, WP 201 00, and WP 627 00.

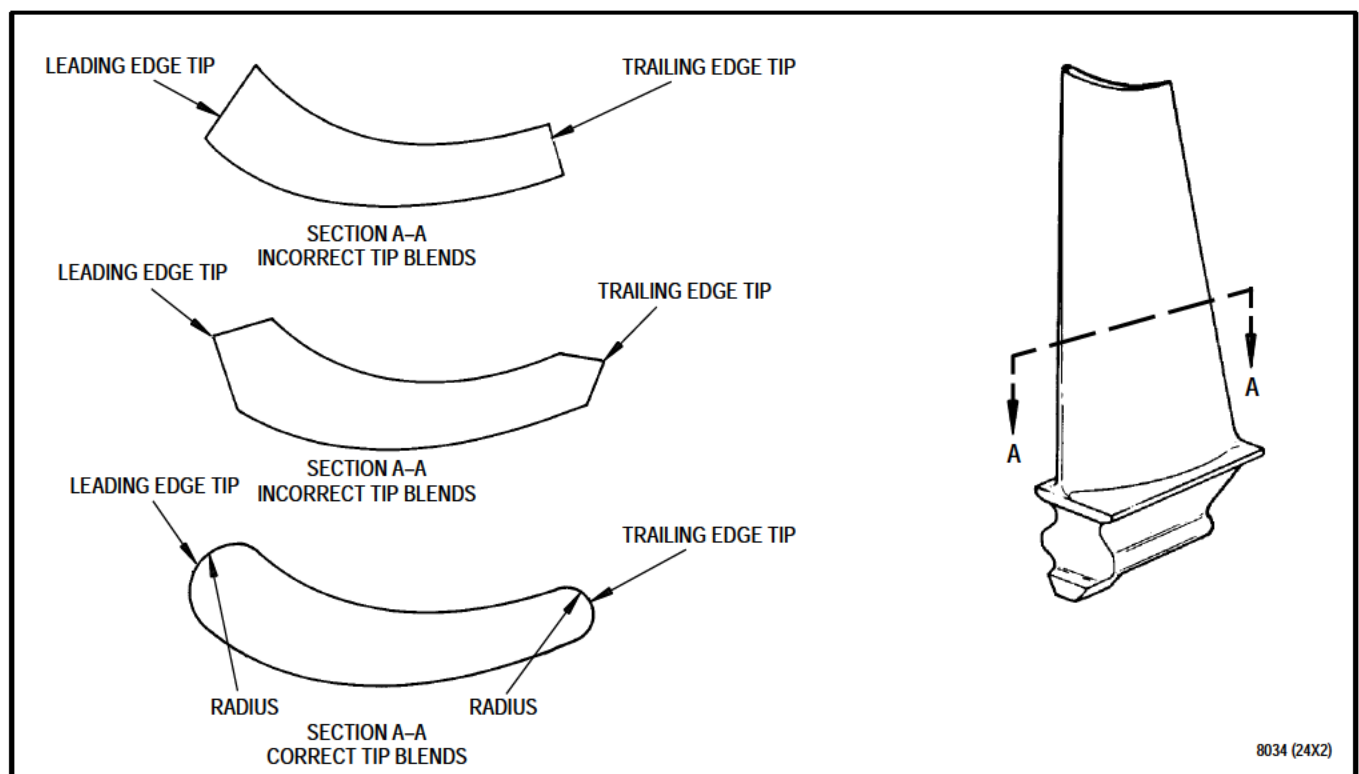


Figure 3. Blending Leading and Trailing Edge Tips

f. Shotpeen blended areas as follows:

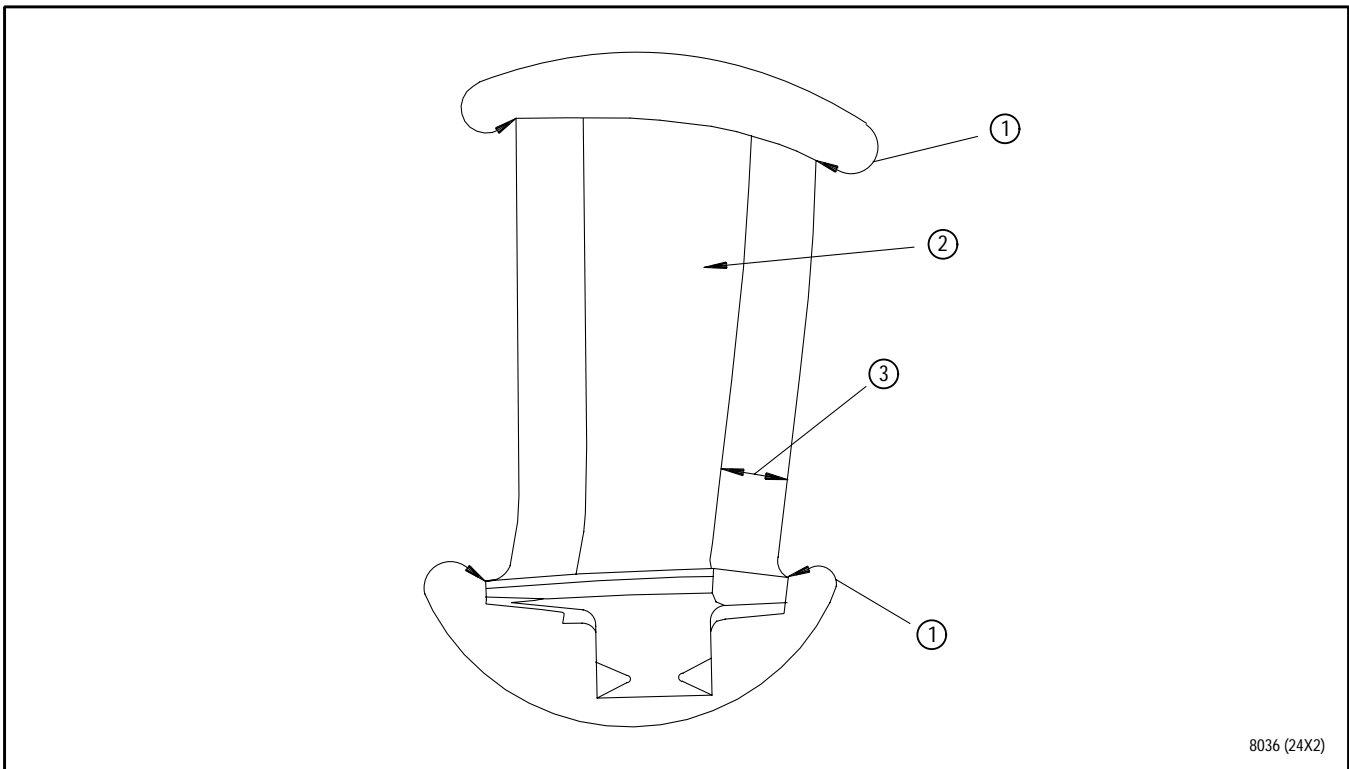
- (1) To intensity of 8N for 4th through 7th stages using SAE 70 cast steel shot.
- (2) To intensity of 10N for 8th through 13th stages using ceramic bead blast.
- (3) Minimum intensity waived in area(3, figure 4), but complete coverage required so that leading and trailing edge are not distorted.

(4) No masking on airfoil.

(5) Deleted.

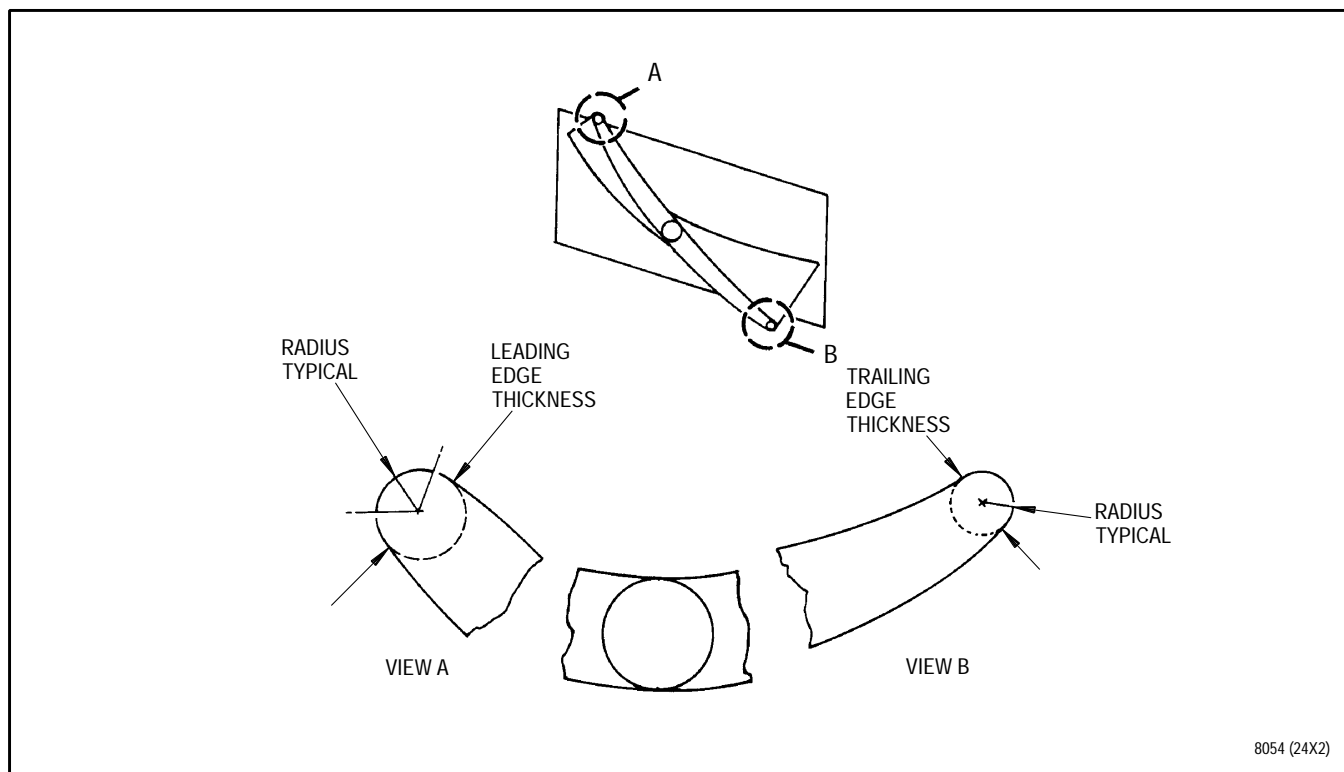
(6) Do not shotpeen blade tips or root.

(7) Refer to T.O. 2-1-111, SPOP 501, for shotpeening instructions.



1. No shotpeen allowed
2. Typical airfoil 4th through 13th stage
3. 0.200 inch maximum along profile both sides of airfoil leading edge and trailing edge

Figure 4. Shotpeening Fourth Through Thirteenth Stage Blades



8054 (24X2)

Stage	Minimum Leading Edge Thickness (Inch)	Minimum Trailing Edge Thickness (Inch)
4	0.007	0.006
5	0.007	0.006
6	0.007	0.006
7	0.007	0.006
8	0.007	0.006
9	0.007	0.005
10	0.007	0.005
11	0.007	0.005
12	0.007	0.005
13	0.007	0.005

Figure 5. Fourth through Thirteenth Stage Compressor Rotor Blades - Airfoil Minimum Thickness

**3. FOURTH THROUGH THIRTEENTH STAGE
COMPRESSOR ROTOR BLADES - ANTIGALLING
COMPOUND APPLICATION.**

(See Figure 6.)

- a. Clean blade root per WP 201 00.
- b. Apply PWA 36545-3 antigalling compound. (See figure 6.)
Surface preparation not required. Refer to
T.O. 2-1-111, SPOP 748.

Legend for figure 6

- 1. Apply antigalling compound per text.
- 2. Application of antigalling compound optional and may be incomplete
- 3. 0.050 inch maximum

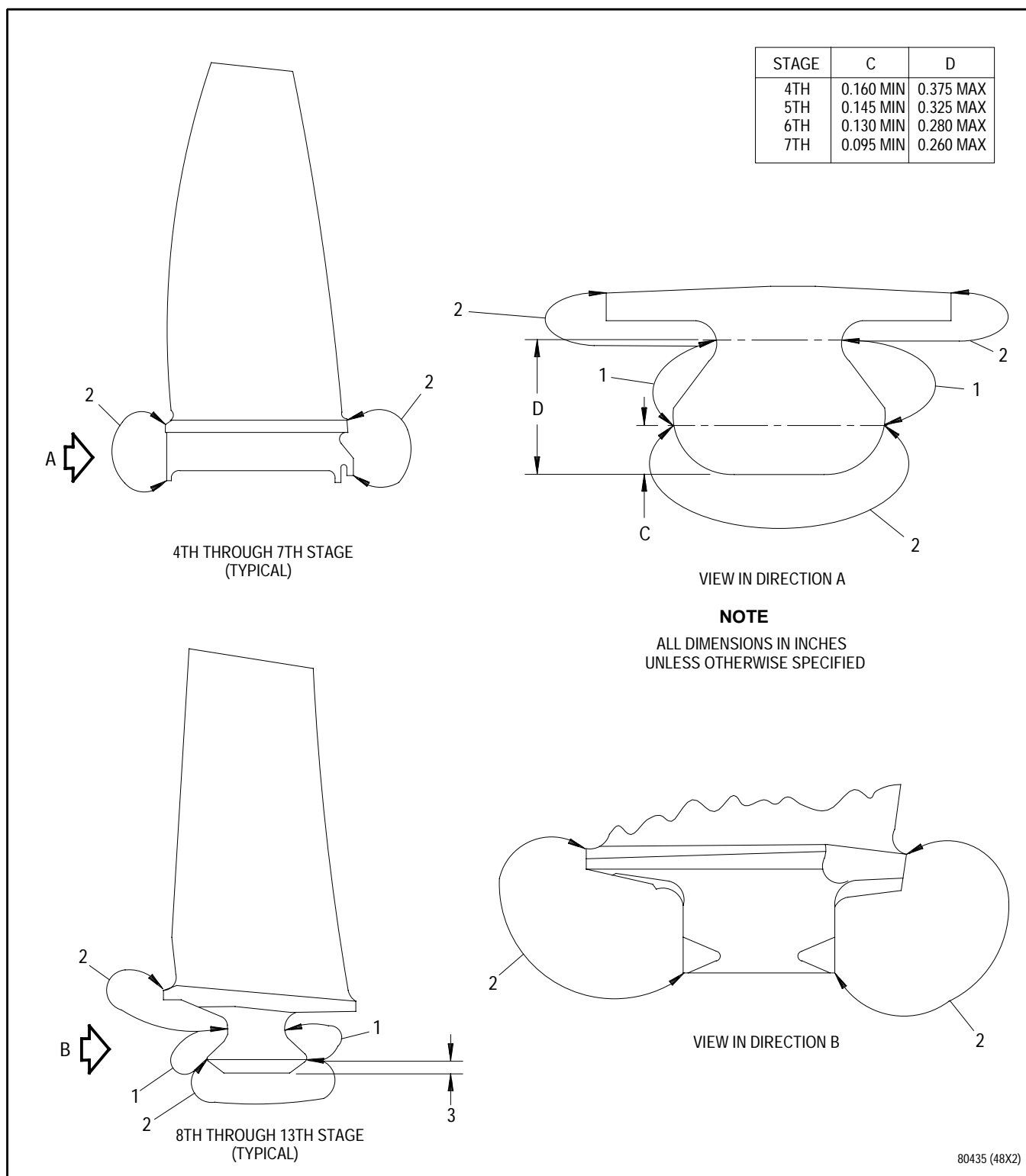


Figure 6. Fourth Through Thirteenth Stage Compressor Rotor Blades - Antigalling Compound Application

**4. FOURTH THROUGH SEVENTH STAGE
COMPRESSOR ROTOR BLADE ROOT - COATING
REPAIR**

(See Figure 7.)

- a. Mask blade per SPOP 36 to protect blade tip coating. Refer to T.O. 2-1-111.
- b. Strip existing coating from blade root per SPOP 710, mask as required. See figure 7. Refer to T.O. 2-1-111.
- c. Apply PWA 53-69 plasma coat 0.0015 to 0.003 inch thick to blade root. See figure 7. Refer to T.O. 2-1-111.
- d. Remove masking.
- e. Apply PWA 36545 antigalling compound to blade root per paragraph 3.

**5. EIGHTH THROUGH THIRTEENTH STAGE
COMPRESSOR ROTOR BLADES WITH CUBIC
BORON NITRIDE/NICKEL COATED (CBN) TIPS -
STRIP/RECOAT DAMAGED COATING**

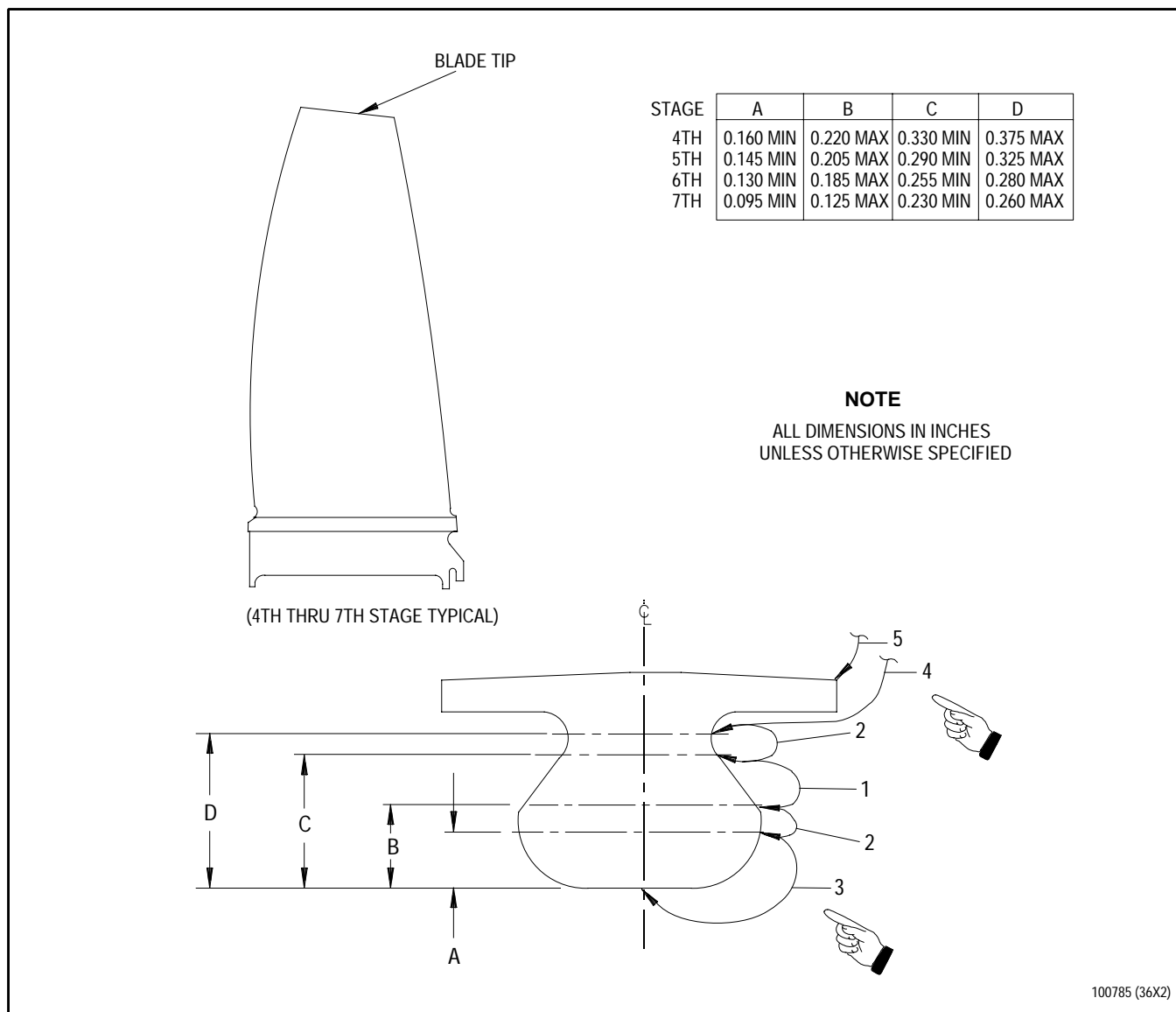
NOTE

Vendor repair procedures listed in QRSL shall be kept current by incorporating all T.O. changes that affect the repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPF of need for revision. SA-ALC/LPF will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in QRSL.

- a. This is a proprietary repair. Proprietary repairs may be performed only by qualified repair sources identified in Qualified Repair Source List (QRSL). Refer to T.O. 2J-F100-53-1, WP 603 00. Typical blade part numbers for this repair are:

4082208-01 through 04
4081609-01 through 04
4082210-01 through 04
4081611-01 through 04
4082212-01 through 04
4081613-01 through 04

- b. Deleted.



1. Coat both sides per text.
2. Coating overspray permitted but must taper out smoothly on both sides in these areas.
3. Grit blast overspray is permissible, both sides.
4. Grit blast overspray is prohibited for entire blade above dimension D.
5. Mask entire airfoil and platform prior to vapor honing or grit blasting during stripping operation (Refer to T.O. 2-1-111, SPOP 710).

Figure 7. Fourth Through Seventh Stage Compressor Rotor Blades - Coating Repair

6. FOURTH THROUGH SEVENTH STAGE COMPRESSOR ROTOR BLADES WITH CUBIC BORON NITRIDE/NICKEL (CBN) COATED TIPS - STRIP AND RECOAT DAMAGED COATING.

- a. Repair is proprietary. Refer to T.O. 2J-F100-53-1, WP 603 00, for Qualified Repair Source List (QRSL) by task code.

NOTE

Vendor repair procedures listed in the QRS� shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in the QRS�.

EEBBB5AAA - JGDFGZB	4th stage compressor blade tip coating wear recoat
EEBBB5AC - JGDFGZD	5th stage compressor blade tip coating wear recoat
EEBBB5AE - JGDFGZD	6th stage compressor blade tip coating wear recoat
EEBBB5AG - JGDFGZD	7th stage compressor blade tip coating wear recoat

7. FOURTH THROUGH SEVENTH STAGE COMPRESSOR ROTOR BLADES WITH ALUMINUM OXIDE (Al₂O₃) COATED TIPS - STRIP AND RECOAT DAMAGED COATING.

- a. Repair is proprietary. Refer to T.O. 2J-F100-53-1, WP 603 00, for Qualified Repair Source List (QRS�) by task code.

NOTE

Vendor repair procedures listed in the QRS� shall be kept current by incorporating all T.O. changes that affect repaired part. If vendor procedure requires revision to comply with T.O. changes, or if vendor wishes to revise a procedure, then vendor must notify SA-ALC/LPFE of need for revision. SA-ALC/LPFE will authorize Pratt & Whitney to coordinate directly with vendor for review and update of procedure/revision listed in the QRS�.

EEBBB5AAA - JGDFGZB	4th stage compressor blade tip coating wear recoat
EEBBB5AC - JGDFGZD	5th stage compressor blade tip coating wear recoat
EEBBB5AE - JGDFGZD	6th stage compressor blade tip coating wear recoat
EEBBB5AG - JGDFGZD	7th stage compressor blade tip coating wear recoat

SUBORDINATE WORK PACKAGE

TECHNICAL PROCEDURES

BLADES, COMPRESSOR ROTOR (FOURTH THROUGH THIRTEENTH STAGE) -

**REPAIR
AFTER VOLCANIC ASH INGESTION**

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					

REFERENCE MATERIAL REQUIRED

Title	Number
Nondestructive Inspection - - - - -	T.O. 2J-F100-9
Engine - - - - -	T.O. 2J-F100-53-7
Core Engine Module-Final Assembly (Front) - - - - -	WP 701 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This subordinate work package contains instructions for repair of 4th through 13th stage compressor rotor blades after volcanic ash ingestion.

2. FOURTH THROUGH THIRTEENTH STAGE COMPRESSOR ROTOR BLADES - BLEND REPAIR.

(See Figures 1 through 4.)



- Filing, stoning, and polishing of compressor blades shall be done lengthwise to blade and never across it. This to ensure that no scratches, however minute, run across blade edge. Elimination of damage in blade shall be performed by local hand or small rotary file blending of damaged area only. Surface finish shall be comparable to a new blade. Do not grind.
- Any damage on inner half of airfoil shall be treated with extreme caution to prevent blade failure.

NOTE





- Polishing is permitted on all surfaces of rear compressor blades, provided above cautions are observed and coatings are not removed. Polishing is defined as no metal removal and no break in demarcation line.
 - Do not attempt to remove damage by straightening.
 - Fourth through seventh stage blades are titanium alloy; eighth through thirteenth stage blades are nickel alloy.
- a. Use hand or small rotary file to blend all damage per limits of referenced figures and the following:
- (1) Length of blends shall be a minimum of four times depth of blend and may extend at full depth into blade tip.

- (2) All blends shall be separated by at least 0.250 inch.
 - (3) All surfaces shall be smooth and repairs well-blended.
 - (4) Do not reduce airfoil cross-sectional width while blending; round off edges of blended surface, but do not extend beyond maximum limits.
- b. Buffing of large areas of airfoil to remove contamination is acceptable provided:
- (1) It is restricted to outer half of airfoil only.
 - (2) Stainless steel or chrome base polishing rouge is used.

BLEND LIMITS

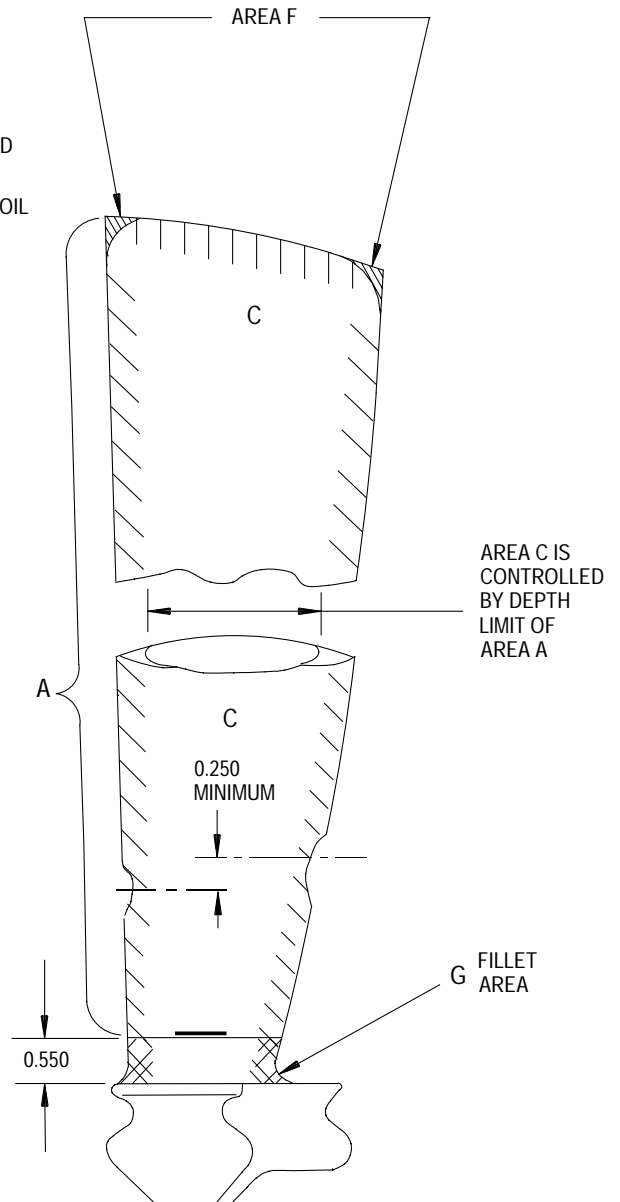
- MAXIMUM OF 2 BLEND REPAIRS ARE PERMITTED PER BLADE.
- MAXIMUM OF 30 PERCENT OF TOTAL NUMBER OF BLADES IN ANY STAGE MAY BE BLENDED EXCEPT NICKS AND DENTS WHICH DO NOT EXCEED 0.003 DEEP ARE ACCEPTABLE IN ANY QUANTITY.
- DAMAGE ON BLADE LEADING AND TRAILING EDGE SHALL BE SEPARATED AT LEAST 0.250 RADIALLY.
- WELL-ROUNDED DAMAGE TO LEADING AND TRAILING EDGES AND AIRFOIL SURFACE WHICH CAN BE SEEN ON OPPOSITE SIDE OF BLADE IS ACCEPTABLE PROVIDED DAMAGE IS IN OUTER HALF OF BLADE AND INDENTATIONS DO NOT EXCEED 0.010.

**MAXIMUM ALLOWABLE
BLENDED NICK LIMITS (AFTER BLENDS)**

BLADE AREA		STAGE 4
	A	0.050 DEPTH
	C	0.010 ROUND BOTTOM
	F	0.250 RADIUS
	G	0.005 DEPTH


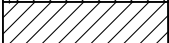
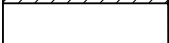


NOTE

- CIRCULAR ROUND BOTTOM DENTS WHICH DO NOT EXCEED 0.005 INCH ARE ACCEPTABLE IN ANY QUANTITY WITHOUT BLENDING IN AREAS A, C, AND G.
- ALL DIMENSIONS IN INCHES



8030 (48X2)

Figure 1. Fourth Stage Compressor Blade - Blend Limits

INCH DEPTH MAXIMUM FOR BLENDED NICKS (AFTER BLENDING)				
BLADE AREA		STAGES		
		5	6 AND 7	8 THROUGH 13
	A	0.050 D	0.050 D	0.030 D
	B	0.100 D	0.050 D	0.050 D
	C	0.010 RB	0.010 RB	0.005 RB
	F	0.250 R	0.250 R	0.250 R
	G	0.005 D	0.005 D	0.005 D

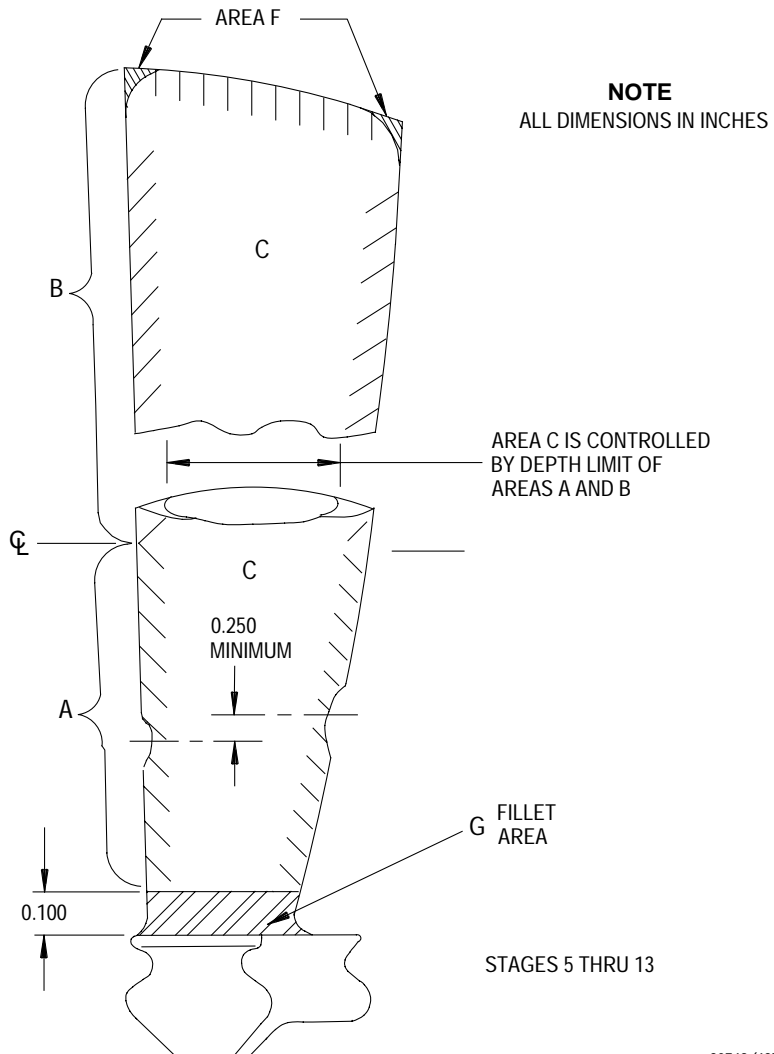
R = RADIUS

D = DEPTH

RB = ROUND BOTTOM

BLEND LIMITS

- MAXIMUM OF TWO BLEND REPAIRS PERMITTED PER BLADE.
- MAXIMUM OF 30 PERCENT OF TOTAL NUMBER OF BLADES IN ANY STAGE MAY BE BLENDED EXCEPT NICKS AND DENTS WHICH DO NOT EXCEED 0.003 DEEP ARE ACCEPTABLE IN ANY QUANTITY.
- DAMAGE ON BLADE LEADING AND TRAILING EDGE MUST BE SEPARATED AT LEAST 0.250 RADIALLY.
- WELL-ROUNDED DAMAGE TO LEADING AND TRAILING EDGES AND AIRFOIL SURFACE WHICH CAN BE SEEN ON OPPOSITE SIDE OF BLADE IS ACCEPTABLE PROVIDED DAMAGE IS IN OUTER HALF OF BLADE AND INDENTATIONS DO NOT EXCEED 0.010.



20749 (48X2)

Figure 2. Fifth Through Thirteenth Stage Compressor Blades - Blend Limits

- c. After blending and buffing, inspect airfoil thickness at tips of blade using a pin micrometer. (See figures 3 and 4.) Sharp edges shall be rounded up to these minimum values.



When inspecting a disk and blade assembly, do not allow fluorescent penetrant to contact blade root sealant.

- e. If any fluorescent penetrant contacts blade root sealant, remove, clean, and seal disk and blade assembly. Refer to T.O. 2J-F100-53-7, WP 701 00.

- d. Fluorescent penetrant inspect all blend repaired areas. If blades are inspected while still in disk, carefully apply penetrant locally. Refer to T.O. 2J-F100-9. No cracks allowed.

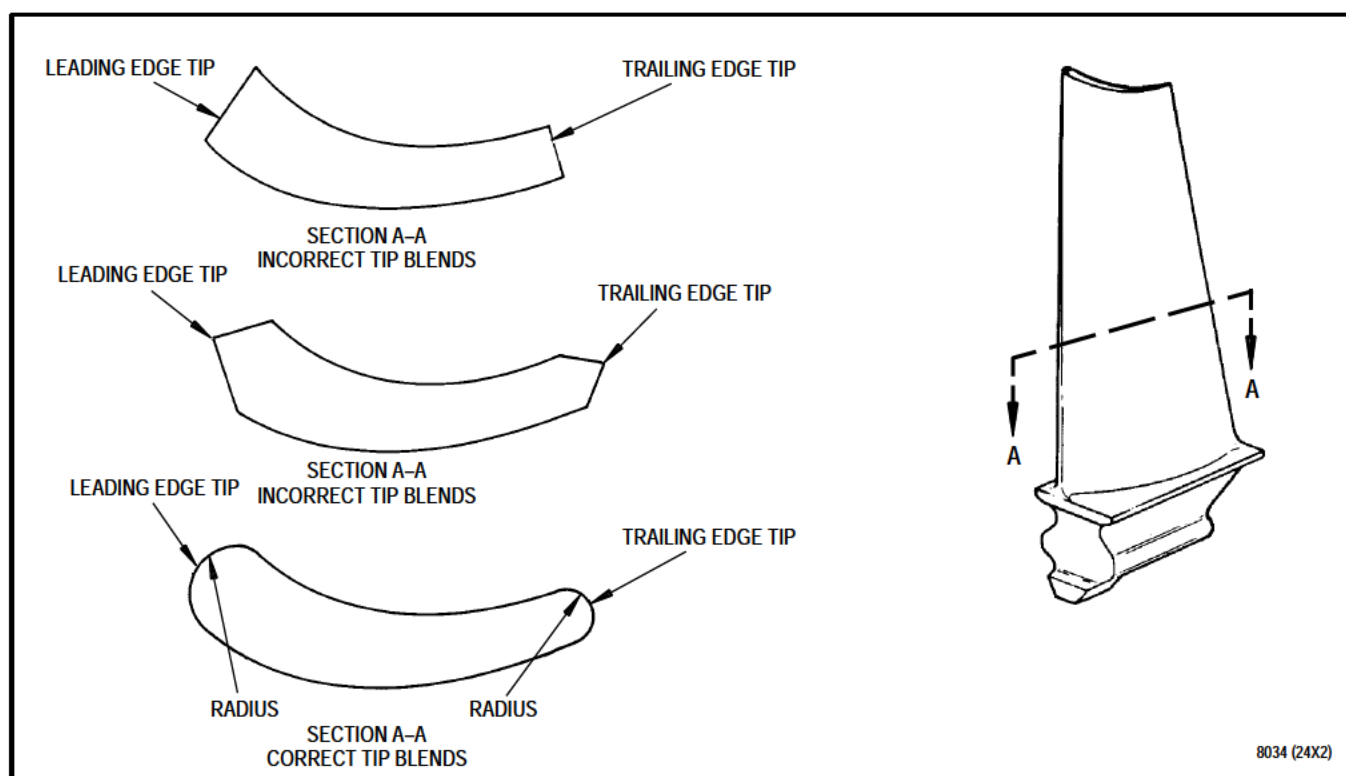
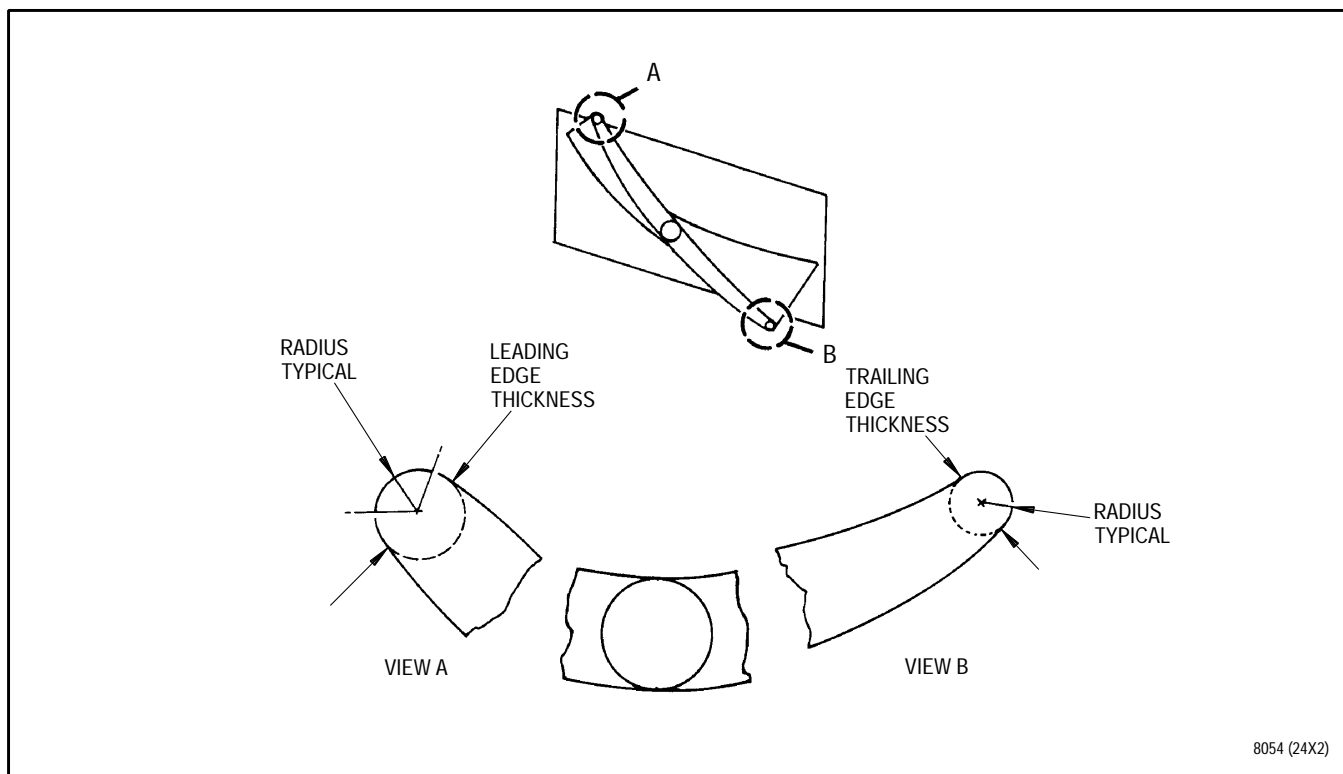


Figure 3. Blending Leading and Trailing Edge Tips



Stage	Minimum Leading Edge Thickness (Inch)	Minimum Trailing Edge Thickness (Inch)
4	0.007	0.006
5	0.007	0.006
6	0.007	0.006
7	0.007	0.006
8	0.007	0.006
9	0.007	0.005
10	0.007	0.005
11	0.007	0.005
12	0.007	0.005
13	0.007	0.005

Figure 4. Fourth through Thirteenth Stage Compressor Rotor Blades - Airfoil Minimum Thickness

WORK PACKAGE

TECHNICAL PROCEDURES

VANES, COMPRESSOR STATOR, FOURTH, FIFTH, AND SIXTH STAGE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4 - 5	29	6	6
2 - 3	0				

REFERENCE MATERIAL REQUIRED

Title

Number

Nondestructive Inspection - - - - - T.O. 2J-F100-9

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature

Specification/Vendor Part Number

Compound, corrosion removing

MIL-C-14460

Type I

Marker, temporary

Marks-A-Lot

Cado Marker

or

Pencil (crayon), silver,
metalmarking (hard) (PMC 4059-7)

Colorbrite No. 2101

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 4th, 5th, and 6th stage compressor stator vanes.

2. FOURTH, FIFTH, AND SIXTH STAGE COMPRESSOR STATOR VANES - BLENDING.

(See Figure 1.)

NOTE

Limits in figure 1 apply to isolated damage areas and shall not be used as authority for removal of material all across leading or trailing edge as might be done in single machine cut.

- a. Minor damage shall be repaired by blending, using fine files and/or stones. Minimum amount of material only shall be removed and surface finish shall compare to that of a new part. Maximum reparable limits in figure 1 must be maintained.

Legend for figure 1

Index	Area	Blend Limits (Maximum after blending)
1	Fillet radius	0.005 inch depth
2	Leading/trailing edge	<p>a. Maximum blend depth 0.050 inch. Multiple blends allowed with sum of blend lengths equal to 0.500 inch maximum. Blend length to depth ratio equals four minimum. Separation between blends equals 0.250 inch minimum.</p> <p>b. Any amount of blends to 0.015 inch depth allowable on all vanes. Do not consider these blends as part of the 0.500 inch maximum.</p>
3	Concave surface	0.010 inch depth
4	Convex surface	0.010 inch depth
5	Transition radius	No blending permitted.
6	Airfoil corners	0.125 inch radius

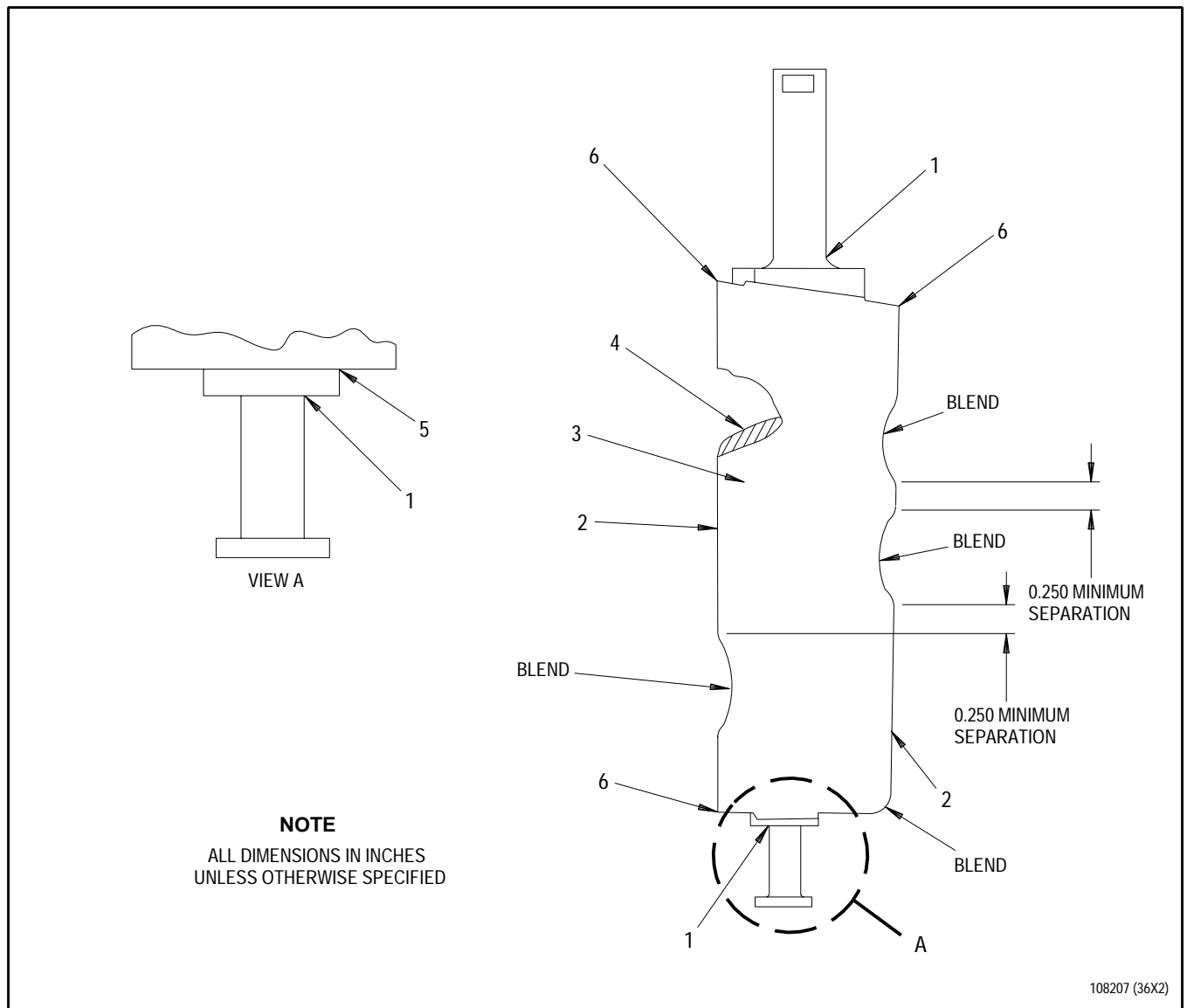


Figure 1. Fourth, Fifth, and Sixth Stage Compressor Stator Vanes Blend Limits

- b. Fluorescent penetrant inspect all blend repaired damage and acceptable round-bottom dents for cracks. Refer to T.O. 2J-F100-9. No cracks allowed.

**3. FOURTH, FIFTH, AND SIXTH STAGE
COMPRESSOR STATOR VANES - VIBRATORY
CLEANING PROCESS.**

NOTE

This process shall be accomplished in Hutson Model H2025 vibratory machine or equivalent.

a. Preparation of solution:

- (1) Fill tank of machine with known quantity, in gallons, of water.
- (2) Add MIL-C-14460 Type I corrosion removing compound to water in concentration of two pounds per gallon of water.

- (3) Add cleaning media which shall consist of 50% polyester resin with 50% virgin aluminum oxide, either cone or pyramid in shape, in concentration of eight cubic feet per gallon of water.

- b. Load vanes in ratio of 1/3 vanes to 2/3 media.
- c. Cycle vanes for maximum cycle time of one hour.
- d. Mark vanes with total blend depth per paragraph 2.

WORK PACKAGE

TECHNICAL PROCEDURES

INSERT, SCREW THREAD (IGNITER PLUG BOSS INSERT) -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4					0

T.O. 2J-F100-53-7

WP 478 00

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Compound, Antigalling (PWA 36545) Application	
(SPOP 748) - - - - -	SWP 098 07

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Compound, antigalling	Kaylube No. 3
(PWA 36545)	

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of screw thread insert (igniter plug boss insert).

2. SCREW THREAD INSERT (IGNITER PLUG BOSS INSERT) - THREAD REPAIR.

(See Figure 1.)

- a. Remove pickup from threads with fine stone.

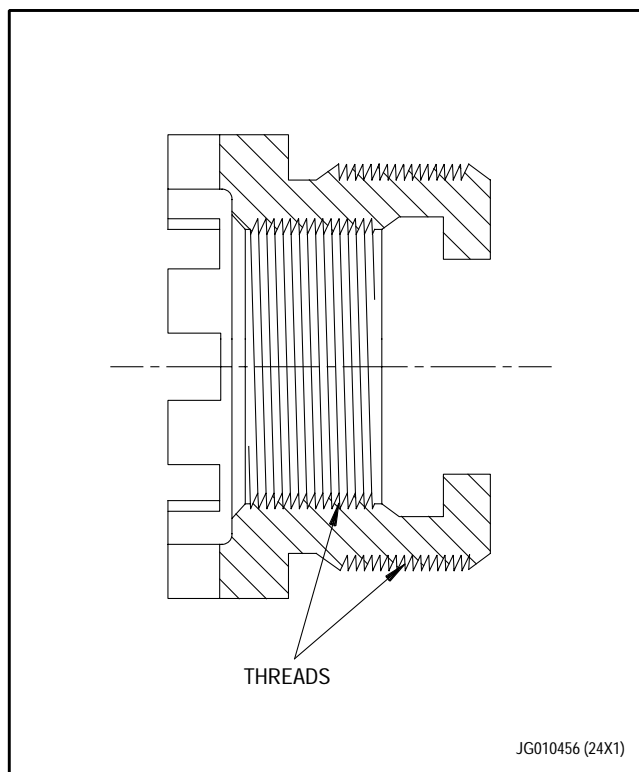
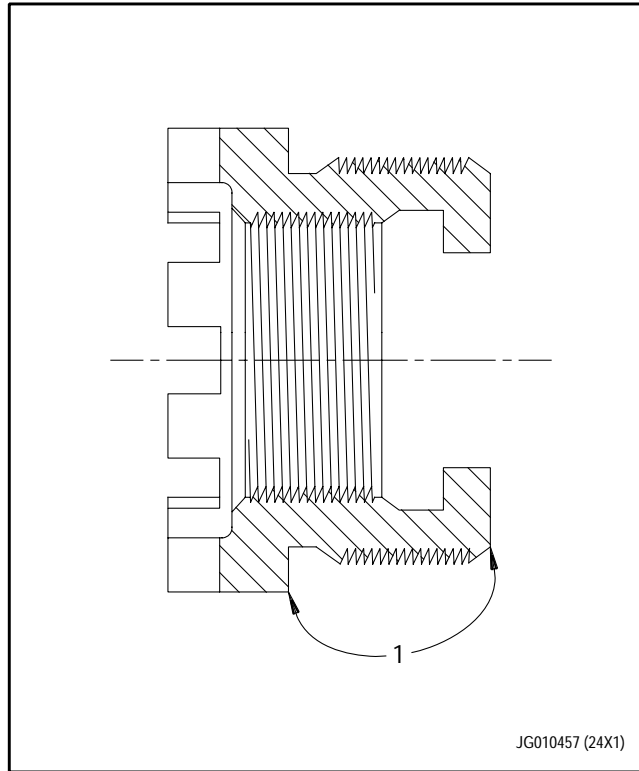


Figure 1. Screw Thread Insert (Igniter Plug Boss Insert) - Thread Repair

3. SCREW THREAD INSERT (IGNITER PLUG BOSS INSERT) - ANTIGALLING COMPOUND APPLICATION.

(See Figure 2.)

- a. Apply Kaylube No. 3 antigalling compound to area(1). Refer to T.O. 2J-F100-53-1, WP 098 07. Surface preparation is not required.



1. Apply antigalling compound per text.

Figure 2. Screw Thread Insert (Igniter Plug Boss Insert) - Antigalling Compound Application

WORK PACKAGE

TECHNICAL PROCEDURES

BAFFLE, GEARBOX -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3		1			
4 Blank		0			

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

This work package contains instructions for repair of the gearbox baffle.

2. BAFFLE, GEARBOX - BLEND REPAIR.

Blend up to 0.010 inch deep to remove scratches and nicks. No sharp corners allowed.

3. BAFFLE, GEARBOX - DENT REPAIR.

- a. Using rawhide or plastic mallet, straighten dent to conform as close as possible to original contour.

- b. Stress relieve baffle at 1175° to 1225°F (635° to 663°C) for 2 hours. Air cool.
- c. Visually inspect spotwelds. No cracks or separation permitted.

WORK PACKAGE

TECHNICAL PROCEDURES

TUBE ASSEMBLY, COMPRESSOR BLEED -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 4		25			

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts By Solvent Cleaning - - - - -	SPOP 208

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

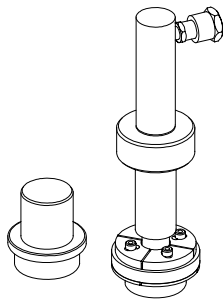
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
SLEEVE	4069349	1

APPLICABLE SUPPORT EQUIPMENT

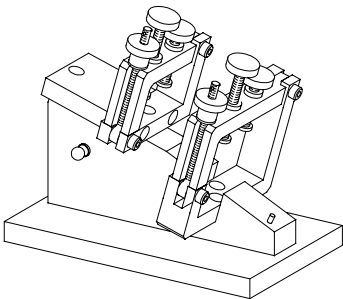
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMPRESSOR BLEED TUBE ASSEMBLY - SLEEVE REPLACEMENT	
	FIXTURE, HOLDING, COMPRESSOR BLEED TUBE (229) - - - -	PWA 57903
	FIXTURE, REMOVE/INSTALL, SEALING SLEEVE INTO COMPRESSOR BLEED TUBE - - - - -	PWA 57901

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57901 -C

Figure T1. PWA 57901 FIXTURE



PWA 57903 -C

Figure T2. PWA 57903 FIXTURE

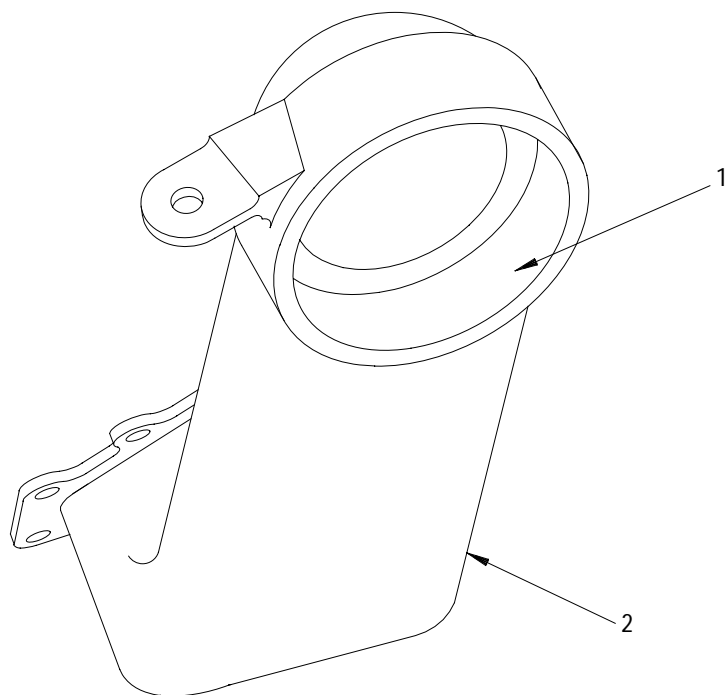
1. INTRODUCTION.

- a. This work package contains instructions for repair of compressor bleed tube assembly.

2. COMPRESSOR BLEED TUBE ASSEMBLY - SLEEVE REPLACEMENT.

(See Figure 1.)

- a. Remove unserviceable sleeve.
Use PWA 57903 holding fixture and PWA 57901 pusher/puller.
See figure 1.
- b. Locally clean sleeve area per SPOP 208, Method A. Refer to T.O. 2-1-111.
- c. Install replacement sleeve. Use PWA 57903 holding fixture and PWA 57901 pusher/puller.



97863 (36X2)

1. Sleeve

2. Tube

Figure 1. Compressor Bleed Tube Assembly - Sleeve Replacement

WORK PACKAGE

TECHNICAL PROCEDURES

DUCT SEGMENTS - COMPRESSOR, FOURTH, FIFTH,
SIXTH AND SEVENTH STAGE -

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	29	6 Blank	29	7 - 26 Deleted	29

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Qualified Repair Source List (QRSL) - - - - -	WP 600 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
PAINT, ALUMINUM (PWA 830-S)	-

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for repair of 4th through 7th stage compressor duct segments.

**2. FOURTH THROUGH SEVENTH STAGE
COMPRESSOR DUCT SEGMENTS - REMOVAL
AND APPLICATION OF PWA 279-1 ABRADABLE.**



Failure to use an approved source for this repair may result in a nonserviceable part.

NOTE

This repair is a source demonstration repair. It is recommended repairable parts be sent to an approved source for repair. An approved source list and information on becoming a qualified source can be obtained by contacting the cognizant USAF F100 Engineering Source Authority at the address listed in T.O. 2J-F100-53-1, WP 600 00.

**3. FOURTH THROUGH SEVENTH STAGE
COMPRESSOR DUCT SEGMENTS - STRIP AND
APPLICATION OF ANTIGALLING COMPOUND
AND ALUMINUM PAINT.**

(See Figure 1.)

- a. Strip PWA 830-S aluminum paint and antigalling compound. Refer to T.O. 2-1-111, SPOP 203. Complete removal of paint is required.
- b. Complete repair as required.
- c. Mask identification marking(3), as required.
- d. Apply PWA 830-S aluminum paint, 0.0003 to 0.0015 inch thick in area(1). Other areas are optional and may be incomplete unless otherwise specified. Refer to T.O. 2-1-111.
- e. Apply PWA 36545-3 antigalling compound in area(2). Other areas are optional and may be incomplete unless otherwise specified. Refer to T.O. 2-1-111, SPOP 748.

Legend for figure 1

- 1. Apply aluminum paint per text.
- 2. Apply antigalling compound per text.
- 3. Identification marking area
- 4. 0.080 inch
- 5. No paint or treat area
- 6. Aluminum paint thickness waived in this area.
Requires visual coverage only.
- 7. 0.120 inch

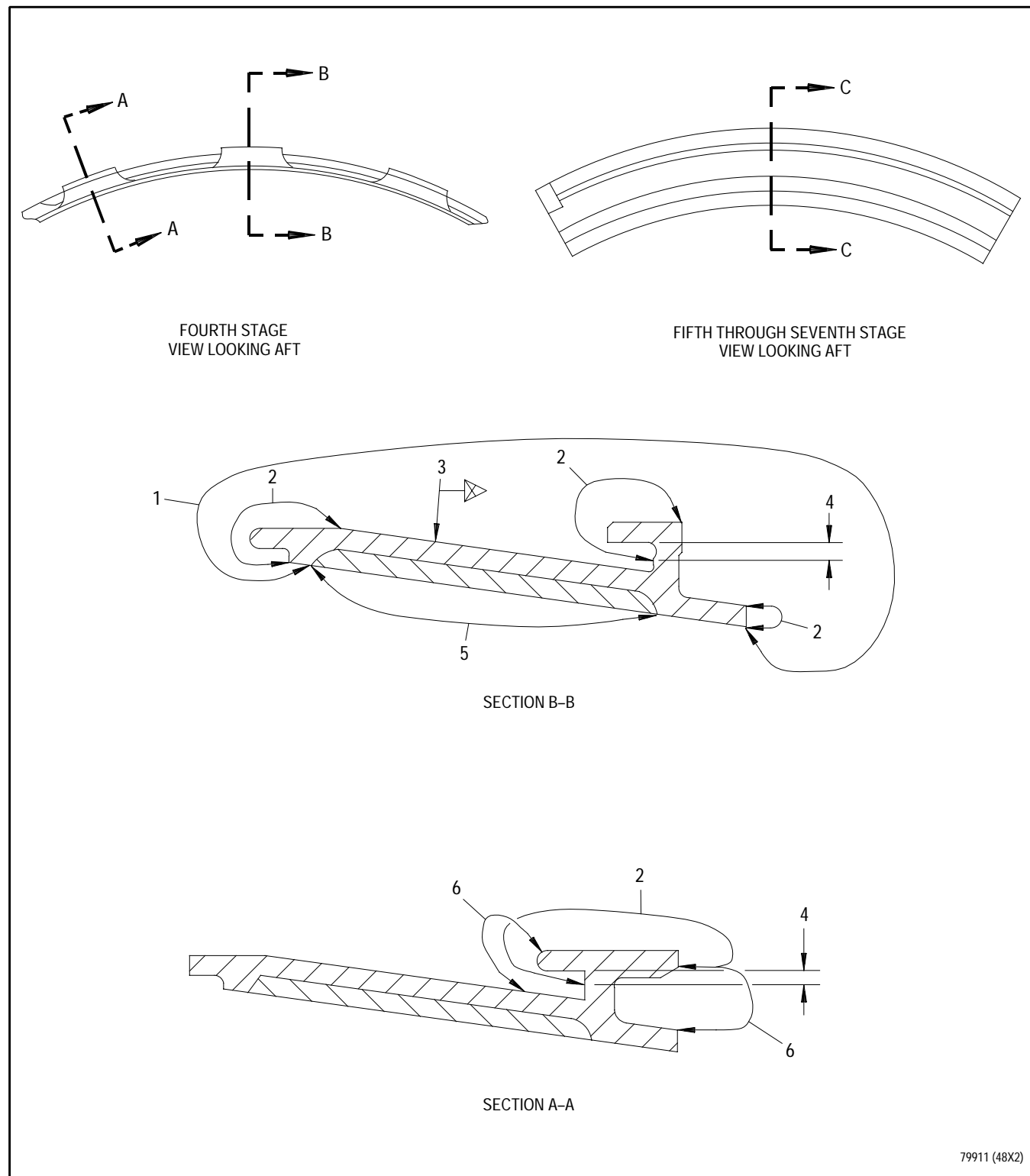


Figure 1. Fourth Through Seventh Stage Compressor Duct Segments - Strip and Application of Antigalling Compound and Aluminum Paint (Sheet 1 of 2)

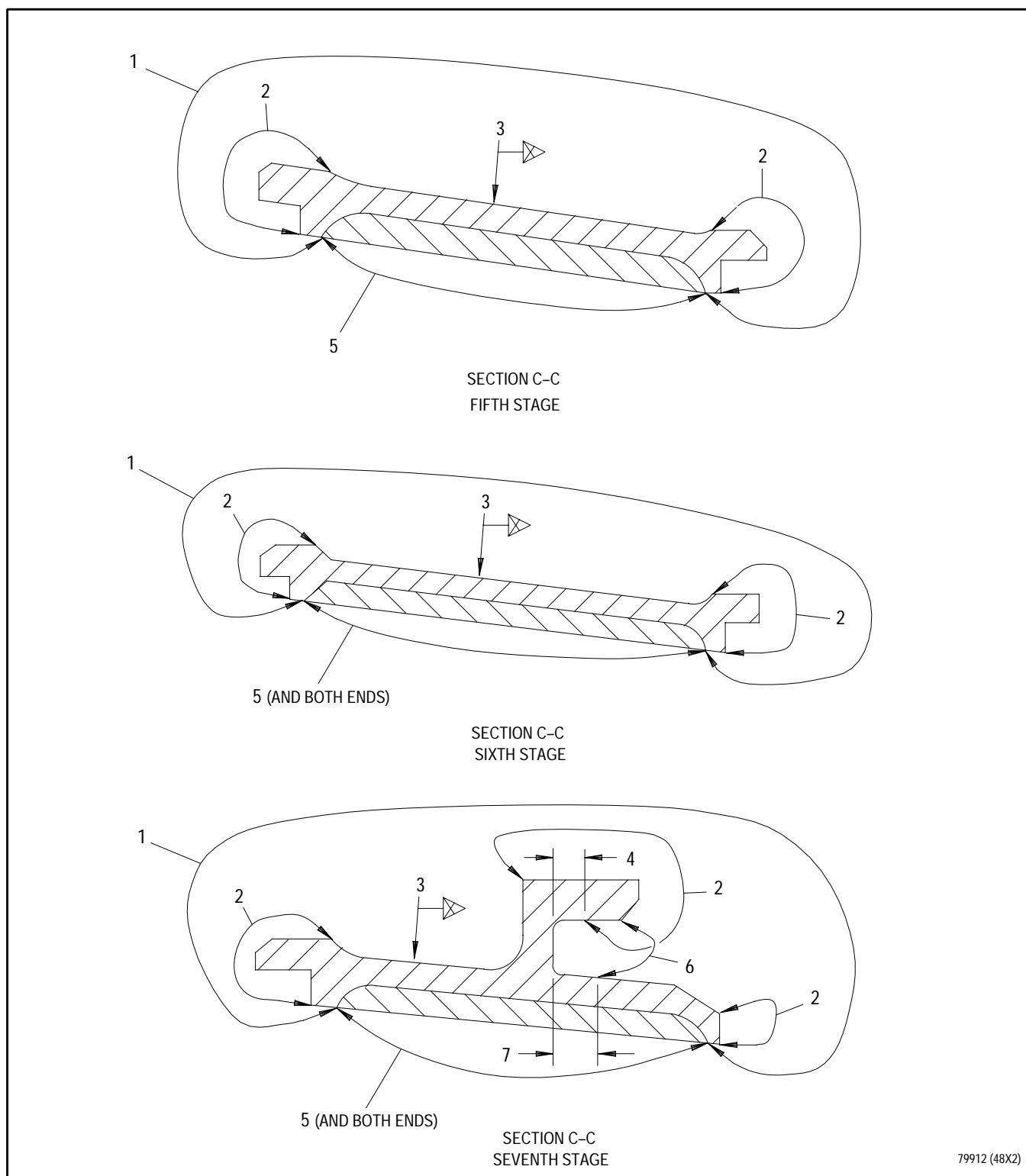


Figure 1. Fourth Through Seventh Stage Compressor Duct Segments - Strip and Application of Antigalling Compound and Aluminum Paint (Sheet 2 of 2)

Pages 7 through 26 deleted.

WORK PACKAGE

TECHNICAL PROCEDURES

**BELLCRANK ASSEMBLY, COMPRESSOR
STATOR LINKAGE -**

REPAIR

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 7	25	8 Blank	25		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Degreasing of Titanium and Non-Titanium Parts by Aqueous Cleaning - - - - -	SPOP 209
Machine Grinding of Titanium Parts (PWA 106) - - - - -	SPOP 530
High Sensitivity Fluorescent Penetrant Inspection - - - -	SPOP 82

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ALCOHOL, ISOPROPYL	TT-I-735
CROCUS CLOTH	P-C-458
OIL, ENGINE	MIL-L-6081

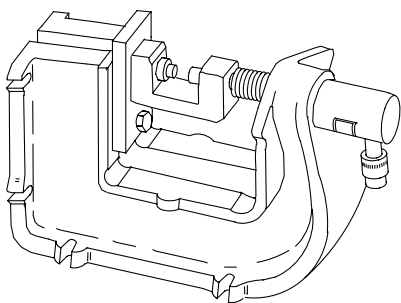
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BEARING OPTION	4062497	AR
BEARING OPTION	4062498	AR

APPLICABLE SUPPORT EQUIPMENT

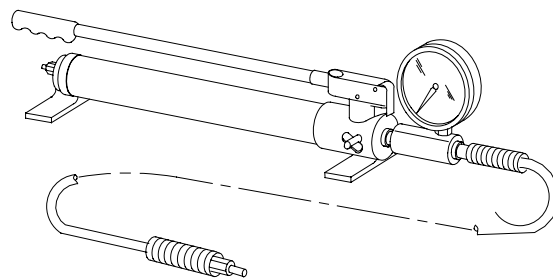
Paragraph	Function - Tool Nomenclature	Tool Number
2	COMPRESSOR STATOR LINKAGE BELLCRANK ASSEMBLY - BEARING REPLACEMENT	
	PULLER, SELF ALIGNING BEARING - - - - -	PWA 57467
	PULLER, SELF ALIGNING BEARING - - - - -	PWA 56662
	FIXTURE, STAKING, SPHERICAL BEARING - - - - -	PWA 55320
	ANVIL, STAKING, SET, COMP STATOR SYNC, RING BRACKET BEARING (0.190 ID) - - - - -	PWA 57199
	ANVIL, STAKING, SET, FRONT COMP STATOR SYNC, RING BELLCRANK BEARING (0.250 ID) - - - - -	PWA 57198
	PUMP, HYDRAULIC - - - - -	PWA 55380
	GAGE, RCVV SPHERICAL BEARING TORQUING - - - - -	PWA 55669

ILLUSTRATED SUPPORT EQUIPMENT



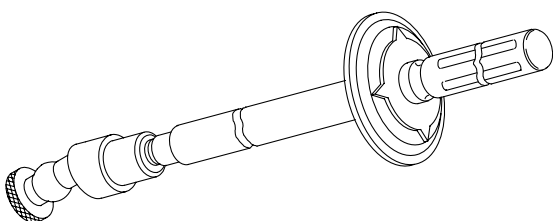
PWA 55320 -C

Figure T1. PWA 55320 FIXTURE



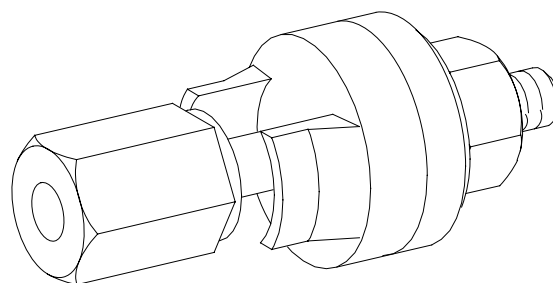
PWA 55380 -C

Figure T2. PWA 55380 PUMP



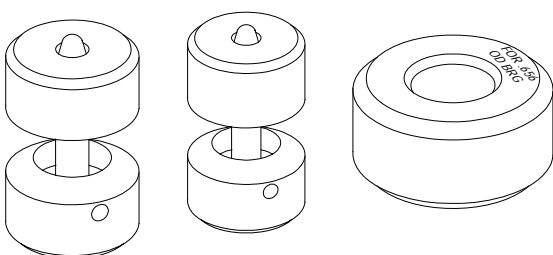
PWA 55669 -C

Figure T3. PWA 55669 GAGE



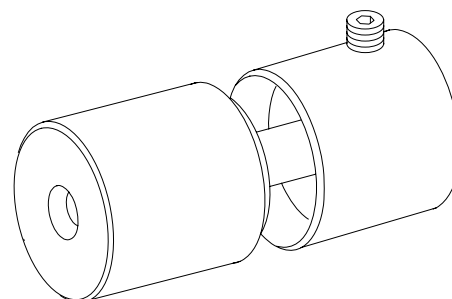
PWA 56662 -C

Figure T4. PWA 56662 PULLER



PWA 57198 -C

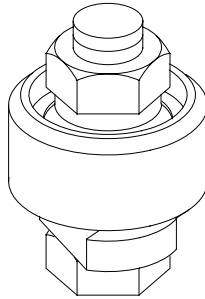
Figure T5. PWA 57198 ANVIL



PWA 57199

Figure T6. PWA 57199 ANVIL

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 57467 -C

Figure T7. PWA 57467 PULLER

1. INTRODUCTION.

- a. This work package contains instructions for repair of compressor stator linkage bellcrank assembly.

- (d) Disassemble tool and discard bearing.

**2. COMPRESSOR STATOR LINKAGE
BELLCRANK ASSEMBLY - BEARING
REPLACEMENT.**

(See Figure 1.)

- a. Remove unserviceable bearings as follows:



Grinding into bellcrank material when removing staked material will cause damage to bellcrank.

- (1) Grind or cut staked edge of bearing outer race on one side of bellcrank. See T.O. 2-1-111, SPOP 530.
- (2) Use PWA 57467 puller to remove 0.190 inch ID spherical bearing and PWA 56662 puller to remove 0.250 inch ID spherical bearing as follows:
 - (a) Install screw detail of puller through bearing with head against side of bearing from which staked material was removed.
 - (b) Install holder detail over screw detail with legs of holder facing in direction of bearing. Secure with nut detail.
 - (c) Tighten nut to remove bearing from bellcrank.

- (3) Clean bellcrank assembly per SPOP 209, Method A. Refer to T.O. 2-1-111.

- (4) Fluorescent penetrant inspect bellcrank assembly surface per SPOP 82. Refer to T.O. 2-1-111. Do not vapor degrease. No cracks allowed.

- b. Prepare for installation of new bearings as follows:



Removal of more than the minimum material necessary may cause rejection of bellcrank.

- (1) Clean bearing hole in bellcrank. Polish by hand using crocus cloth to remove score marks in holes. If necessary, run a reamer through the holes to obtain correct dimensions per figure 1. If holes are over maximum dimension per figure 1, discard bellcrank.
- (2) Lightly coat the bellcrank bearing hole ID with MIL-L-6081 engine oil. Wipe off excess.
- (3) Place new self-aligning bearing into the freezer for a minimum of 20 minutes.



Failure to install bearing before temperature normalizes may cause damage to bellcrank during bearing installation.

c. Install new bearings as follows:

- (1) Remove bearing from freezer and install into hole in bellcrank as rapidly as practical to minimize effect of bearing warming.
- (2) Use PWA 56662 puller to install 0.250 inch ID bearing and PWA 57467 puller to install 0.190 inch ID bearing into bellcrank as follows:
 - (a) Install screw detail of puller through bearing.
 - (b) Align bearing with hole in bellcrank.
 - (c) Install holder detail over screw detail with legs of holder facing in direction of bearing. Secure with nut detail.
 - (d) Tighten detail nut to seat bearing per dimension (6, figure 1).
 - (e) Remove puller after bearing has warmed to room temperature.

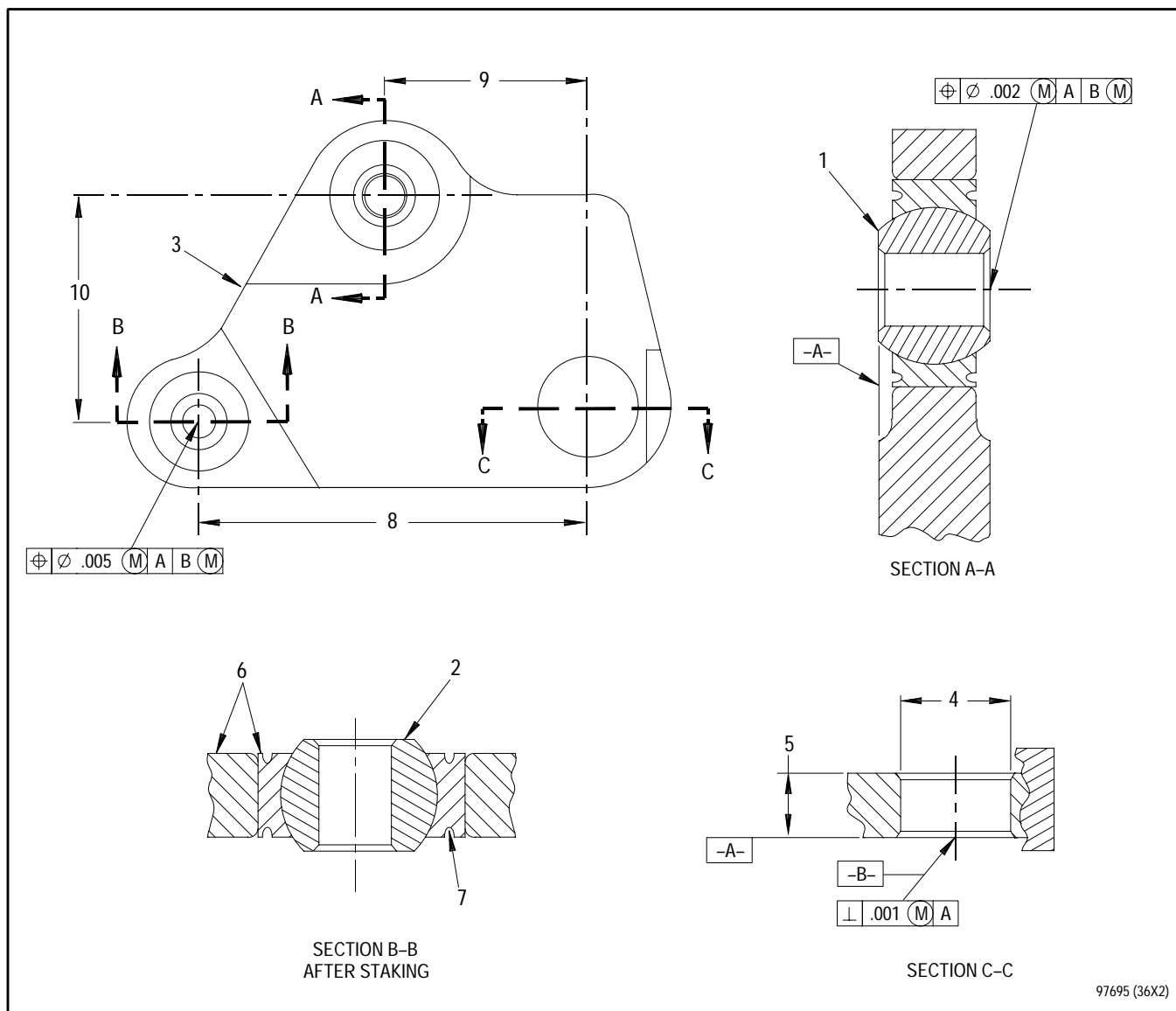
d. Stake new bearings as follows:

- (1) Install PWA 55320 fixture with PWA 57199 anvil to stake 0.190 inch bearing or PWA 57198 anvil to stake 0.250 inch bearing.
- (2) Attach PWA 55380 pump to PWA 55320 fixture.



Applying excess pressure during hydraulic staking operation may result in damage to parts.

- (3) Install bellcrank in fixture with correct anvil. Actuate pump and groove stake the bearing 360 degrees until the flaring cone comes in full contact with bellcrank. Refer to T.O. 2-1-111.
- (4) Remove bellcrank from fixture. Remove pump and anvil from fixture.
- (5) Inspect bearing stake per figure 1. Check freedom of movement using PWA 55669 gage. Spherical ball shall move through 9 degrees minimum cone angle. Maximum allowable torque is 5 pound-inches. Bearing outer race must be securely staked onto bellcrank with no movement in any direction.
- (6) Wipe bellcrank assembly clean using isopropyl alcohol.



1. Self-aligning bearing (pre-installation diameter of 0.6560 to 0.6565 inch)
2. Self-aligning bearing (pre-installation diameter of 0.5622 to 0.5628 inch)
3. Bellcrank
4. 0.545 to 0.546 inch diameter
5. 0.326 to 0.329 inch (reference)
6. Bearing outer race shall be flush to 0.005 inch above surface of bellcrank, both sides.
7. 360° groove stake, both sides
8. 2.375 inches (reference)
9. 1.198 inches (reference)
10. 1.370 inches (reference)

Figure 1. Compressor Stator Linkage Bellcrank Assembly - Bearing Replacement

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

ASSEMBLY OF SUBASSEMBLIES

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 4

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	26	3	26	4 Blank	0
2	0				

1. INTRODUCTION.

This work package introduces the 600 00 through 699 00 series of work packages for assembly of core engine module subassemblies. The following work packages are included in this series:

WP No.	Title
601 00	Seal and Support Assembly, No. 2 Bearing - Assembly
602 00	Seal and Support Assembly, No. 2 Bearing - Air Leak Check
603 00	Bearing and Coupling, No. 2 - Assembly
604 00	Gearshaft Assembly, Gearbox Drive Bevel - Assembly
605 00	Housing, Assembly of, No. 2 Bearing - Assembly
606 00	Seal Assembly, No. 2 and 3 Bearing - Assembly
607 00	Seal Assembly, No. 2 and 3 Bearing - Air Leak Check
608 00	No. 3 Bearing, No. 3 Bearing Support and Gearbox Drive Bevel Gear (No. 3 Bearing Package) - Assembly
609 00	Case Assembly, Compressor Intermediate - Assembly
610 00	Seal Assembly, No. 3 Bearing Rear - Assembly
611 00	Seal Assembly, No. 3 Bearing Rear - Air Leak Check
612 00	Seal Assembly, No. 4 Bearing Front (and Air Sealing Ring) - Assembly
613 00	Seal Assembly, No. 4 Bearing Front - Air Leak Check
614 00	Case Assembly, Diffuser - Assembly
615 00	Oil Nozzles, No. 4 Bearing - Airflow Check
616 00	Housing, No. 4 Bearing and Race, Outer - Assembly
617 00	Seal Assembly, No. 4 Bearing Rear - Assembly
618 00	Seal Assembly, No. 4 Bearing Rear - Air Leak Check

WP/SWP No.	Title
619 00	Chamber - Combustion, Vanes and Support, First Stage Turbine Stator - Assembly
619 01	Chamber - Combustion; Vanes and Support, First Stage Turbine Stator; and Front Turbine Case - Assembly
620 00	Open
621 00	Case and Stator Assembly, Rear Compressor Fourth through Ninth Stage - Assembly
622 00	Rotor Assembly, Rear Compressor - Assembly
623 00	Rotor Assembly, Rear Compressor - Installation of Dynamic Balance Tooling
624 00	Rotor Assembly, Rear Compressor - Dynamic Balance
625 00	Rotor Assembly, Rear Compressor - Removal of Dynamic Balance Tooling
626 00	Open
627 00	Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Application of Adhesive Sealant PWA 36056
628 00	Blades, Rear Compressor Rotor Assembly, Fourth and Fifth Stage - Replacement
629 00	Blades, Rear Compressor Rotor Assembly, Sixth and Seventh Stage - Replacement
630 00	Blades, Rear Compressor Rotor Assembly, Eighth through Thirteenth Stage - Replacement
631 00	Open
through 699 00	

WORK PACKAGE**TECHNICAL PROCEDURES****SEAL AND SUPPORT ASSEMBLY, NO. 2 BEARING -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 11					0
12 Blank					0

T.O. 2J-F100-53-7

WP 601 00

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Procedures, Oil Nozzle Assembly Air or Visual Flow Check - - - - -	WP 026 00
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal And Support Assembly, No. 2 Bearing - Air Leak Check - - - - -	WP 602 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Oil, Lubricating	MIL-L-7808 or
Petrolatum (alternate to oil)	VV-P-236

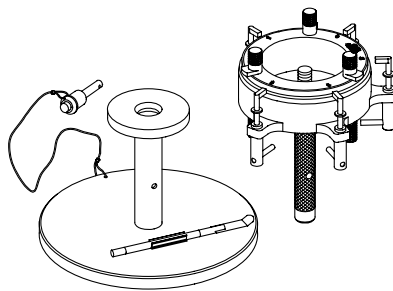
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Packing	MS9388-015	1
Pin, cotter	MS9245-23	3
Washer	MS9880-09	2

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 2 Bearing Seal and Support Assembly - Assembly	
	Compressor, Ring - - - - -	PWA 57433

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57433 -C

Figure T1. PWA 57433 Compressor

T.O. 2J-F100-53-7

WP 601 00

1. INTRODUCTION.

- a. This work package contains instructions for assembling the No. 2 bearing seal and support assembly.

**2. NO. 2 BEARING SEAL AND SUPPORT
ASSEMBLY - ASSEMBLY.**

(See Figures 1 through 4.)

- a. Install metal seal ring(2, figure 1) onto No. 2 bearing seal face assembly(3) as follows:
 - (1) Place a lint free cloth on work bench.
 - (2) Place seal face assembly(3) with carbon seal facing down on lint free cloth.

NOTE

Metal seal ring will not fully compress if installed upside down. Ensure larger OD of metal seal ring is facing down.

- (3) Install metal seal ring(2) with larger OD facing down into ring groove on seal face assembly(3).
- (4) Install spring tension washer(1) into ring groove to sit on top of metal seal ring(2).

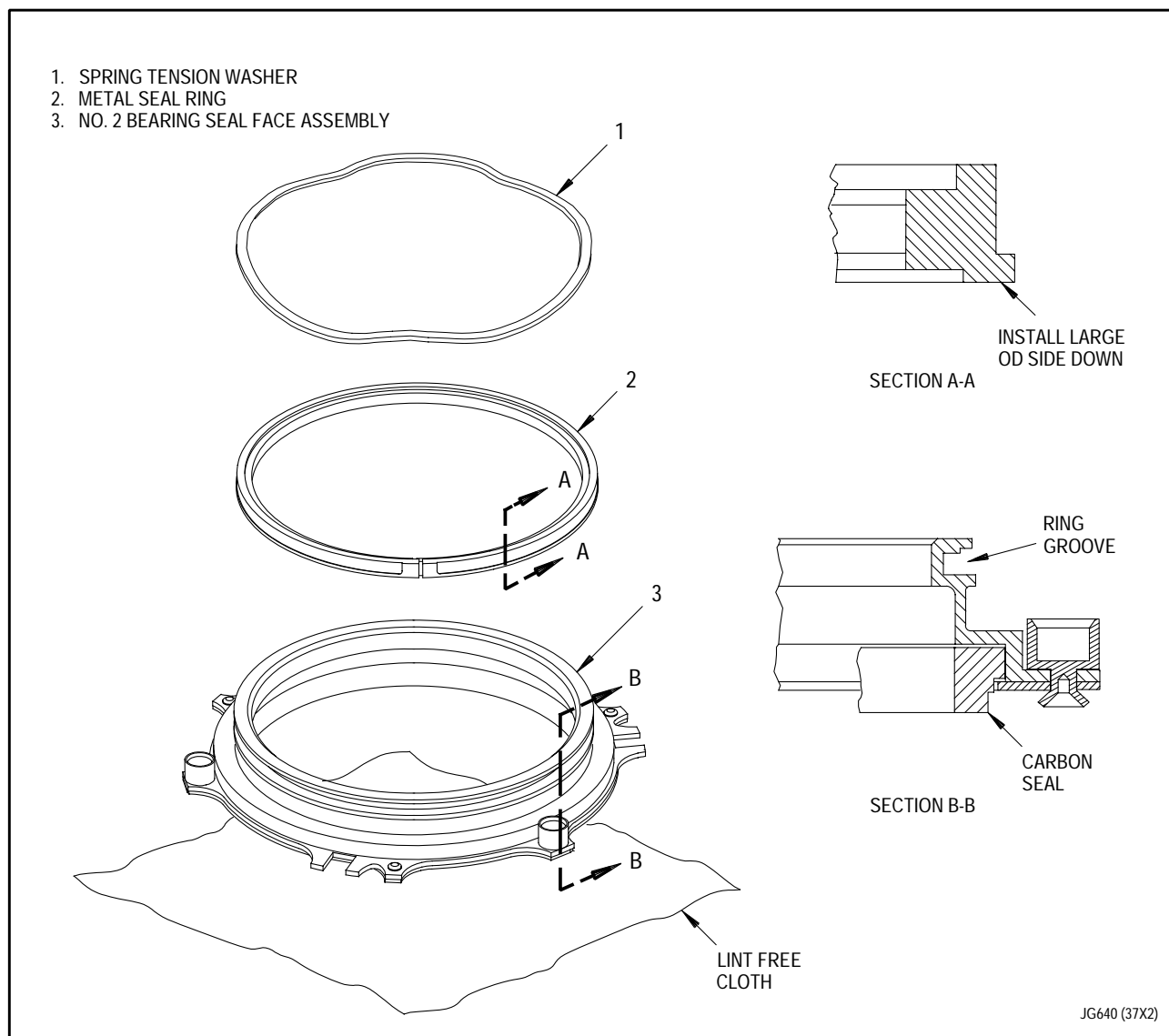


Figure 1. No. 2 Bearing Seal Face Assembly - Assembly

b. Install No. 2 bearing seal face assembly(1, figure 2) into PWA 57433 ring compressor as follows:

- (1) Place PWA 57433 ring compressor on work bench so seal ring gap reference mark is at 12 o'clock position.
- (2) Install seal face assembly(1), with carbon seal facing down, onto PWA 57433 ring compressor detail-1 body(3).
- (3) Position larger of three scallops on OD of seal face assembly(1) in line with large scallop reference mark on detail-1 body(3).
- (4) Align gap in metal seal ring(5) with seal ring gap reference mark on detail-1 body(3).

NOTE

Metal seal ring will not fully compress if spring tension washer is not installed correctly.

- (5) Compress metal seal ring(5) fully and secure in position with five detail-12 cam rods(4).
- (6) Ensure spring tension washer(6) is correctly positioned on top of metal seal ring(5) using detail-16 positioning tool(7).
- (7) Secure seal face assembly(1) in detail-1 body(3) with three detail-14 knob clamps(2).

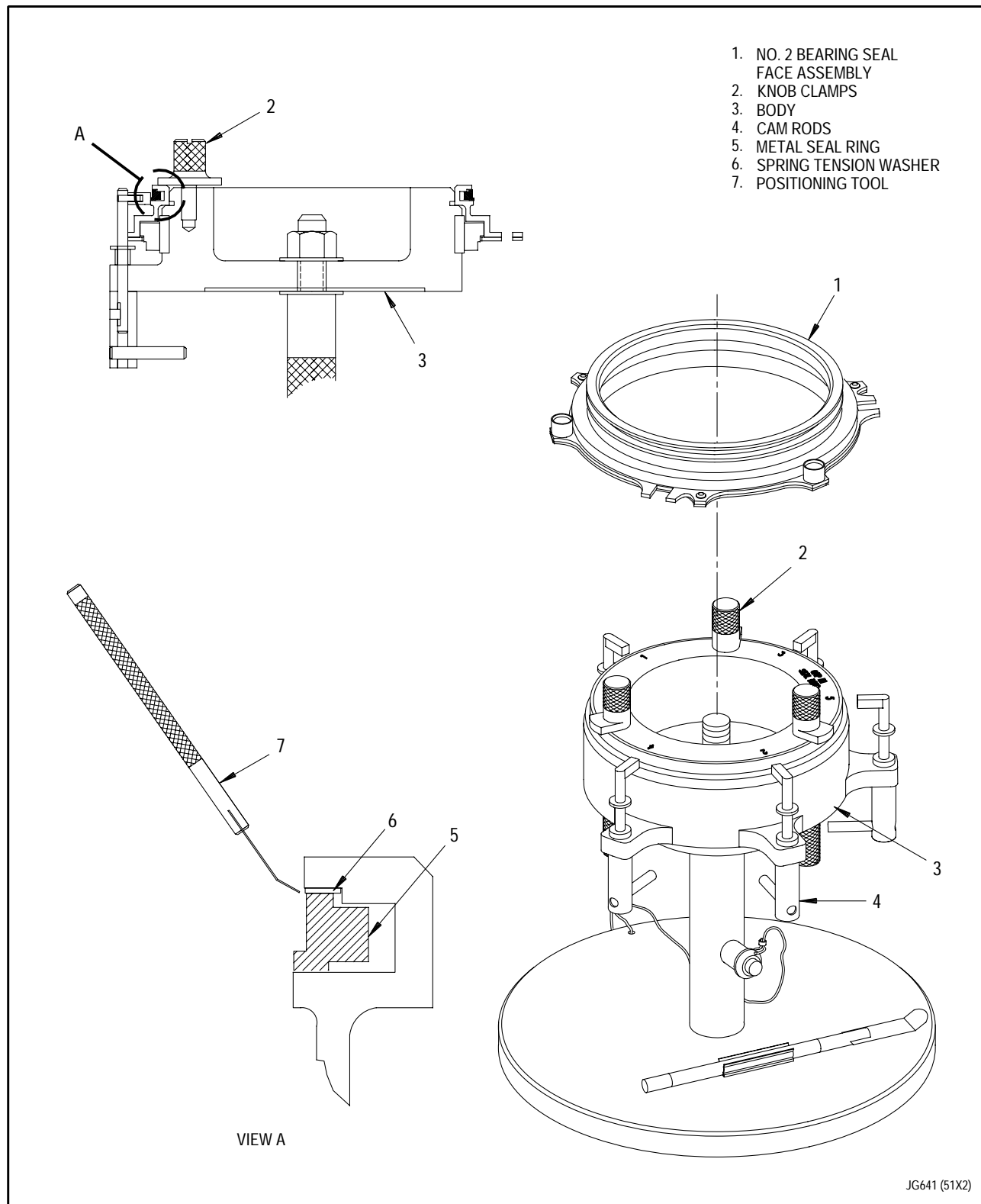


Figure 2. No. 2 Bearing Seal Face Assembly - Installation Into PWA 57433 Ring Compressor

c. Install seal face assembly(3, figure 3) into No. 2 bearing seal support(9) as follows:

- (1) Install six springs(8) onto six seal pins in support(9).
- (2) Remove PWA 57433 ring compressor detail-1 body(2) and seal face assembly(3) from detail-15 base assembly(1).
- (3) Install three guides(5) into slots on seal face assembly(3).
- (4) Align guides(5) with three longer seal pins in support(9).
- (5) Position reference mark TDC on detail-1 body(2) at 12 o'clock position. Oil nozzle(10) shall be located at 3 o'clock position.

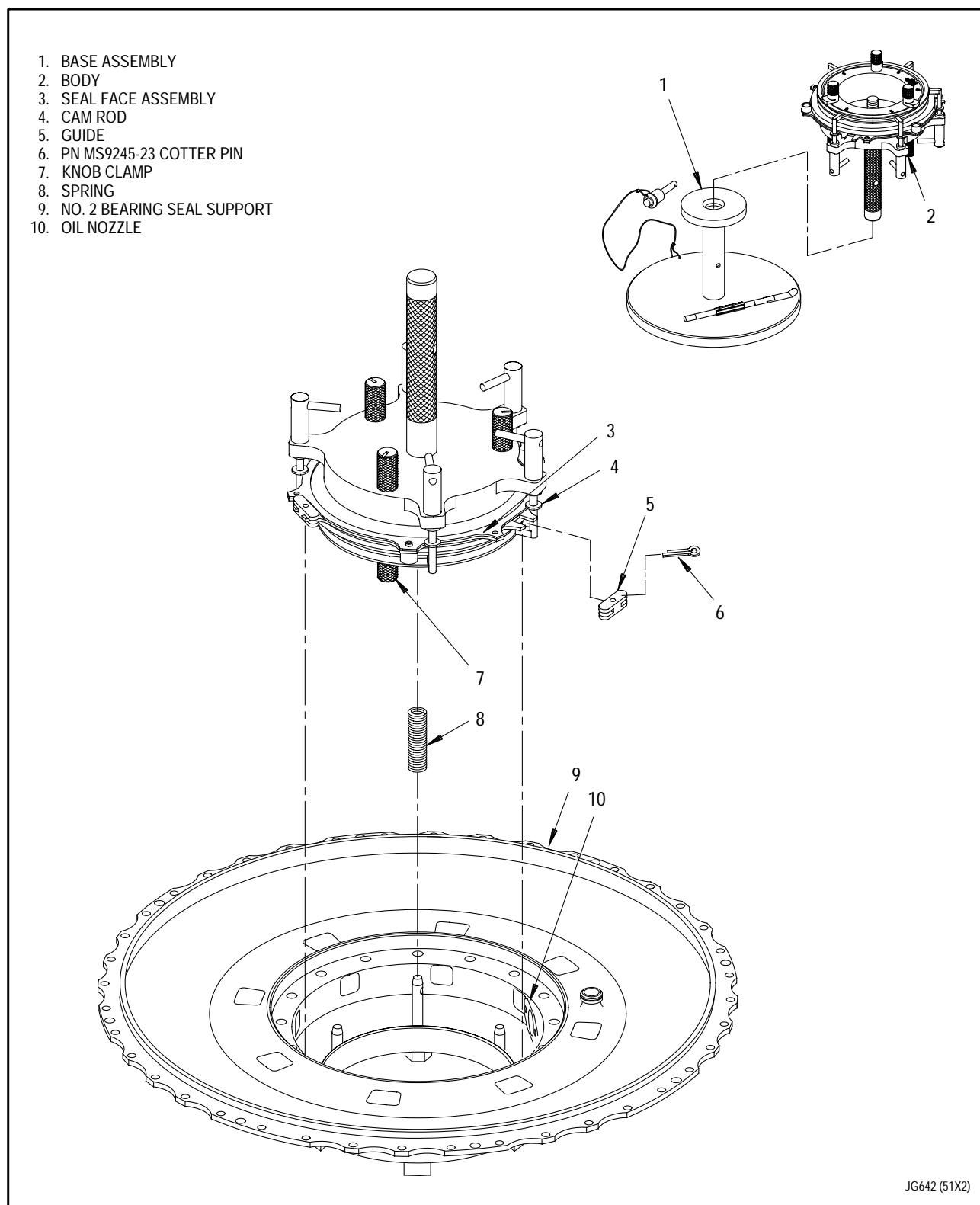
(6) Install seal face assembly(3) down into support(9).

- (7) Ensure six springs(8) are correctly seated.

NOTE

Do not bend cotter pins at this time. Cotter pins will be bent after air leak check.

- (8) Install three cotter pins(6), while holding down on detail-1 body(2).
- (9) Disengage detail-14 knob clamp(7) and detail-12 cam rod(4) and remove detail-1 body(2).
- (10) Ensure seal face assembly(3) has free travel on seal pins without binding.



JG642 (51X2)

Figure 3. No. 2 Bearing Support Assembly

d. If No. 2 bearing nozzle(2, figure 4) was removed, flow check per T.O. 2J-F100-53-1, WP 026 00 and install as follows:

- (1) Lubricate packing(3) with engine oil or petrolatum.
- (2) Install packing(3) onto nozzle(2).
- (3) Lubricate two bolts(5) with engine oil.
- (4) Secure nozzle(2) to support assembly(1) using two washers(4) and two bolts(5).

(5) Torque bolts 23 to 26 pound-inches.

(6) Bend edges of washers(4) into scallops of each bolt head at two places 180 degrees apart.

e. Perform No. 2 bearing seal and support assembly air leak check per WP 602 00.

f. Bend cotter pins(6, figure 3) after favorable air leak check.

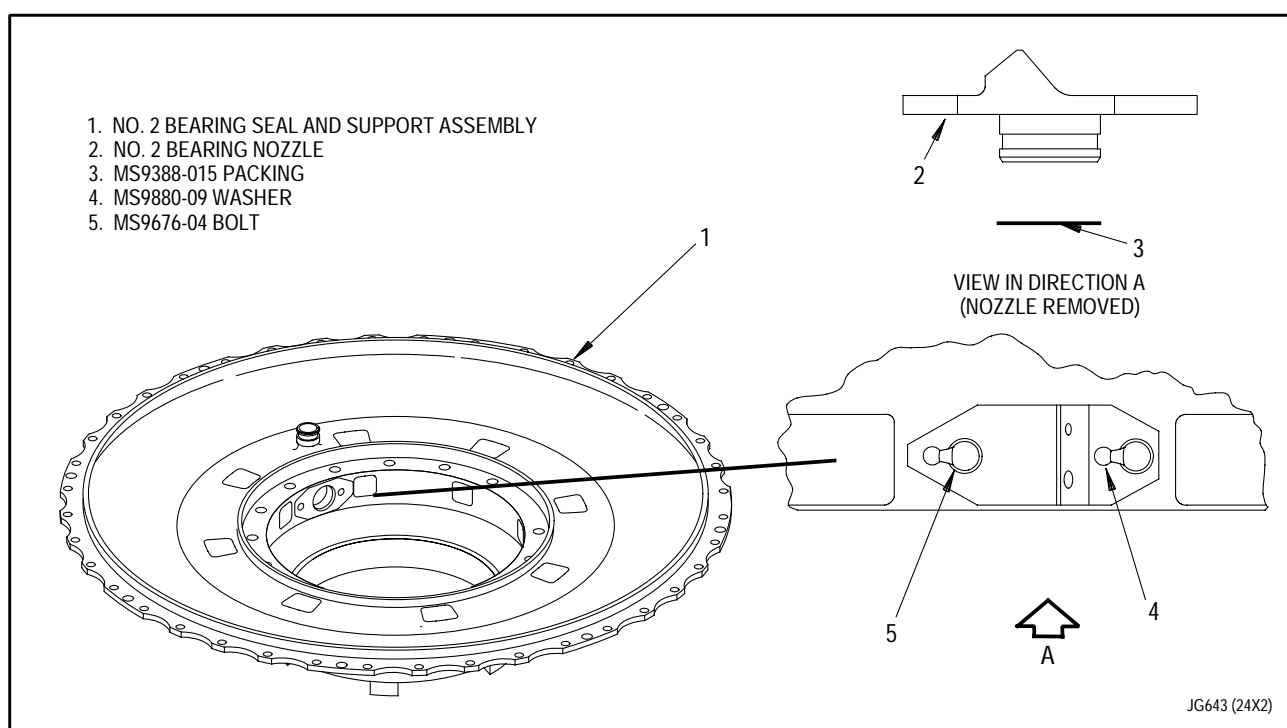


Figure 4. No. 2 Bearing Nozzle - Installation

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL AND SUPPORT ASSEMBLY, NO. 2 BEARING -

AIR LEAK CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

This Work Package Supersedes WP 602 00 Through and Including Change 0.

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6					17

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
OIL, LUBRICATING	MIL-L-7808
OR	
PETROLATUM	VV-P-236

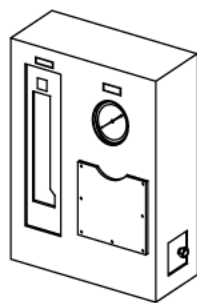
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

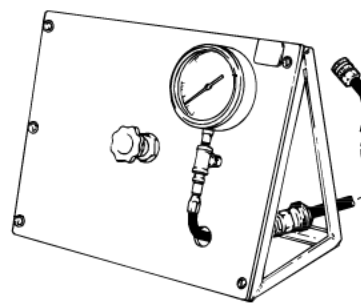
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 2 BEARING SEAL AND SUPPORT ASSEMBLY - AIR LEAK CHECK	
	FIXTURE, AIR LEAK CHECK - SEAL AND SUPPORT ASSEMBLY, NO. 2 BEARING - - - - -	PWA 57827
		OR
	FIXTURE, AIR LEAK CHECK, NO. 2 BEARING ASSEMBLY - -	PWA 57647
	REGULATOR - - - - -	PWA 21875
	FLOWMETER, AIRSEAL ASSEMBLY AIRFLOW CHECK - - - - -	PWA 6507

ILLUSTRATED SUPPORT EQUIPMENT



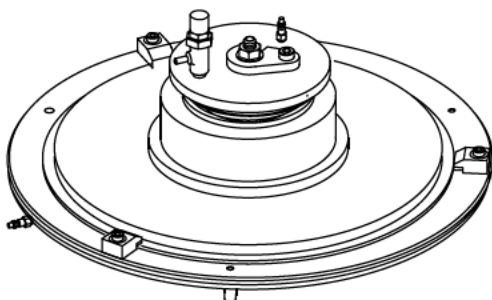
PWA 6507-C

Figure T1. PWA 6507 FLOWMETER



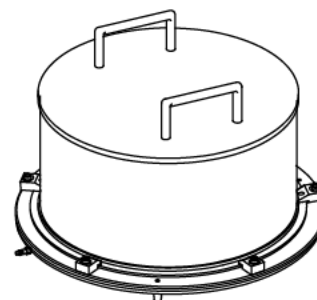
PWA 21875 -C

Figure T2. PWA 21875 REGULATOR



PWA 57647 -C

Figure T3. PWA 57647 FIXTURE



PWA 57827 -C

Figure T4. PWA 57827 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for performing air leak check on No. 2 bearing front seal assembly.

2. NO. 2 BEARING SEAL AND SUPPORT ASSEMBLY - AIR LEAK CHECK.

(See Figure 1.)

- a. Loosen PWA 57827 air leak check fixture socket head cap screws(14) and swing clamps(13) to side. Remove detail-28 protective cover from fixture and set aside.
- b. Loosen flange nut(10). Move C-washer(9) out of way and remove detail-16 plate(7).
- c. Protect against false seal assembly leakage indications by ensuring preformed packings(4) and detail-12 adapter(12) are in satisfactory condition.
- d. Lubricate preformed packings(4) with VV-P-236 petrolatum or MIL-L-7808 engine oil.

- e. Position detail-12 adapter(12), plated surface up, in PWA 57827 fixture.
- f. Position No. 2 bearing seal and support assembly(5) on PWA 57827 fixture with carbon seal(6) against detail-12 adapter(12) and seat by hand.
- g. Position detail-16 plate(7) over seal and support assembly(5) and carbon seal(6); position C-washer(9) and tighten flange nut(10) to secure.



Overtightening socket head cap screws(14) may cause damage to outer flange of seal and support assembly(5).

- h. Tighten socket head cap screws(14) handtight.

Legend for figure 1

- 1. Outlet for carbon seal leak check
- 2. Base assembly
- 3. Jackscrew
- 4. Preformed packing
- 5. Seal and support assembly
- 6. Carbon seal
- 7. Plate
- 8. Relief valve
- 9. C-washer
- 10. Flange nut
- 11. Inlet for carbon seal leak check
- 12. Adapter
- 13. Clamp
- 14. Socket head cap screw

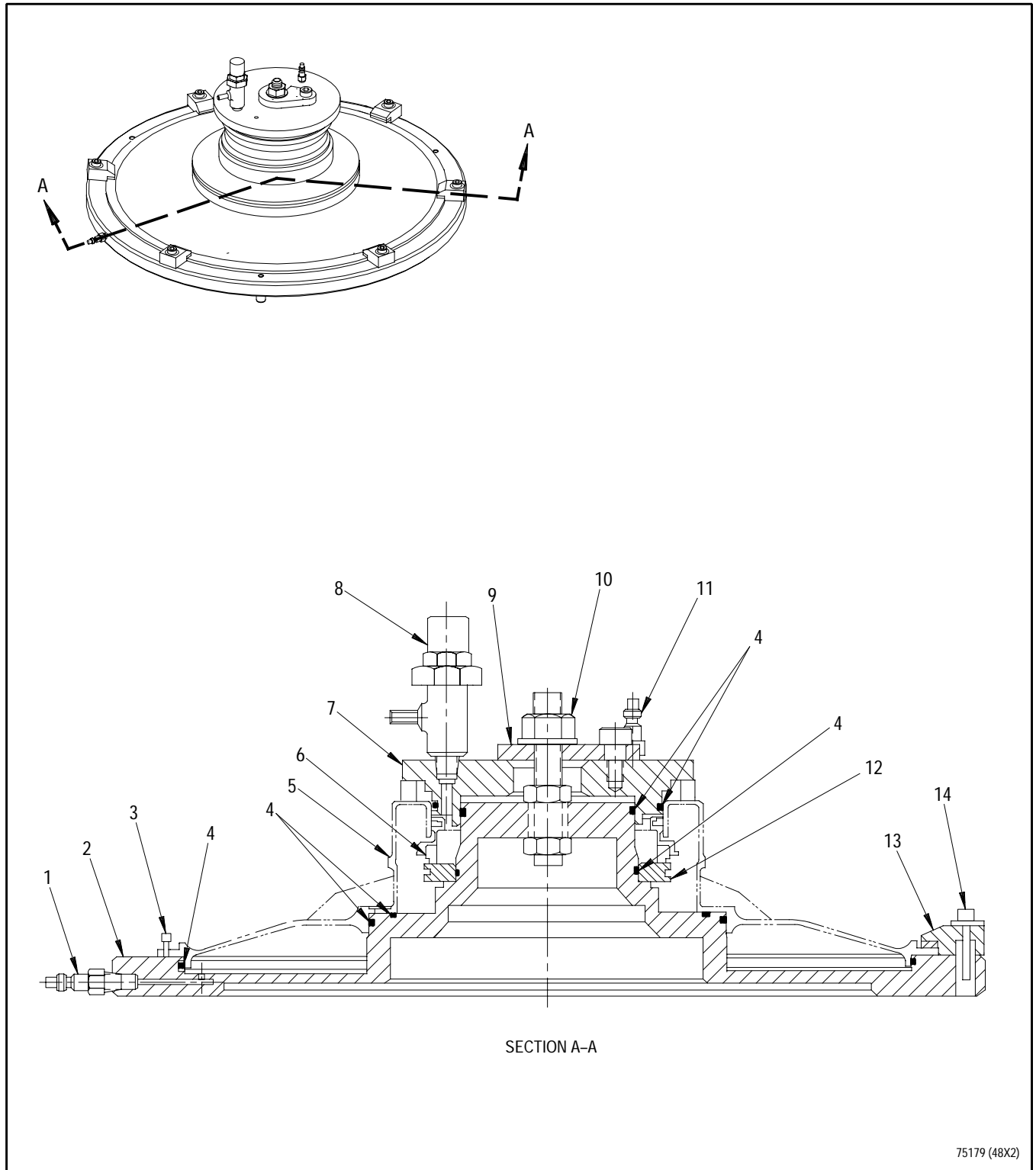


Figure 1. No. 2 Bearing Seal and Support Assembly Installed in PWA 57827 Fixture



Failure to ensure regulator valve is off prior to connecting shop air can result in overpressurization of No. 2 bearing seal and support assembly.

- i. Ensure regulator valve is off and gage on PWA 21875 regulator is reading zero.
- j. Connect shop air to PWA 21875 regulator. Connect regulator hose to PWA 57827 fixture, inlet for carbon seal leak check(11). Connect air outlet(1) from PWA 57827 fixture to PWA 6507 flowmeter.



If carbon seal is not seated properly, large flow of air may damage flowmeter.

- k. Regulate air pressure slowly to fixture to 30 psig. Read total leakage in cubic feet per minute (cfm) from flowmeter. Leakage shall not exceed 0.80 cfm. If leakage is less than 0.80 cfm, seal and support assembly is acceptable. If leakage is greater than 0.80 cfm, tap fixture with rawhide mallet to ensure proper seating.
- l. Release pressure and disconnect hoses.
- m. Loosen socket head cap screws(14) and swing clamps(13) to side.

- n. Loosen flange nut(10); move C-washer(9) out of way and remove detail-16 plate(7).
- o. Remove seal and support assembly(5) from fixture using two jackscrews(3) approximately 180 degrees apart on outer flange.
- p. Carbon seal leakage of greater than 0.80 cfm may be reduced as follows:
 - (1) Compress and release carbon seal against its springs to ensure proper alignment and no sticking.
 - (2) Clean seal assembly. Refer to T.O. 2-1-111.
 - (3) Glass lap carbon seal. Refer to T.O. 2-1-111.
 - (4) Ensure pressure side of metal seal ring faces proper direction.
 - (5) Check metal seal ring gap clearance. Gap clearance shall be 0.067 to 0.093 inch. Replace if necessary.
 - (6) Repeat air leak check.
- q. After completion of testing, install detail-28 protective cover on PWA 57827 fixture and secure using clamps(13) and socket head cap screws(14). Tighten screws handtight.

WORK PACKAGE**TECHNICAL PROCEDURES****BEARING AND COUPLING, NO. 2 -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	5 - 9	0	12	29
2 - 4	26	10	29	13 - 14	26
4A Added	7	11	7	15	7
4B Blank Added	7			16 Blank	7

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BRUSH, BRASS	GA 63-10
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
GLOVES, LINT-FREE	-

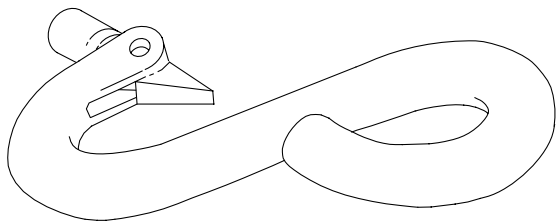
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

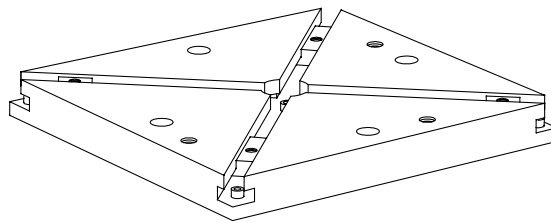
Paragraph	Function - Tool Nomenclature	Tool Number
3	NO. 2 BEARING AND COUPLING ASSEMBLY - ASSEMBLY	
	BASE, NO. 2 BEARING COUPLING - - - - -	PWA 51230
	ADAPTER, HOLDING - - - - -	PWA 21500
	PUSHER, NO. 2 BEARING AND REAR SCOOP - - - - -	PWA 56506
		OR
	DRIFT, NO. 2 BEARING AND REAR SCOOP - - - - -	PWA 50601
	WRENCH, NO. 2 BEARING INNER RACE RETAINING NUT - - -	PWA 50604
	ADAPTER, NO. 2 BEARING INNER RACE RETAINING NUT - - -	PWA 50603
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
		OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200

ILLUSTRATED SUPPORT EQUIPMENT



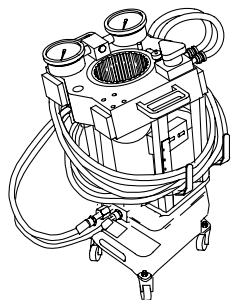
PWA 2388 -C

Figure T1. PWA 2388 HOOK



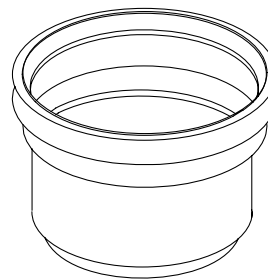
PWA 21500 -C

Figure T2. PWA 21500 ADAPTER



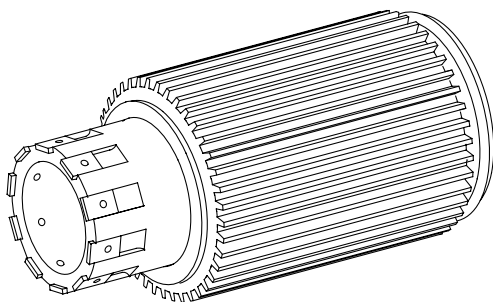
PWA 50308 -C

Figure T3. PWA 50308 WRENCH



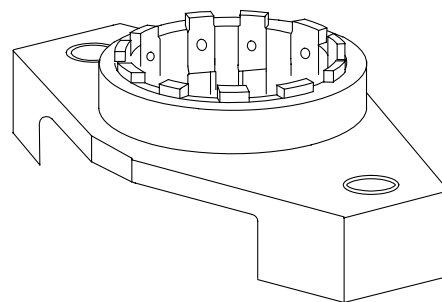
PWA 50601 -C

Figure T4. PWA 50601 DRIFT



PWA 50603 -C

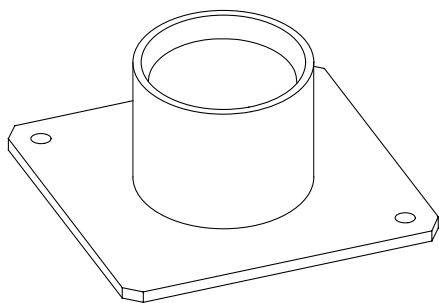
Figure T5. PWA 50603 ADAPTER



PWA 50604 -C

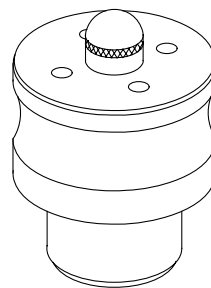
Figure T6. PWA 50604 WRENCH

ILLUSTRATED SUPPORT EQUIPMENT (continued)



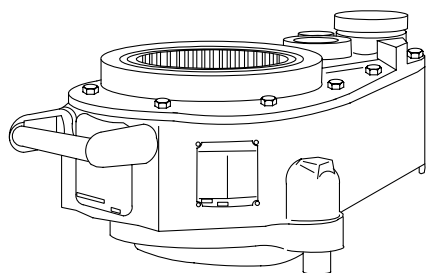
PWA 51230

Figure T7. PWA 51230 BASE



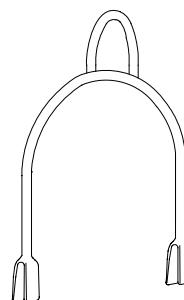
PWA 56506 -C

Figure T8. PWA 56506 PUSHER



SWE 8200 -C

Figure T9. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T10. SWE 81001/81002 SLING

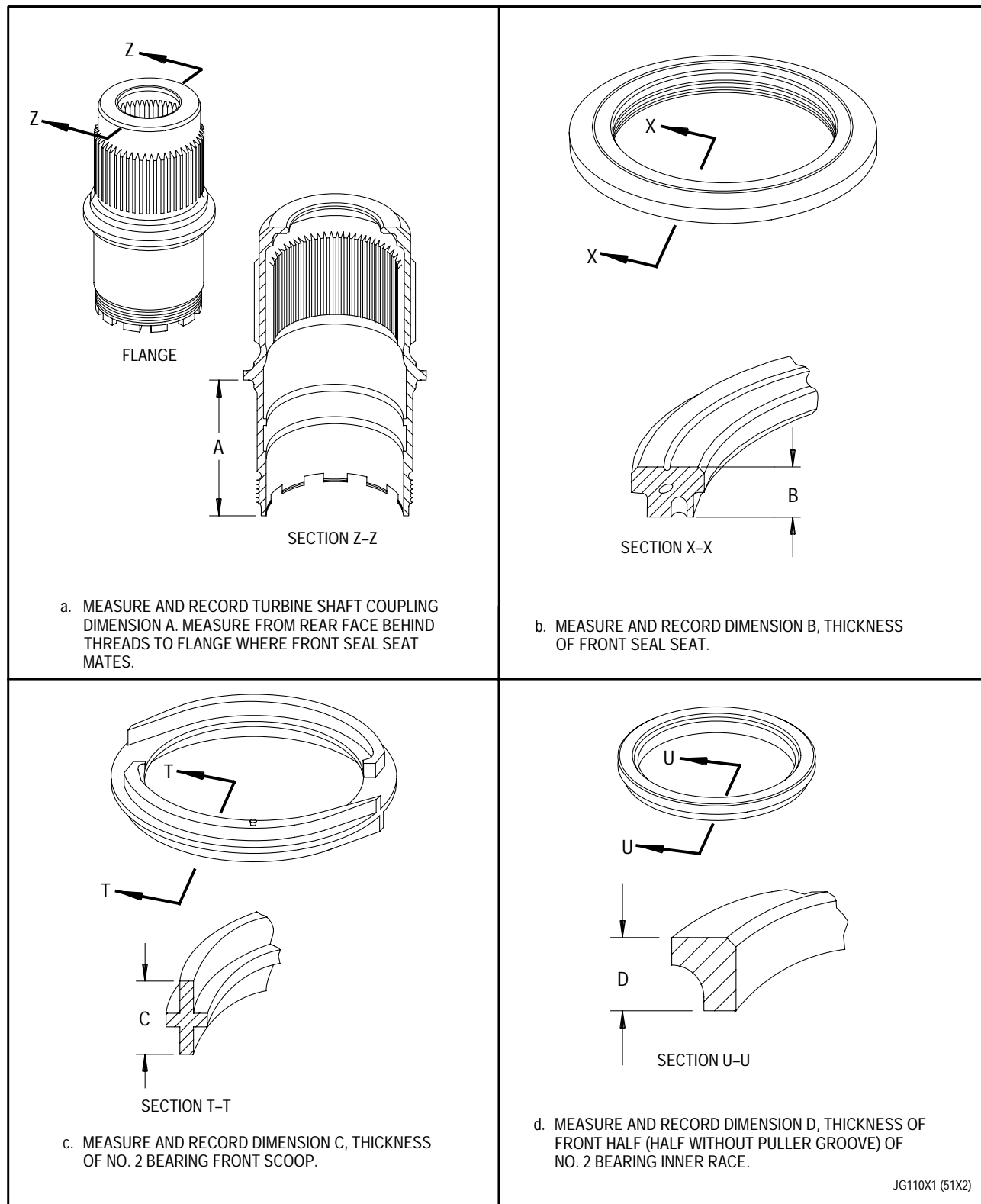
1. INTRODUCTION.

- a. This work package contains instructions for assembling the No. 2 bearing and coupling assembly.
- b. Before assembly, the thickness of each detail part is measured and recorded.
- c. After assembly, the thickness of the installed parts is checked to ensure they are fully seated.

2. MEASUREMENT OF PARTS.

(See Figure 1.)

- a. Measure length of each part in No. 2 bearing coupling assembly as shown in figure 1. These dimensions will be used to check seating of parts after assembly.



JG110X1 (51X2)

Figure 1. No. 2 Bearing and Coupling - Measuring Individual Parts (Sheet 1 of 2)

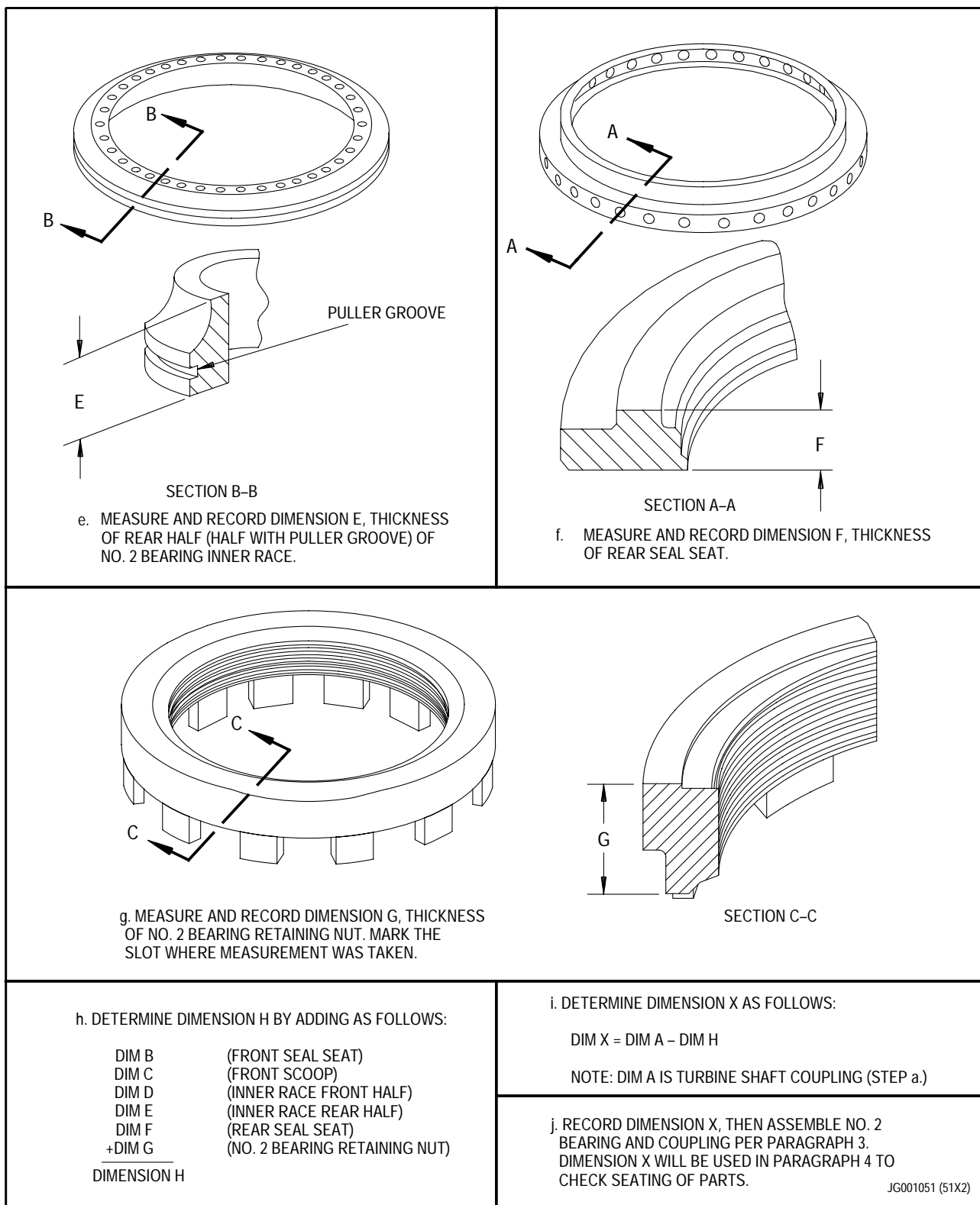


Figure 2. No. 2 Bearing and Coupling - Measuring Individual Parts (Sheet 2 of 2)

**3. NO. 2 BEARING AND COUPLING
ASSEMBLY - ASSEMBLY.**

(See Figures 2 through 4.)

- a. Heat the following parts in hot oil for 20 minutes at 225° to 275°F (107° to 135°C):
 - Rear seal seat(8, figure 2)
 - Rear scoop(4)
 - Inner race front half(5)
 - Inner race rear half(7)
- b. Install PWA 51230 base(3, figure 3) onto PWA 21500 adapter.
- c. Install turbine shaft coupling(4) with splines down into PWA 51230 base.

NOTE

If the seal seat is used and is being installed with a new or different carbon seal, lap seat and perform a flatness inspection. Refer to T.O. 2J-F100-53-1, WP 092 00 and 095 00.

- d. Install front seal seat(2, figure 2) as follows:
 - (1) Find dowel pin hole on seal seat.

- (2) Find X-mark on seal seat.
- (3) Find X-mark on turbine shaft coupling(1).
- (4) Install front seal seat(2) on turbine shaft coupling(1) with dowel pin hole up and X-mark aligned with X-mark on coupling.

- e. Install front scoop(3) as follows:

- (1) Find dowel pin on front face of scoop.
- (2) Install front scoop on turbine shaft coupling(1) so dowel pin engages hole in front seal seat(2).

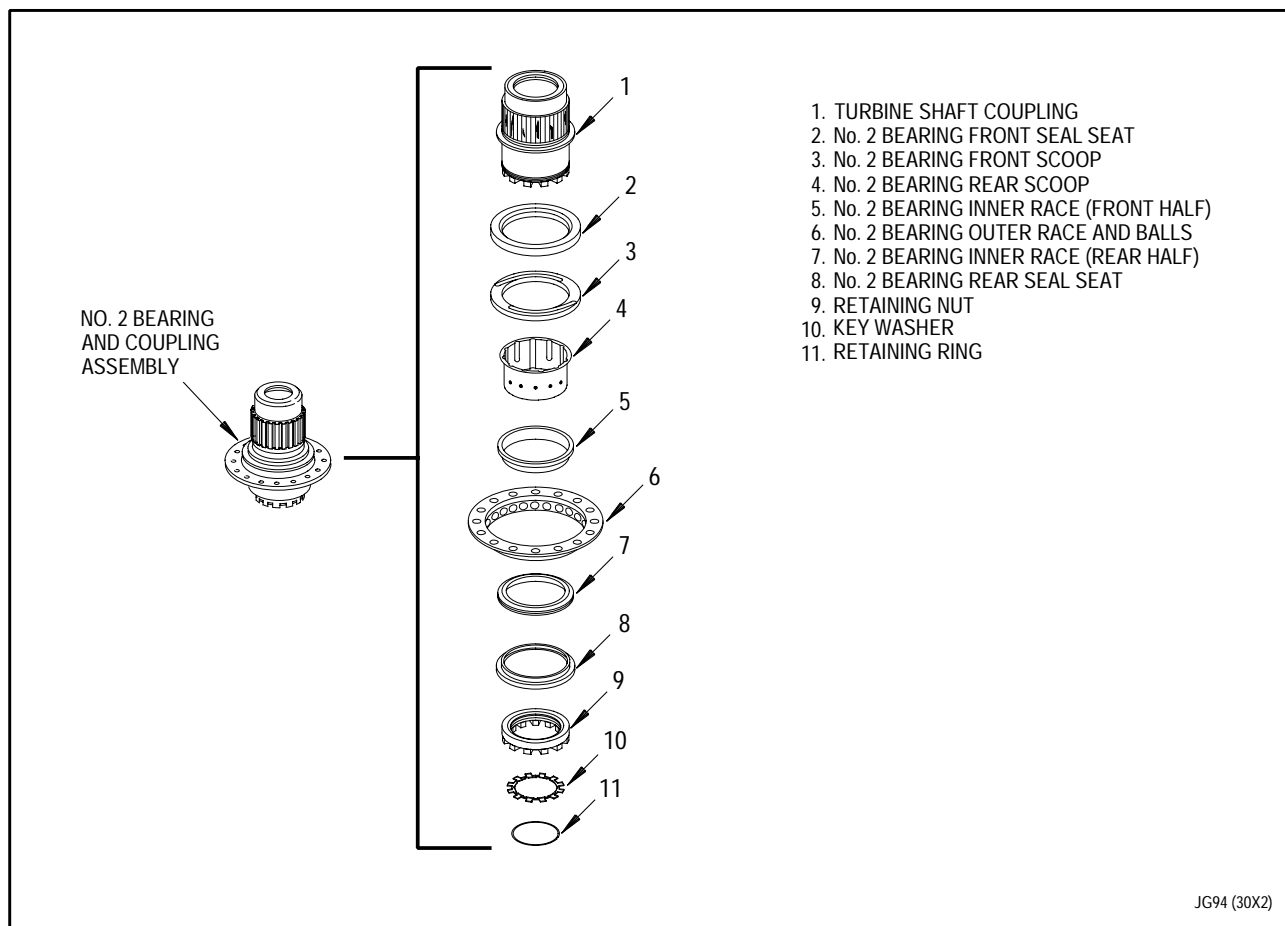


Figure 2. No. 2 Bearing and Coupling Assembly - Assembly

- f. Install rear scoop(4) as follows:
- (1) Find X-mark on OD lip at front of scoop.
 - (2) Install scoop onto turbine shaft coupling(1) with OD lip down and X-mark aligned with X-mark on turbine shaft coupling.
 - (3) Install PWA 56506 pusher(1, figure 3) over coupling(1, figure 2); then seat scoop with standard arbor press.
 - (4) Let assembly cool to room temperature.
- g. Install No. 2 bearing inner race front half(5) as follows:

NOTE

Front half of inner race is the half that does not have a puller groove.

- (1) Find X-mark at front of inner race.
- (2) Install inner race over turbine shaft coupling(1). Align X-mark with X-marks on scoop(4) and coupling(1).
- (3) Install PWA 56506 pusher over coupling(1); then seat inner race(5) with standard arbor press.
- (4) Maintain seating pressure on front half of bearing inner race(5) using standard arbor press for minimum of 1 minute until inner race and turbine shaft coupling are approximately same temperature.

- h. Install No. 2 bearing outer race, cage and balls(6) as follows:

- (1) Place outer race on clean surface with flanged end down.
- (2) Install cage and balls into outer race with mating number on cage up.
- (3) Install outer race, cage and balls onto coupling(1) and inner race front half(5). Flange of outer race goes down.



Failure to ensure proper seating of No. 2 bearing outer race and cage and ball assembly may result in installation damage and bearing failure.

- (4) Ensure cage and ball assembly does not hang up on inner or outer race edges by rotating cage and ball assembly after installation.

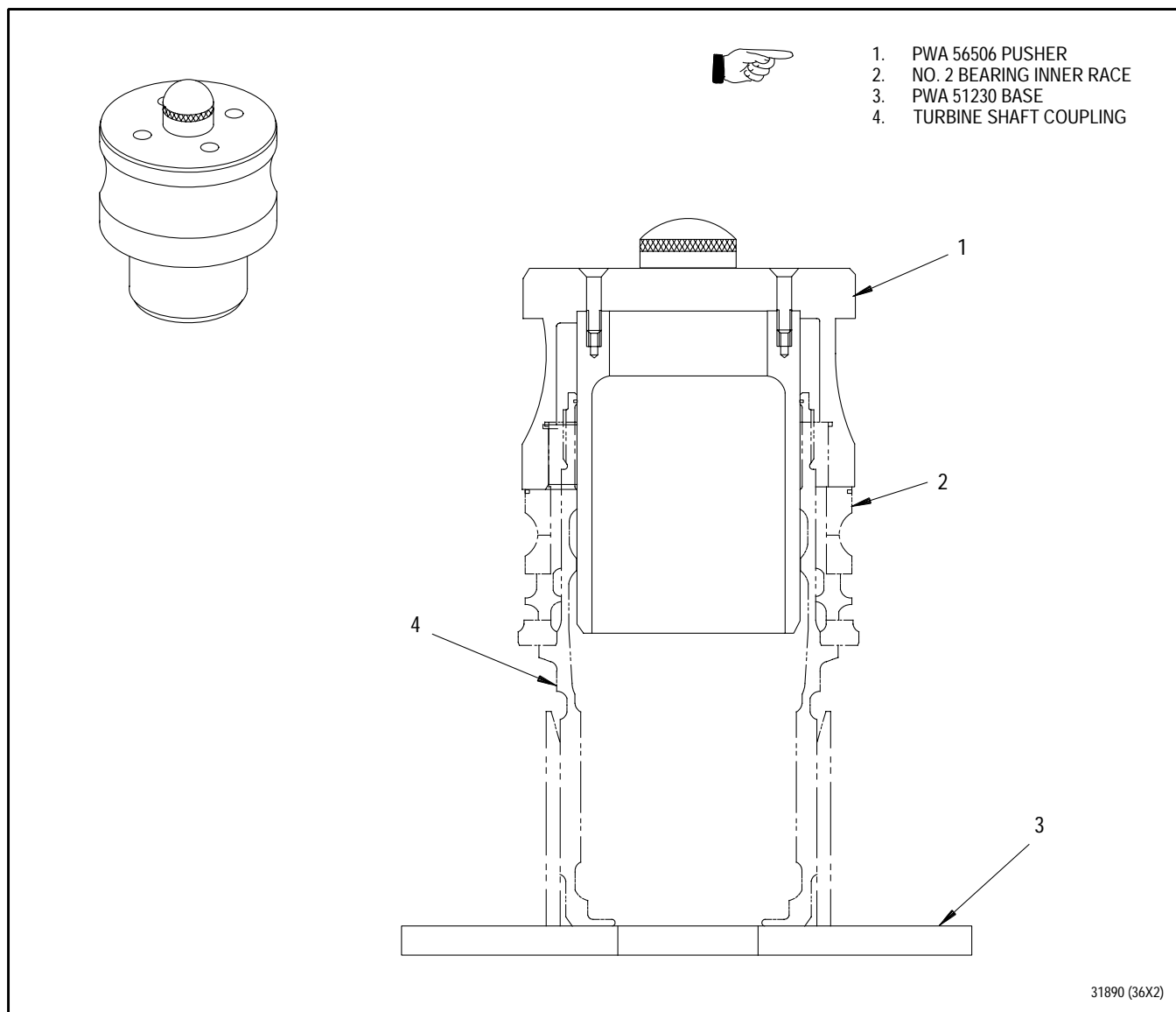


Figure 3. No. 2 Bearing Inner Race - Assembly Tooling

i. Install inner race(7) rear half as follows:

- (1) Find X-mark on inner race rear half.
- (2) Install inner race rear half over turbine shaft coupling(1). Align X-mark with X-marks on previously installed parts.
- (3) Install PWA 56506 pusher(1, figure 3) over coupling(4); seat inner race(2) with standard arbor press.
- (4) Maintain seating pressure on rear half of bearing inner race(7) using standard arbor press for minimum of 1 minute until inner race and turbine shaft coupling are approximately same temperature.

j. Install rear seal seat(8, figure 2) as follows:

NOTE

If seal seat is used and is being installed with new or different carbon seal, seat shall be lapped and a flatness inspection performed. Refer to T.O. 2J-F100-53-1, WP 092 00 and 095 00.

- (1) Find X-mark on rear seal seat.
- (2) Install seal seat by hand against No. 2 bearing with flat side of seal seat up. Align X-mark with X-marks on previously installed parts.
- (3) Let parts cool to room temperature.

k. Key washer(10) and retaining ring(11) will be installed after final seating measurement per paragraph 4.

l. Install and torque No. 2 bearing inner race retaining nut(9) as follows:

- (1) Apply PWA 36545 antigalling compound to threads and front face of inner race retaining nut(9).
- (2) Using brass brush, remove any excess antigalling compound from nut threads, coupling threads, and coupling OD splines so that no parent metal is visible and coated surface is shiny and smooth in appearance.

NOTE

Inner race retaining nut has left-hand threads. Nut shall be turned counterclockwise (left-hand) to tighten it.

- (3) Turn nut counterclockwise to install inner race retaining nut(9) onto turbine shaft coupling. (See figure 4.) Nut shall turn freely for full length of threads until contact with rear seal seat.
- (4) Install PWA 50604 wrench so teeth engage slots in retaining nut(9, figure 2).
- (5) Install PWA 50603 adapter so teeth of adapter fit into slots inside turbine shaft coupling(1).

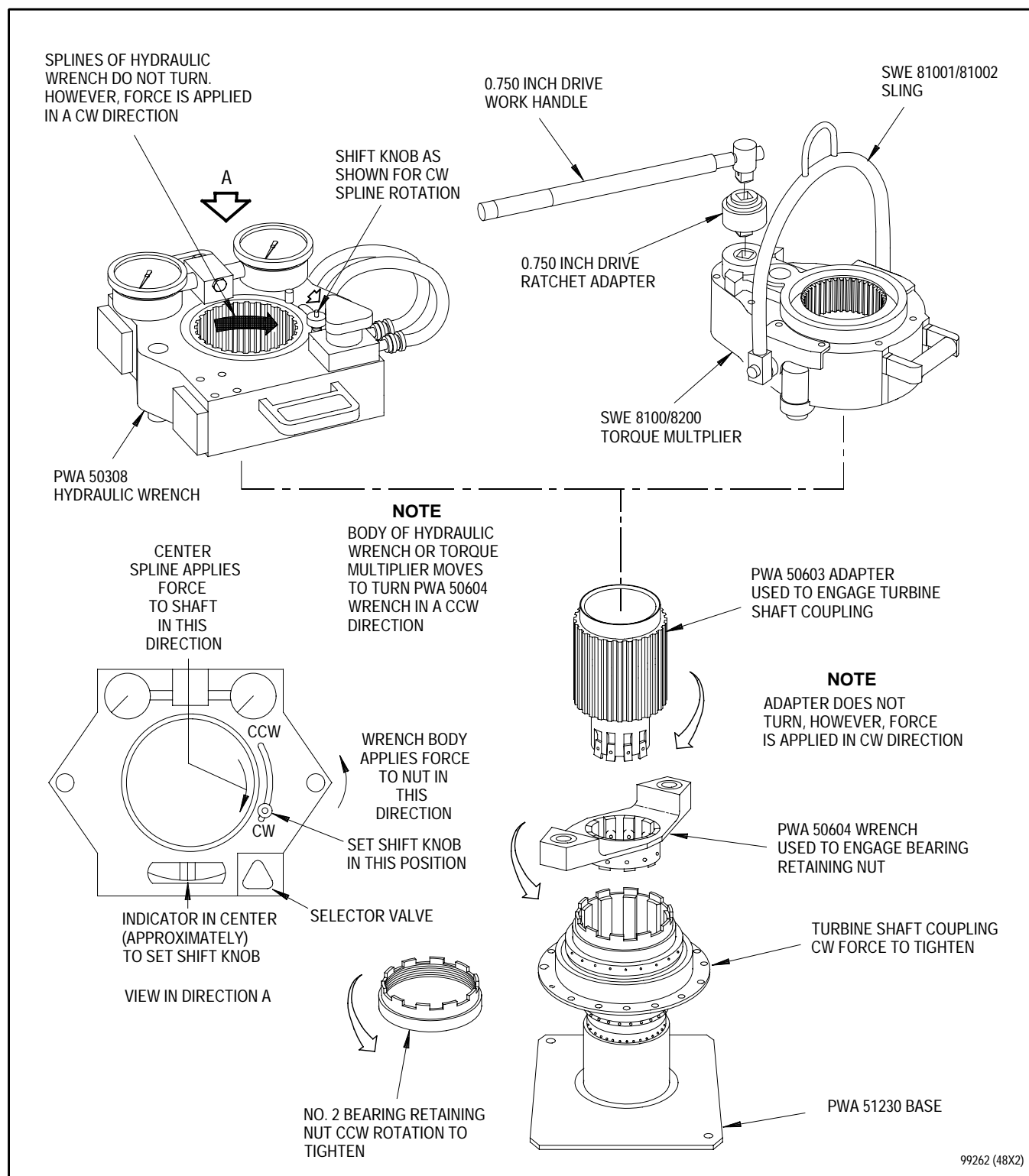


Figure 4. No. 2 Bearing Retaining Nut - Installation Tooling

- (5a) If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling onto torque multiplier.
- (5b) Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 wrench or connect PWA 2388 hook to SWE 81001/81002 sling.
- (6) Install PWA 50308 wrench or SWE 8100/8200 torque multiplier so dowels on body of wrench or torque multiplier fit into holes on PWA 50604 wrench. Attach ratchet adapter and work handle if SWE 8100/8200 torque multiplier is used. See figure 4.
- (6a) Set PWA 50308 wrench or SWE 8100/8200 torque multiplier so splines will turn clockwise. This will cause body of wrench or torque multiplier to turn counterclockwise and turn retaining nut counterclockwise. Splines at center of wrench or torque multiplier do not turn. See figure 4.
- (7) Actuate PWA 50308 wrench or SWE 8100/8200 torque multiplier to torque nut 4600 to 4800 pound-inches. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
- (8) Loosen nut to zero pound-inch torque.
- (9) Torque nut 4600 to 4800 pound-inches.
- (10) Align zero degree marks on moveable and stationary scales of PWA 50308 wrench or SWE 8100/8200 torque multiplier.
- (11) Loosen nut to zero pound-inch torque.
- (12) Torque nut 4600 to 4800 pound-inches.
- (13) Check zero degree marks on scales of PWA 50308 wrench or SWE 8100/8200 torque multiplier. If marks are lined up or if nut has been tightened up to 1°30' maximum beyond point when zero degree marks line up, proceed to step 1.(15).
- (14) If zero degree marks are not lined up or nut has been tightened more than 1°30'; go back and repeat step 1.(8) through (13).
- (15) Loosen nut to zero pound-inch torque.
- (16) Torque nut 1500 to 1700 pound-inches.
- (17) Align zero degree marks on moveable and stationary scales of PWA 50308 wrench or SWE 8100/8200 torque multiplier.
- (18) Further tighten nut by turning it through an angle of 12 degrees minimum to 14 degrees maximum.
- (19) Remove hydraulic wrench or torque multiplier using hoist with nylon strap or sling respectively. Remove tooling.



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.

4. FINAL SEATING MEASUREMENT.

(See figure 2 and Figure 5.)

NOTE

Be sure to measure at the slot which was marked per paragraph 2.

- a. Measure Dimension Y, distance from end of turbine shaft coupling to the base of marked slot on retaining nut. (See figure 5.)
- b. Compare Dimension Y with Dimension X (determined in paragraph 2.) Dimension Y can be equal to or greater than Dimension X by 0.005 inch maximum.
- c. If measurement is within limits, parts are properly seated and the assembly is completed.
- d. If measurement is not within limits, parts are not properly seated. Disassemble the No. 2 bearing and coupling to determine cause of parts not seating.
- e. Check to see if key washer(10, figure 2) fits into slots of nut and turbine shaft coupling. If slots are not lined up, it is permissible to further tighten nut to the next slot.
- f. Install key washer(10) and retaining ring(11).

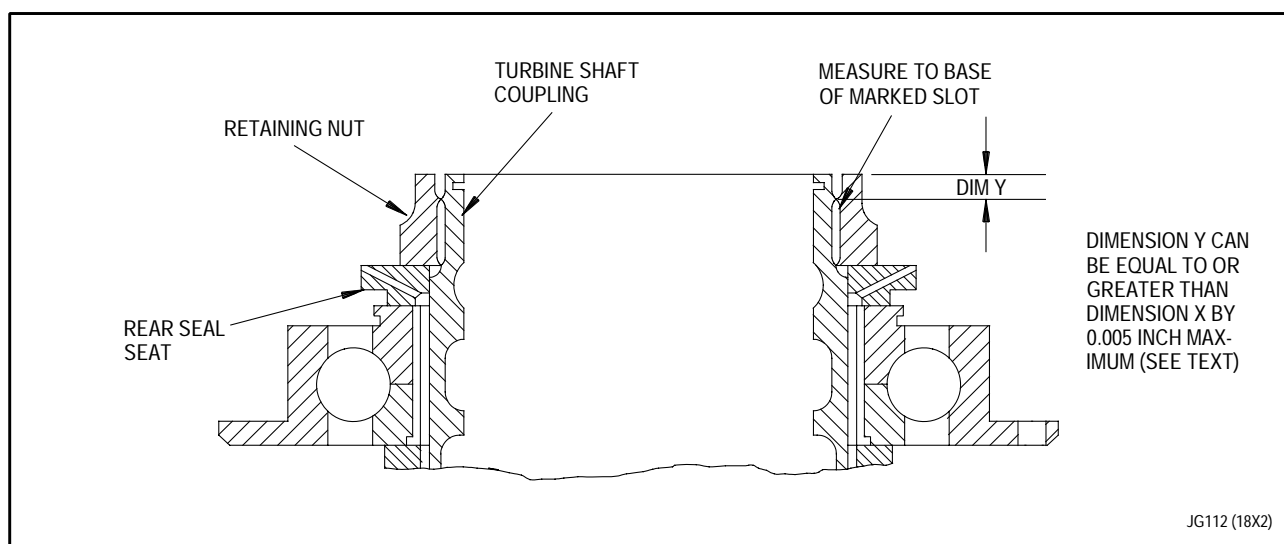


Figure 5. No. 2 Bearing and Coupling - Final Seating Measurement

WORK PACKAGE

TECHNICAL PROCEDURES

GEARSHAFT ASSEMBLY, GEARBOX DRIVE BEVEL -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	12	29	13 - 18	0
2 - 11	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Gloves, lint-free	-
Pencil (crayon), silver metal marking (hard) (PMC 4059-7)	Colorbrite No. 2101 or Anadel No. 1936
Pencil (crayon), silver metal marking (hard)	Color-Tex No. 1843

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Key washer	4001879	1
Key washer	4001884	1
Key washer	4010797	1

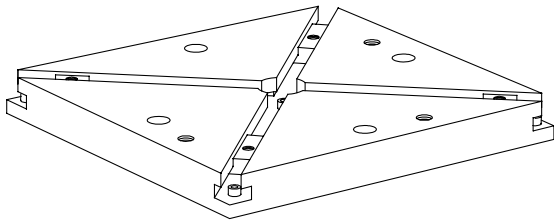
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	Gearshaft Bearing Inner Race and Rollers - Installation	
	Adapter, Holding - - - - -	PWA 21500
	Base, Gearbox drive bevel gearshaft - - - - -	PWA 50684
	Wrench, Gearbox drive bevel gearshaft roller bearing inner race retaining nut - - - - -	PWA 50686
	Base, Gearbox drive bevel gearshaft bearings - - - - -	PWA 51818
	Drift, Gearbox drive bevel gearshaft roller bearing inner race - - - - -	PWA 55228

APPLICABLE SUPPORT EQUIPMENT (continued)

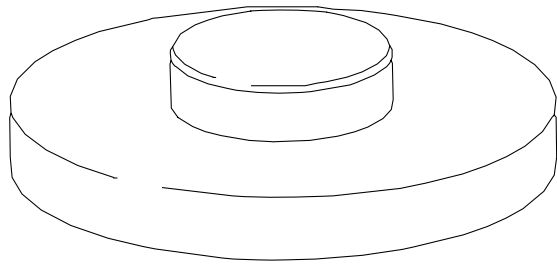
Paragraph	Function - Tool Nomenclature	Tool Number
3	Gearbox Drive Bearing Housing - Bearing Installation	
	Drift, Gearbox drive bevel gearshaft roller bearing inner race - - - - -	PWA 50687
	Support, Gearbox drive bevel gearshaft ball bearing sleeve - - - - -	PWA 50688
	Support, Gearbox drive bevel gearshaft ball bearing sleeve - - - - -	PWA 50689
	Drift, Gearbox drive bevel gearshaft ball bearing inner race - - - - -	PWA 50690
	Drift, Gearbox drive bevel gearshaft ball bearing outer race - - - - -	PWA 50692
	Holder, No. 2 bearing housing - - - - -	PWA 50695
	Wrench, Gearbox drive bevel gearshaft ball bearing outer race retaining nut - - - - -	PWA 50696
4	Gearbox Drive Bearing Housing And Bearing - Installation Onto Gearshaft	
	Base, Gearbox drive bevel gearshaft bearings - - - - -	PWA 51818
	Drift, Ball bearing to gearshaft - - - - -	PWA 51819
6	Inner Retaining Nut And Coupling - Installation	
	Wrench, Gearbox drive bevel gearshaft ball bearing inner race retaining nut - - - - -	PWA 50699
	Base, Gearbox drive bevel gearshaft bearings - - - - -	PWA 51818

ILLUSTRATED SUPPORT EQUIPMENT



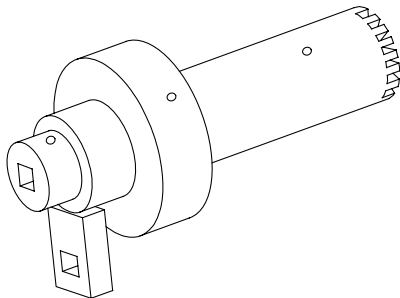
PWA 21500 -C

Figure T1. PWA 21500 Adapter



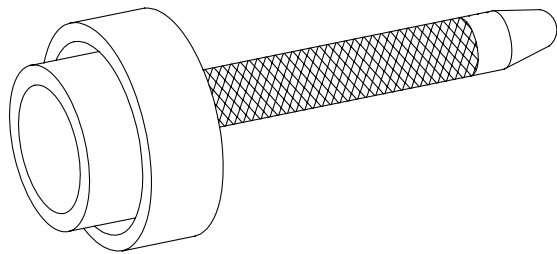
PWA 50684 -C

Figure T2. PWA 50684 Base



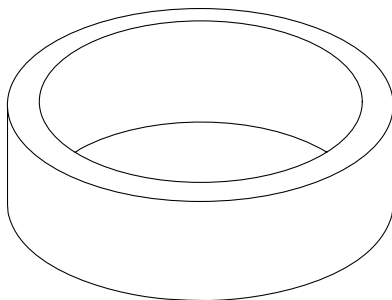
PWA 50686 -C

Figure T3. PWA 50686 Wrench



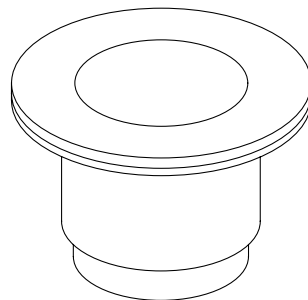
PWA 50687 -C

Figure T4. PWA 50687 Drift



PWA 50688 -C

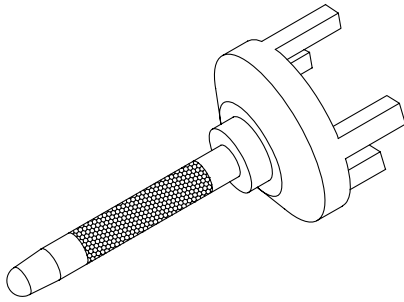
Figure T5. PWA 50688 Support



PWA 50689 -C

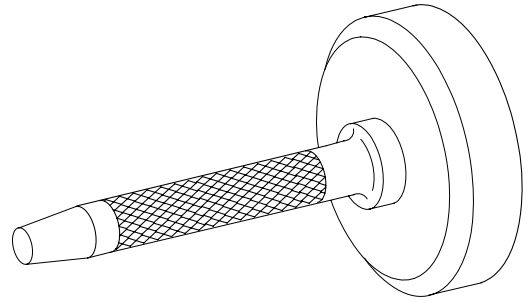
Figure T6. PWA 50689 Support

ILLUSTRATED SUPPORT EQUIPMENT (continued)



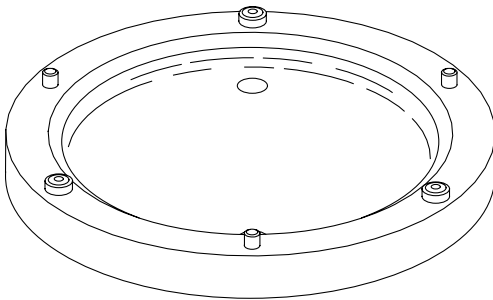
PWA 50690 -C

Figure T7. PWA 50690 Drift



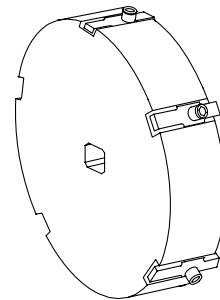
PWA 50692 -C

Figure T8. PWA 50692 Drift



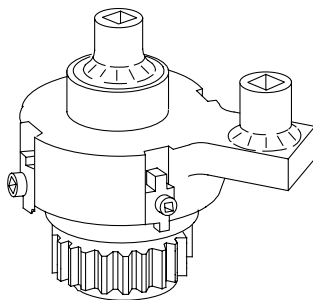
PWA 50695 -C

Figure T9. PWA 50695 Holder



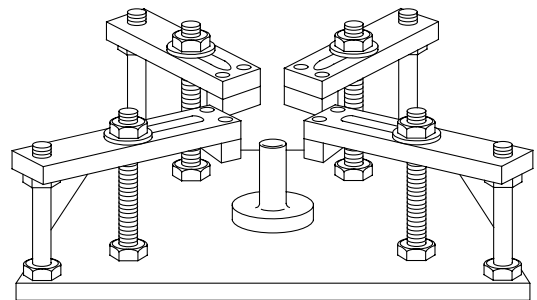
PWA 50696 -C

Figure T10. PWA 50696 Wrench



PWA 50699 -C

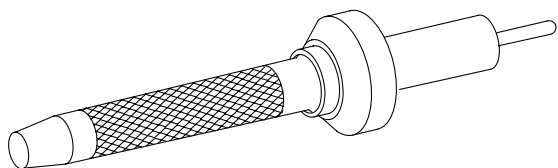
Figure T11. PWA 50699 Wrench



PWA 51818 -C

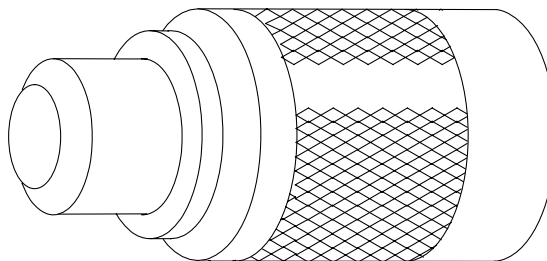
Figure T12. PWA 51818 Base

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 51819 -C

Figure T13. PWA 51819 Drift



PWA 55228 -C

Figure T14. PWA 55228 Drift

1. INTRODUCTION.

- a. This work package contains instructions for assembling the gearbox drive bevel gearshaft assembly.

2. GEARSHAFT BEARING INNER RACE AND ROLLERS - INSTALLATION.

(See Figure 1.)



Be careful when handling gearshaft bearing(16, figure 1). Rollers can separate from the inner race and fall free. Rollers can be wrapped with an elastic band to keep them from falling out.

- a. Heat gearshaft bearing inner race and rollers(16) in hot oil 225° to 275°F (107° to 135°C).
- b. Place gearshaft(14) over center post of PWA 50684 base. Seat gearshaft on bottom of base.
- c. Install retaining ring(15) into ID groove of gearshaft(14).
- d. Install gearshaft bearing inner race and rollers(16) on gearshaft(14) as follows:
 - (1) Install gearshaft bearing inner race and rollers (with mating number up) on gearshaft.

- (2) Install PWA 55228 drift and seat inner race and rollers with standard arbor press.

- (3) Remove drift.

- e. Install PWA 51818 base onto PWA 21500 adapter.
- f. Install bolt(17) into small ID of gearshaft.
- g. Install gearshaft with bolt onto PWA 51818 base with gear teeth down.
- h. Install key washer(13) and retaining nut(12) onto bolt(17).

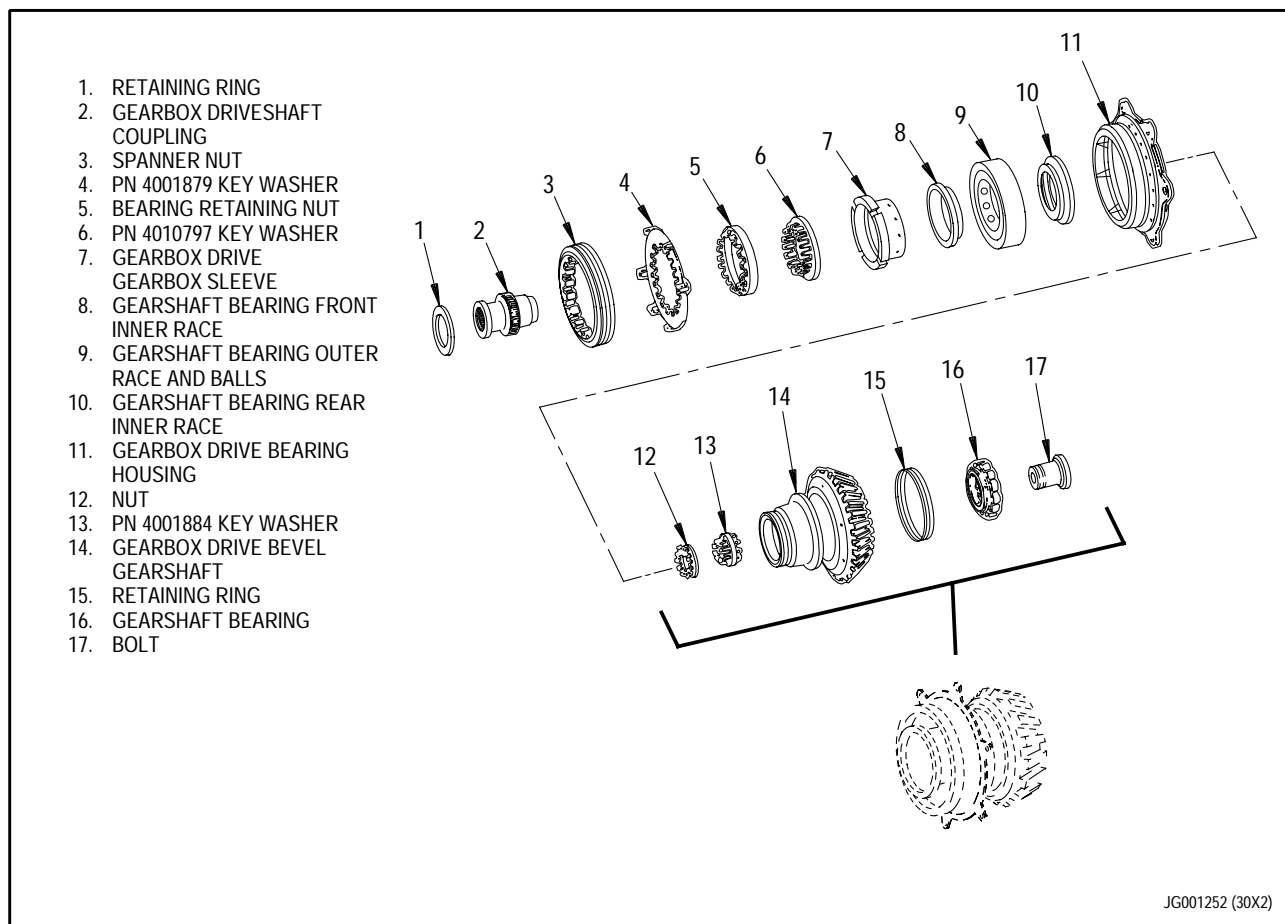


Figure 1. Gearbox Drive Bevel Gearshaft - Assembly

i. Torque retaining nut as follows:

- (1) Engage teeth on inner detail of PWA 50686 wrench with slots on bolt(17).
- (2) Engage teeth on outer detail with slots in retaining nut(12).
- (3) Install wrench on inner detail to act as counterforce.
- (4) Turn outer detail, torquing nut 245 to 255 pound-inches.

NOTE

All key washer slots do not align.

- (5) Check to see if slots in nut and key washer tabs align. If necessary, it is permissible to further tighten to next slot.

j. Bend tabs of key washer to lock nut in place.

3. GEARBOX DRIVE BEARING HOUSING - BEARING INSTALLATION.

(See figure 1 and Figures 2 and 3.)

- a. Mark location of X-marks on front and rear bearing inner races(8 and 10, figure 1) using a silver pencil.
- b. Mark location of Z-mark on rear inner race(10) using a silver pencil.
- c. Heat inner races(8 and 10) and housing(11) in hot oil for 20 minutes, 225° to 275°F (107° to 135°C).
- d. Make a mark next to any one cutout on gearshaft sleeve(7).
- e. Install sleeve(7), smaller diameter up, onto recessed side of PWA 50688 support.
- f. Install front half of inner race (8) as follows:

NOTE

- Front half of inner race does not have a Z-mark.
 - Inner race and sleeve were marked in steps a. and d.
- (1) Install inner race front half on sleeve(7). Put end with mating number down and align X-mark with mark that was put on sleeve in step d.

- (2) Install PWA 50687 drift; seat inner race front half with standard arbor press.
- (3) Check race for seating using 0.001 inch piece of feeler stock between race and sleeve. If feeler stock can be inserted race is not fully seated.

- g. Install inner race rear half(10) as follows:

NOTE

- (1) Install inner race rear half (10) on sleeve(7). Put end with mating number up, and align X-mark on rear half with X-mark on front half(8) within five degrees.
- (2) Install PWA 50687 drift.
- (3) Seat inner race rear half with standard arbor press.

- (4) Check race for seating using 0.001 inch piece of feeler stock between front and rear inner race halves. If feeler stock can be inserted, race is not fully seated.

- h. Allow assembly to cool to room temperature. Measure distance from top of inner race to bottom of sleeve. (See figure 2.) Record dimensions as A and AA.

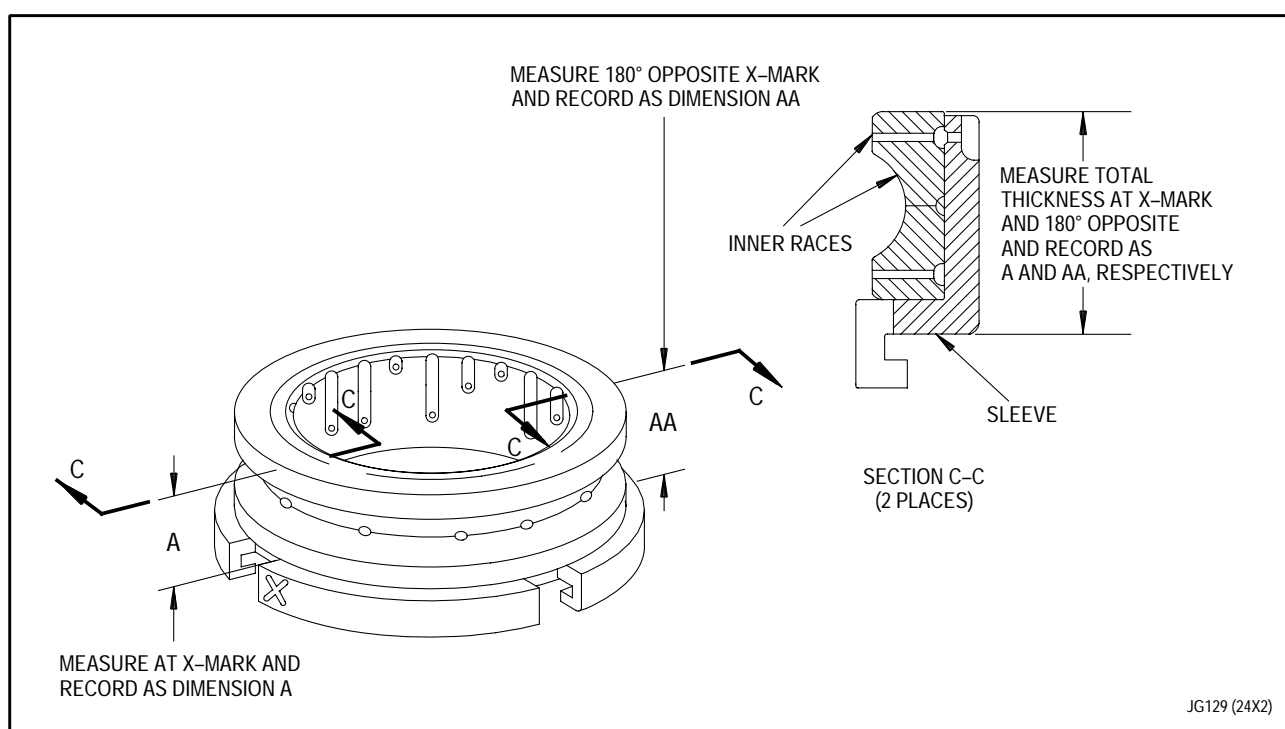


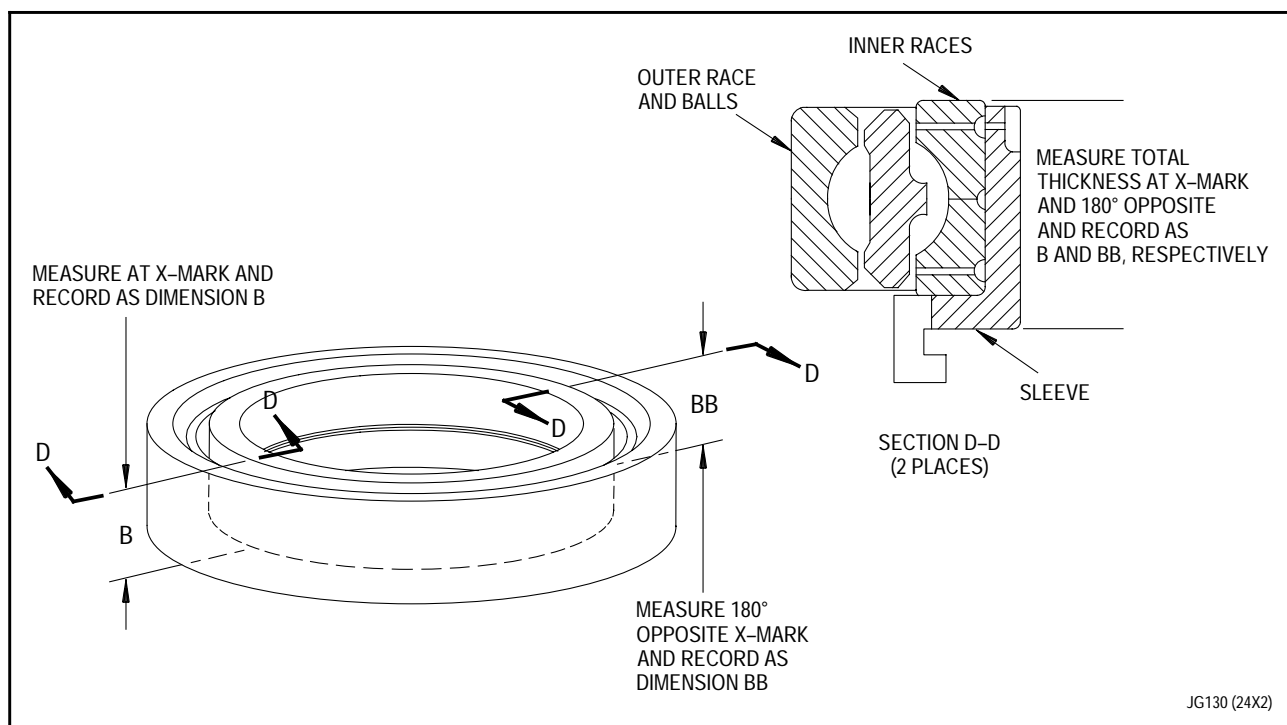
Figure 2. Stack-up Measurement of Inner Races and Sleeve

- i. Disassemble sleeve and bearing details as follows:
 - (1) Install assembled sleeve(7, figure 1) and inner race halves (8 and 10) on PWA 50689 support with flanged end of sleeve up.
 - (2) Install PWA 50690 drift so tabs on base of drift fit in four slots on flange of sleeve(7).
 - (3) Press bearing inner races(8 and 10) off sleeve with standard arbor press.
- j. Repeat steps a. through c., e., and f.
- k. Mark upper edge of sleeve(7) in line with X-mark on bearing front inner race(8) using a silver pencil.
- l. Install outer race and balls(9), with part number up, onto inner race front half(8).
- m. Install inner race rear half (10) as follows:
 - n. Record dimensions as B and BB.
 - o. Compare dimensions from step n. with dimensions recorded at step h.
 - (1) Dimension A shall equal dimension B within 0.001 inch.
 - (2) Dimension AA shall equal dimension BB within 0.001 inch.
 - p. If requirements of step o. are not met, repeat steps i. through o.

NOTE

Rear half has a Z-mark.

- (1) Install inner race rear half(10) on sleeve(7). Put end with mating number up, and align X-mark on bearing with mark on sleeve.
- (2) Install PWA 50687 drift.
- (3) Seat inner race rear half(10) with standard arbor press. Allow assembly to cool to room temperature. Measure distance from top of inner race to bottom of sleeve. See figure 3.



JG130 (24X2)

Figure 3. Stack-up Measurement of Inner Races, Sleeve and Outer Race and Balls

q. Install bearing and sleeve into gearbox drive bearing housing(11, figure 1) as follows:

- (1) Place housing on bench with threaded end up.
- (2) Install assembled bearing and sleeve into housing with large OD of sleeve up.
- (3) Install PWA 50692 drift on outer race of bearing.
- (4) Seat bearing with standard arbor press.

r. Install spanner nut(3) as follows:

- (1) Place assembled gearbox drive bearing housing onto PWA 50695 holder with large OD down. Align holes in housing with three pins (supplied with PWA 50695) and secure with cap screws.

NOTE

Spanner nut has left-hand threads. Turn spanner nut counterclockwise (left-hand) to tighten it.

- (2) Install key washer(4) into bearing housing(11); install spanner nut(3) in housing by turning counterclockwise.

- (3) Install PWA 50696 wrench so teeth engage slots in key washer(4) and spanner nut(3).
- (4) Torque nut 425 to 475 pound-inches.
- (5) Check alignment of locking tabs of key washer(4) with slots in spanner nut(3) and bearing housing(11). If necessary, tighten spanner nut to next slot.
- (6) Bend key washer(4) tabs to secure spanner nut(3).

4. GEARBOX DRIVE BEARING HOUSING AND BEARING - INSTALLATION ONTO GEARSHAFT.

(See figure 1 and Figure 4.)

- a. Heat assembled gearbox drive bearing housing(11, figure 1) in hot oil for 30 minutes 225° to 275°F (107° to 135°C).

NOTE

Marks were made on gearshaft when it was measured per paragraph 3. If necessary, touch up marks to keep them clearly visible.

- b. Install assembled gearshaft(14) into PWA 51818 base, gear end down. Measure and record gearshaft per figure 4.

- c. Remove gearbox drive bearing housing(11, figure 1) from hot oil tank.

NOTE

Sleeve(7) was installed in housing(11) per paragraph 3. Flanged end of sleeve faces up for installation onto gearshaft(14).

- d. Install drive bearing housing(11) on gearshaft(14). Align mark on sleeve(7) with mark on gearshaft(14).
- e. Install PWA 51819 drift. Seat drive bearing housing(11) on gearshaft(14) with standard arbor press.

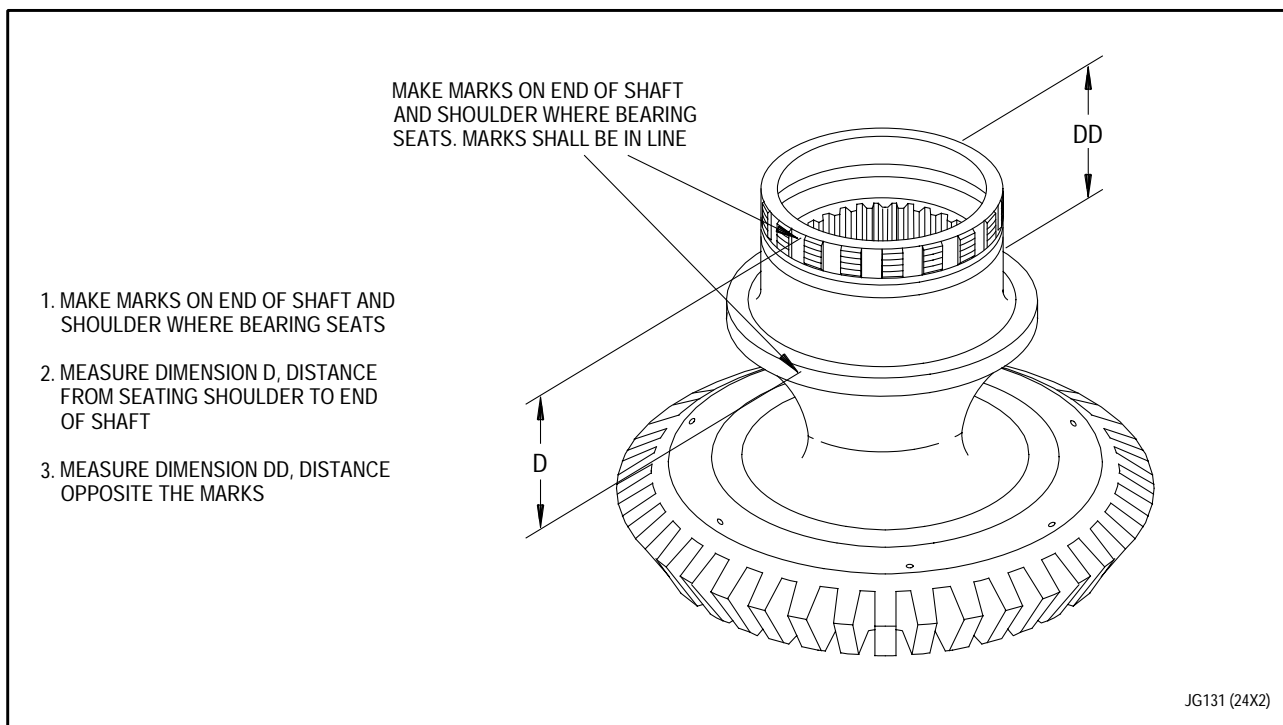


Figure 4. Gearbox Drive Bevel Gearshaft - Measurement

**5. GEARBOX DRIVE BEARING HOUSING
AND BEARING - SEATING CHECK.**

(See figures 2, 4 and Figure 5.)

- a. Measure distance from top of gearshaft to top of sleeve inside bearing housing (See figure 5.) Be sure to measure at marked location (figure 2). Record as Dimension F.
- b. Measure distance from top of gearshaft to top of sleeve at location opposite (180 degrees) marked location. Record as Dimension FF.
- c. Subtract Dimension A, recorded in paragraph 3, from Dimension D (figure 4) to find Dimension E.

$$D - A = E$$

- d. Subtract Dimension AA, recorded in paragraph 3, from Dimension DD (figure 4) to find Dimension EE.

$$DD - AA = EE$$

- e. Compare Dimension E with Dimension F. Dimension E shall be less than or equal to Dimension F within 0.001 inch.
- f. Compare Dimension EE with Dimension FF. Dimension EE shall be less than or equal to Dimension FF within 0.001 inch.
- g. If dimensions are within limits, drive bearing housing and bearing are properly seated. If not within limits reassemble to properly seat parts.

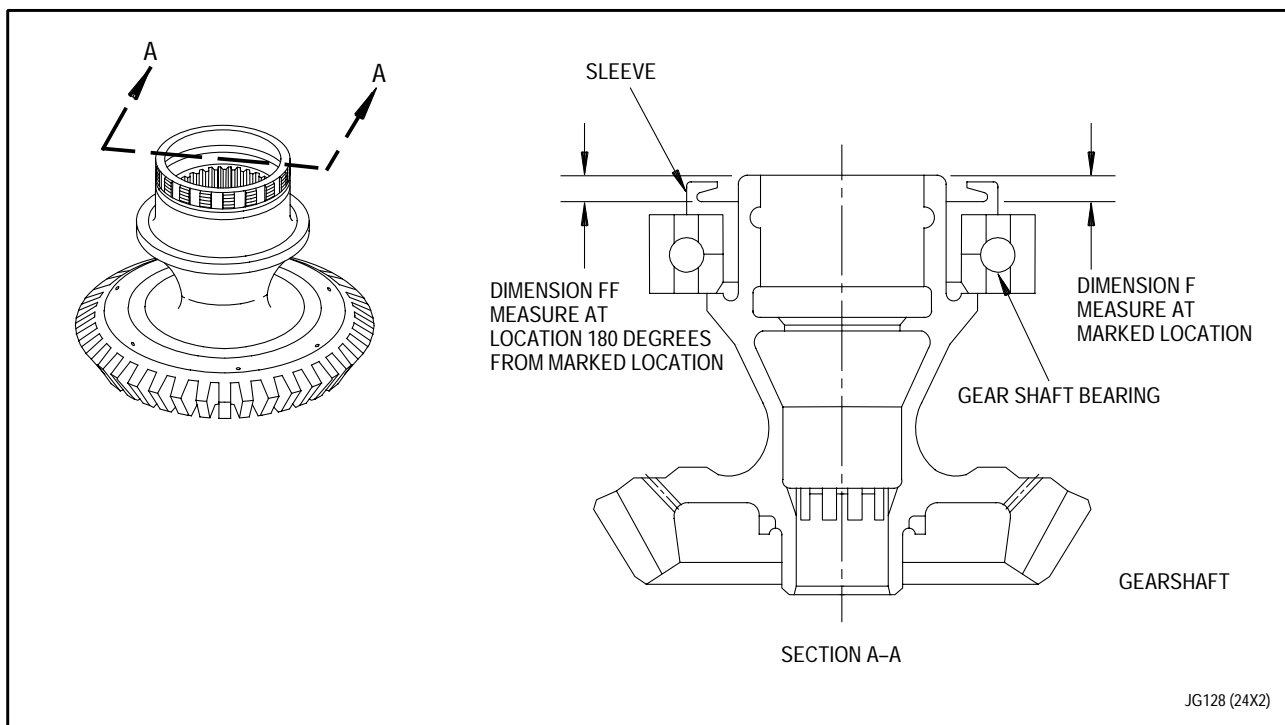


Figure 5. Gearbox Drive Bearing and Housing - Seating Check

**6. INNER RETAINING NUT AND COUPLING -
INSTALLATION.**

(See figure 1.)

- a. Install gearshaft assembly(14, figure 1) onto PWA 51818 base with gear end down.
- b. Install key washer(6) over gearshaft(14).
- c. Install retaining nut(5) onto gearshaft(14).
- d. Torque retaining nut(5) as follows:
 - (1) Install PWA 50699 wrench so spline inside wrench engages spline in end of gearshaft(14).
 - (2) Engage teeth of outer detail of PWA 50699 wrench with slots in retaining nut(5).
 - (3) Hold inner detail of PWA 50699 with wrench for counterforce and tighten outer detail. Torque nut 475 to 525 pound-inches.
 - (4) Check to see if locking tab in key washer(6) aligns with slot in nut(5). If necessary, tighten nut to next slot.
 - (5) Install coupling(2), with splined end up, inside gearshaft(14).
 - (6) Install retaining ring(1) to secure coupling(2) inside gearshaft(14).
 - (7) Bend tabs of key washer(6) to lock nut(5). Bend all unused tabs inward over end of gear.

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, ASSEMBLY OF, NO. 2 BEARING -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	9	4	0	8 - 10	0
2	0	5 - 6	9		
3	9	7	8		

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Compound, antigalling (PWA 36545)	Everlube 382
Compound, antigalling (PWA 550)	Hi-T 650 or Lubri-Bond HT
Dye, layout	Micro-Supreme (Purple)
Gloves, lint-free	-
Lockwire (0.025 inch diameter)	MS9226-03
Oil, lubricating	MIL-L-7808

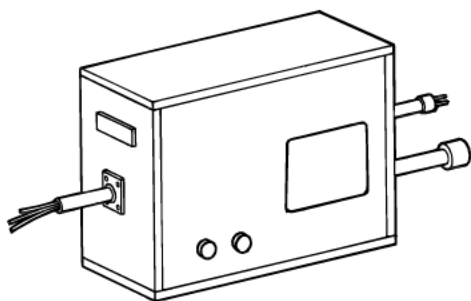
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Key washer	4001886	1

APPLICABLE SUPPORT EQUIPMENT

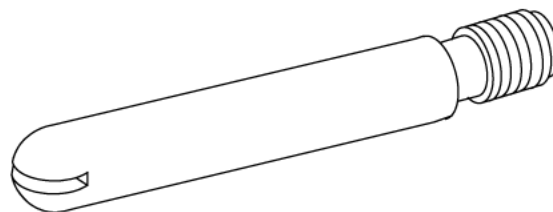
Paragraph	Function - Tool Nomenclature	Tool Number
2	Gearbox Drive Bevel Gearshaft Assembly - Installation	
	Drift, Gearbox drive bevel gearshaft roller bearing outer race - - - - -	PWA 50680
	Wrench, Gearbox drive bevel gearshaft roller bearing outer race - - - - -	PWA 50682
	Heater - - - - -	PWA 57393
		or
		PWA 50700
	Drift, Tower shaft subassembly to No. 2 bearing housing - - - - -	PWA 51822
	Fixture, No. 2 bearing housing assembly - - - - -	PWA 51823
	Heater, No. 2 bearing housing control, heater - - - - -	PWA 57400
		or
		PWA 52848
	Control, Heater - - - - -	PWA 61685
		or
		PWA 25672
3	No. 2 Rear and No. 3 Front Seal Assembly - Installation	
	Fixture, No. 2 bearing housing assembly - - - - -	PWA 51823
4	No. 2 Bearing and Coupling Assembly - Installation	
	Pin, Aligning (two required) - - - - -	PWA 50611
	Drift, No. 2 bearing and coupling assembly - - - - -	PWA 50702

ILLUSTRATED SUPPORT EQUIPMENT



PWA 25672 -C

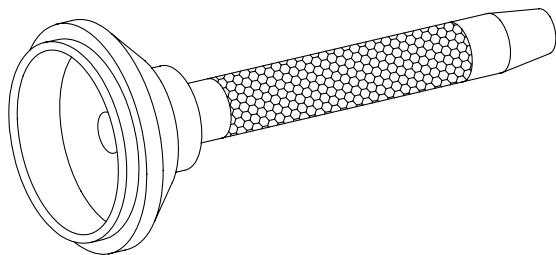
Figure T1. PWA 25672 Control



PWA 50611 -C

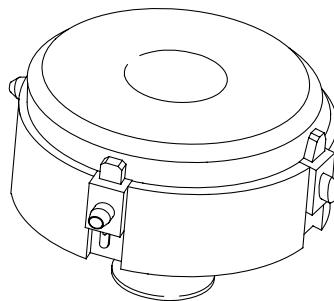
Figure T2. PWA 50611 Pin

ILLUSTRATED SUPPORT EQUIPMENT (continued)



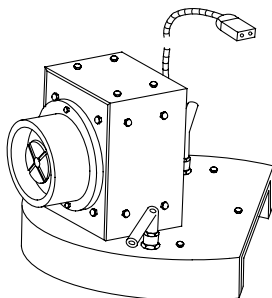
PWA 50680 -C

Figure T3. PWA 50680 Drift



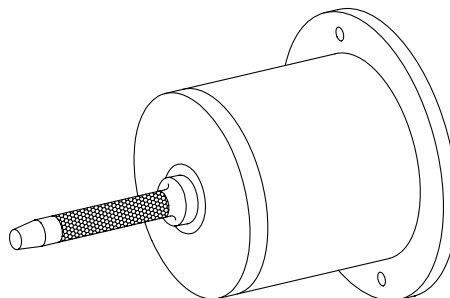
PWA 50682 -C

Figure T4. PWA 50682 Wrench



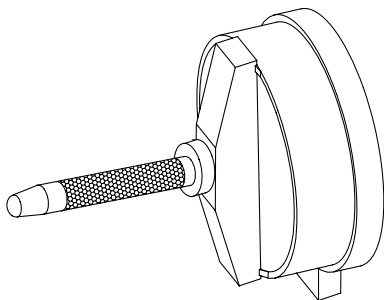
PWA 50700 -C

Figure T5. PWA 50700 Heater



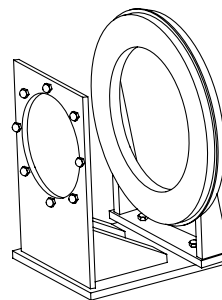
PWA 50702

Figure T6. PWA 50702 Drift



PWA 51822 -C

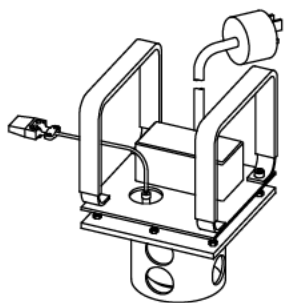
Figure T7. PWA 51822 Drift



PWA 51823 -C

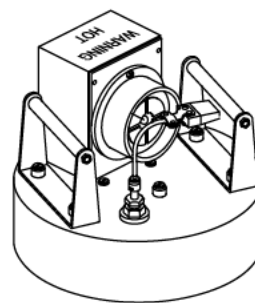
Figure T8. PWA 51823 Fixture

ILLUSTRATED SUPPORT EQUIPMENT (continued)



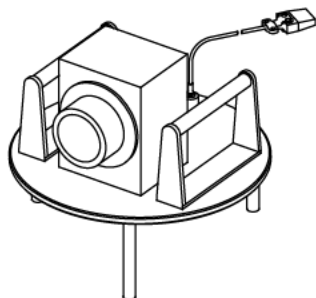
PWA 52848 -C

Figure T9. PWA 52848 Heater



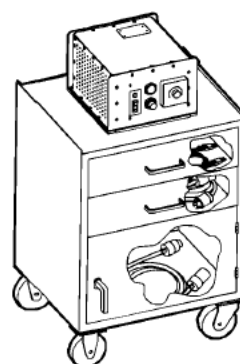
PWA 57393 -C

Figure T10. PWA 57393 Heater



PWA 57400 -C

Figure T11. PWA 57400 Heater



PWA 61685 -C

Figure T12. PWA 61685 Control

1. INTRODUCTION.

a. This work package contains instructions for assembly of the No. 2 bearing housing (No. 2 bearing package). The following items are installed:

- No. 2 bearing and coupling assembly
- Gearbox drive bevel gearshaft assembly
- No. 2 rear and No. 3 front seal assembly

2. GEARBOX DRIVE BEVEL GEARSHAFT ASSEMBLY - INSTALLATION.

(See Figures 1 and 2.)

NOTE

PWA 51823 fixture is used for the following operations:

- Roller bearing outer race installation
 - Outer race retaining nut installation
 - Heating of bevel gearshaft bore
 - Installation of gearbox drive bevel gearshaft
 - Installation of No. 2 and 3 bearing seal
- a. Install No. 2 bearing housing assembly(2, figure 1) in PWA 51823 fixture so bore for bevel gearshaft is up.

b. Install PWA 57400 or PWA 52848 heater over gearbox drive bevel gearshaft bore of No. 2 bearing housing assembly(2).

c. Connect PWA 61685 or PWA 25672 heater control to heater. Heat area to 250°F (121°C) with PWA 57400 for 10 minutes or with PWA 52848 for 30 minutes.

d. Disconnect and remove heater.

e. Install roller bearing outer race(11) as follows:

(1) Install outer race into bevel gearshaft bore of No. 2 bearing housing assembly(2) with serial number down.

(2) Insert pilot of PWA 50680 drift into race.

- (3) Seat race by striking drift with a hammer.

NOTE

Gearbox drive upper bearing retaining nut(9) has left-hand threads. Tighten nut counterclockwise (left-hand) to tighten it.

- (4) Install key washer(10) and retaining nut(9). Turn nut counterclockwise for installation.
- (5) Install PWA 50682 wrench so teeth engage slots of retaining nut(9).
- (6) Torque retaining nut 145 to 155 pound-inches.
- (7) Check that tabs of key washer(10) align with slots in retaining nut(9). If slots do not align, tighten to next slot.
- (8) Bend tabs of key washer(10) to secure retaining nut(9).

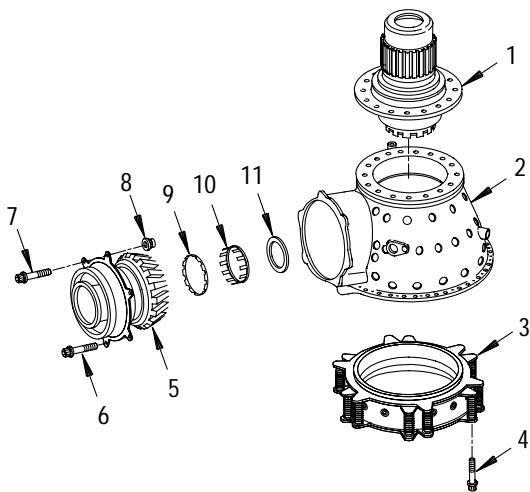


Be careful when handling gearbox drive bevel gearshaft assembly(5). Bearings inside could separate from inner race, and fall out of gearshaft.

f. Install gearshaft assembly(5) and housing assembly(2) as follows:

- (1) Set gearshaft assembly(5) loosely into bore of housing assembly(2).
- (2) Line up offset holes in housing assembly(2) and gearshaft assembly(5). Make temporary marks at these locations with layout dye.

- (3) Remove gearshaft assembly(5).
- (4) Install PWA 57393 or PWA 50700 heater as follows:
 - (a) Install PWA 57393 or PWA 50700 heater onto flanged area of gearshaft bore with flat side of heater flange facing rear flange of housing assembly(2).
 - (b) Secure heater to housing assembly(2) by pushing down and turning locking lugs under ID lip of gearshaft bore.
 - (c) Ensure thermocouple contacts flange of bore.
- (5) Connect PWA 61685 or PWA 25672 heater control and heat flange to 250°F (121°C) with PWA 57393 for 10 minutes or PWA 50700 for 20 minutes.
- (6) Lubricate gearshaft bearing rollers with engine oil. Push rollers inward against inner race.
- (7) Disconnect and remove heater.
- (8) Install gearshaft assembly(5) so offset holes line up. Be sure bearing rollers properly engage outer race in housing assembly(2).
- (9) Install PWA 51822 drift so it engages boltholes of gearshaft assembly(5).



INDEX NUMBER	DESCRIPTION	LUBRICATION	TORQUE (LB.-IN.)	LOCKWIRE
1.	NO. 2 BEARING AND COUPLING ASSEMBLY	-	-	-
2.	NO. 2 BEARING HOUSING ASSEMBLY	-	-	-
3.	NO. 2 REAR AND NO. 3 FRONT SEAL ASSEMBLY	-	-	-
4.	BOLT	-	36-40	-
5.	GEARBOX DRIVE BEVEL GEARSHAFT ASSEMBLY	-	-	-
6.	BOLT, 2 REQUIRED	PWA 550	27-30	MS9226-03
7.	BOLT, 4 REQUIRED	FEL PRO C-200	27-30	-
8.	NUT, 4 REQUIRED	-	-	-
9.	GEARBOX DRIVE UPPER BEARING RETAINING NUT	-	-	-
10.	PN 4001886 KEY WASHER	-	-	-
11.	ROLLER BEARING OUTER RACE	-	-	-

JG103 (30X2)

Figure 1. No. 2 Bearing Housing (No. 2 Bearing Package) - Assembly

- (10) Seat gearshaft assembly(5) by striking drift with a hammer. Tap gearshaft assembly lightly if necessary to ensure it is seated.
- (11) Lubricate bolts(7) with PWA 36545 antigalling compound.
- (12) Install bolts(7) and nuts(8) in four through-holes. Torque nuts 27 to 30 pound-inches.
- (13) Lubricate bolts(6) with PWA 550 antigalling compound.
- (14) Install bolts(6) in two threaded holes. Torque bolts 27 to 30 pound-inches.
- (15) Ensure there is no gap between flange faces of gearshaft assembly(5) and housing assembly(2) after bolts(6) are torqued.
- (16) Lockwire bolts(6) with MS9226-03 lockwire. To avoid interference, lockwire bolts as shown in figure 2. This will prevent interference when housing assembly is installed in intermediate case.

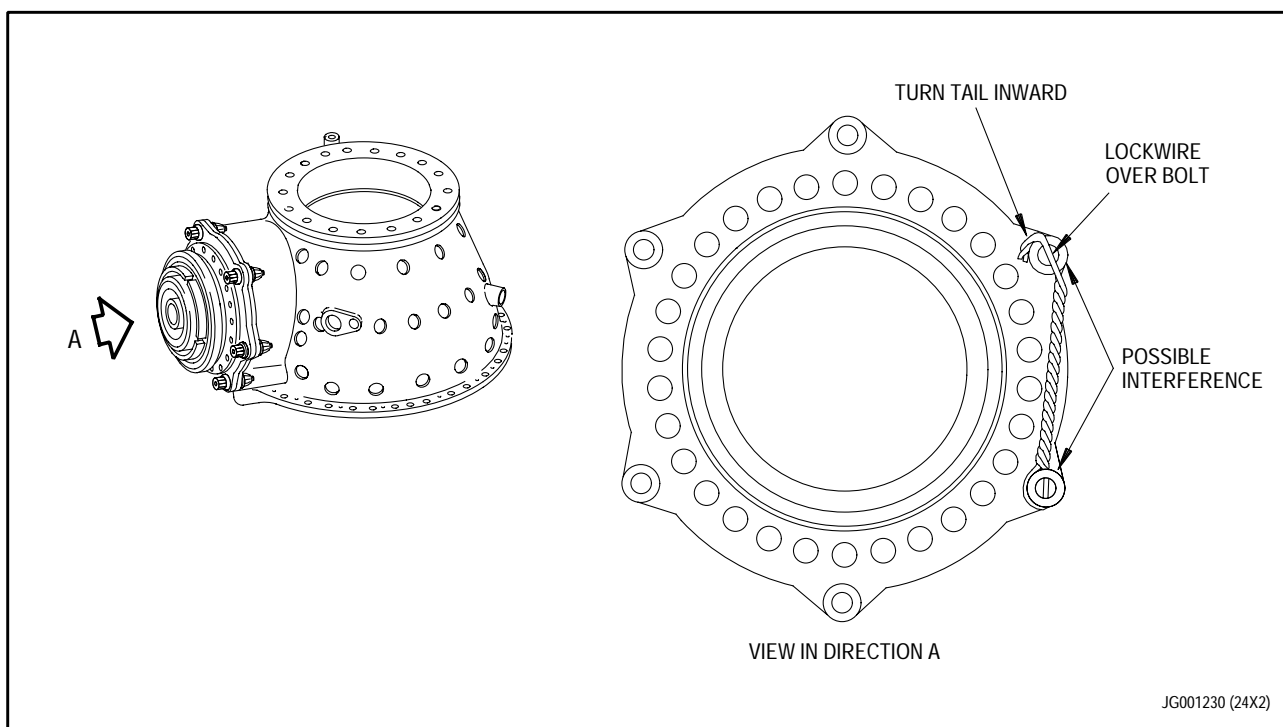


Figure 1. Lockwiring Gearbox Drive Bevel Gearshaft Bolts

3. NO. 2 REAR AND NO. 3 FRONT SEAL ASSEMBLY - INSTALLATION.

(See figure 1.)

- a. Install No. 2 bearing housing assembly(2, figure 1) in PWA 51823 fixture so front side is down.
- b. Stepped flange of seal support goes against housing assembly(2).
- c. Install seal assembly(3) into housing assembly(2). Align bolt holes of seal assembly with holes in housing assembly.
- d. Install bolts(4), and torque 36 to 40 pound-inches.

4. NO. 2 BEARING AND COUPLING ASSEMBLY - INSTALLATION.

(See figure 1.)

- a. Remove No. 2 bearing housing(2, figure 1) from PWA 51823 fixture and place on bench, rear end down.

- b. Install two PWA 50611 aligning pins, 180 degrees apart in bearing housing(2).
- c. Install coupling(1) into bearing housing(2).
- d. Install PWA 50702 drift so it engages two aligning pins installed in bearing housing(2).
- e. Seat coupling with standard arbor press and PWA 50702 drift.
- f. Remove PWA 50611 aligning pins.
- g. Install workbolts as follows:
 - (1) Loosely install two 0.100-32 UNJF X 0.500 inch workbolts 180 degrees apart in coupling.
 - (2) Torque bolts 65 to 85 pound-inches.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 2 AND 3 BEARING -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal Assembly, No. 2 and 3 Bearing - Air Leak Check - - - -	WP 607 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Pin, cotter	MS9245-23	6

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for assembly of the No. 2 and 3 bearing seal assembly. This assembly is sometimes called the No. 2 bearing rear and No. 3 bearing front seal assembly.

2. SEAL ASSEMBLY, NO. 2 AND 3 BEARING - ASSEMBLY.

(See Figure 1.)

NOTE

No. 2 bearing seal(1, figure 1), No. 2 and 3 bearing seal support assembly(5), and No. 3 bearing seal(7) were marked at disassembly.

- a. Place a clean piece of paper on work bench. Place No. 3 bearing seal(7) on bench with carbon seal down.
- b. Install metal seal ring(6) into groove of No. 3 bearing seal(7). Be sure pressure side of ring faces up (large OD down). (See figure 1.) Pressure side is next to part number on ID of ring.
- c. Place seal support assembly(5) on bench, 0.202 inch diameter dowel pin down.
- d. Place No. 3 bearing seal(7) on bench with carbon seal up.

- e. Install springs(4) onto pins of seal support assembly(5).
- f. Install three seal guides(3) on No. 3 bearing seal(7).
- g. Install No. 3 bearing seal(7) so seal guides(3) fit over pins of seal support assembly(5).
- h. Carefully compress seal(7) and install cotter pins(2). Do not bend cotter pins.
- i. Check that all springs(4) are properly seated over pins and on seal seats of seal support assembly(5).
- j. Turn seal support assembly(5) over so No. 3 bearing seal(7) is down.
- k. Install springs(4) onto pins of seal support assembly(5).
- l. Install three seal guides(3) on No. 2 bearing seal(1).

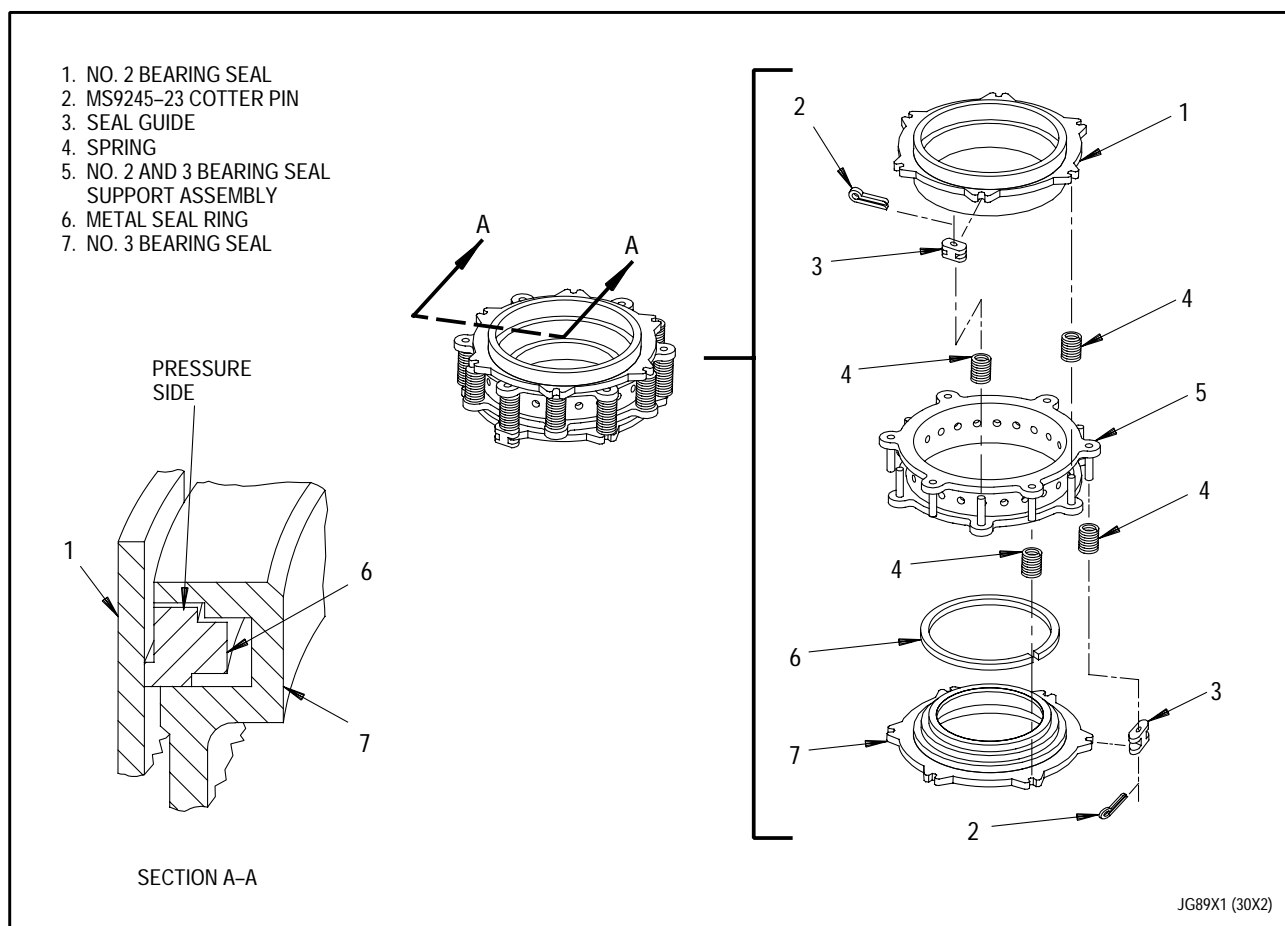


Figure 1. No. 2 and 3 Bearing Seal Assembly - Assembly

- m. Install No. 2 bearing seal(1) so seal guides(3) fit over pins of seal support assembly(5).
- n. Carefully compress seal(1) and install cotter pins(2). Do not bend cotter pins.
- o. Check that all springs(4) are properly seated over pins and on seal seats of seal support assembly(5).
- p. Leak check No. 2 and 3 bearing seal assembly per T.O. 2J-F100-53-7, WP 607 00.

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 2 AND 3 BEARING -

AIR LEAK CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8					0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

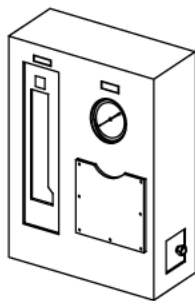
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

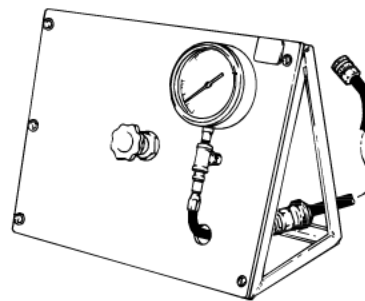
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 2 and 3 Bearing Seal Assembly - Air Leak Check	
	Flowmeter, Air seal assembly airflow check - - - - -	PWA 6507
	Regulator - - - - -	PWA 21875
	Fixture, Air leak check, No. 2 and 3 bearing seal assembly - - - - -	PWA 51021

ILLUSTRATED SUPPORT EQUIPMENT



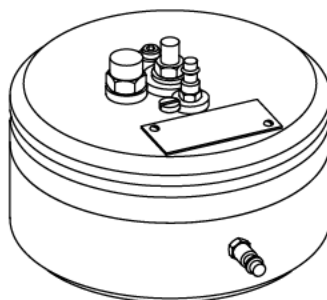
PWA 6507-C

Figure T1. PWA 6507 Flowmeter



PWA 21875 -C

Figure T2. PWA 21875 Regulator



PWA 51021 -C

Figure T3. PWA 51021 Fixture

1. INTRODUCTION.

- a. This work package contains instructions for leak check of No. 2 and 3 bearing seal assembly.

2. NO. 2 AND 3 BEARING SEAL ASSEMBLY - AIR LEAK CHECK.

(See Figure 1.)

- a. Perform air leak check per figure 1.

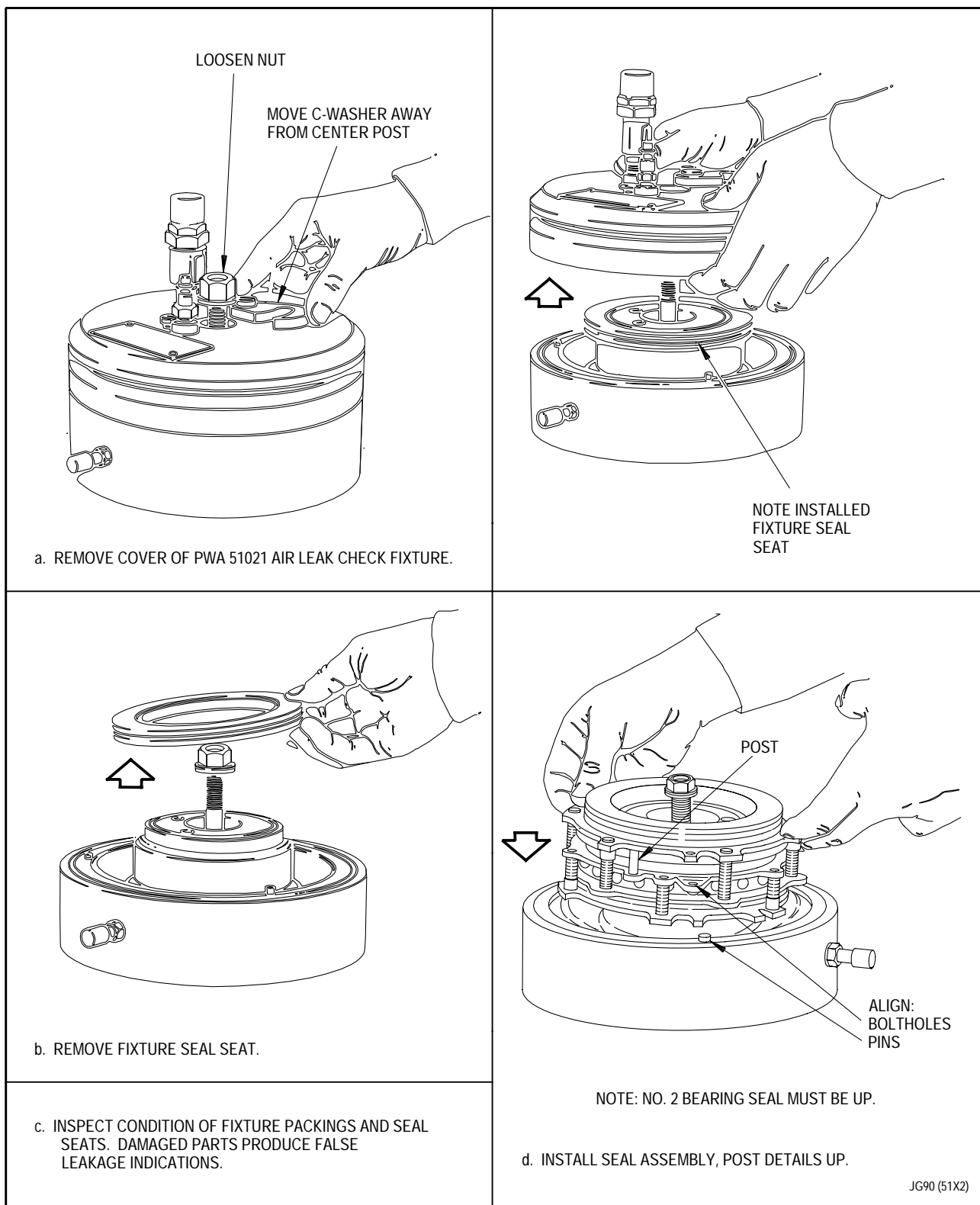
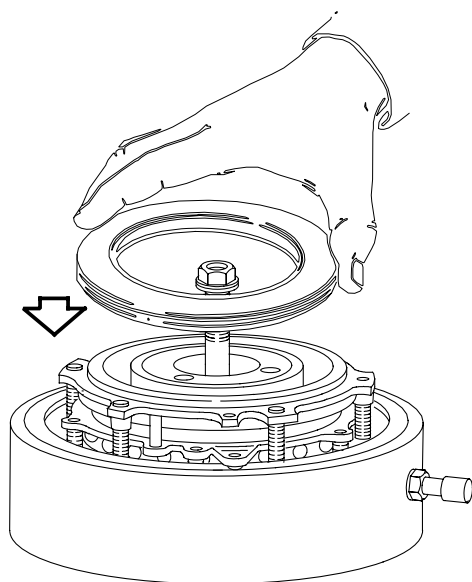
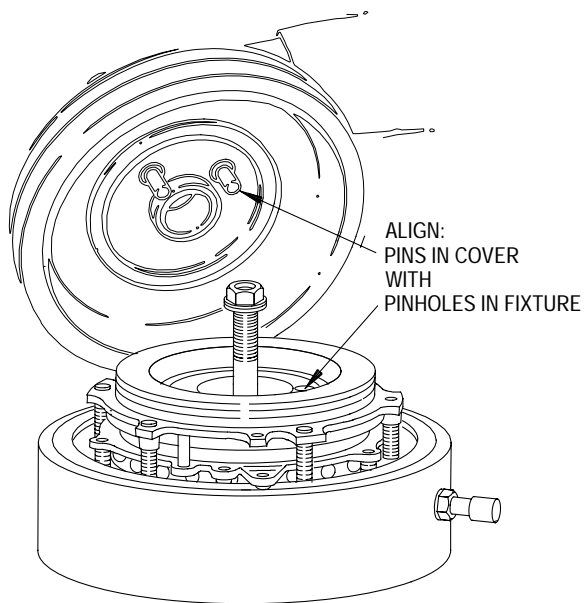


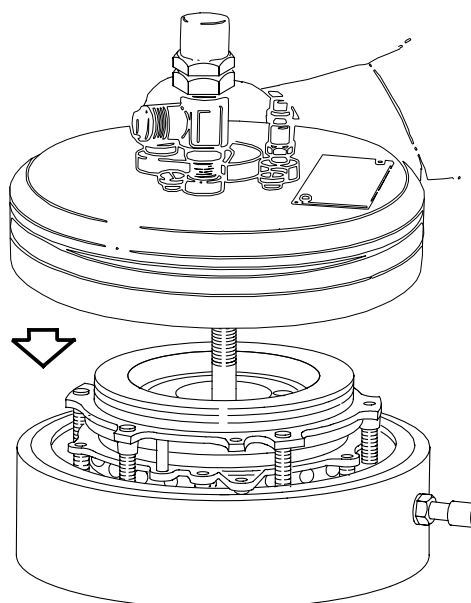
Figure 1. No. 2 and 3 Bearing Seal Assembly - Air Leak Check
(Sheet 1 of 4)



e. INSTALL FIXTURE SEAL SEAT.



f. INSTALL COVER OF FIXTURE.



JG91 (51X2)

**Figure 1. No. 2 and 3 Bearing Seal Assembly - Air Leak Check
(Sheet 2 of 4)**

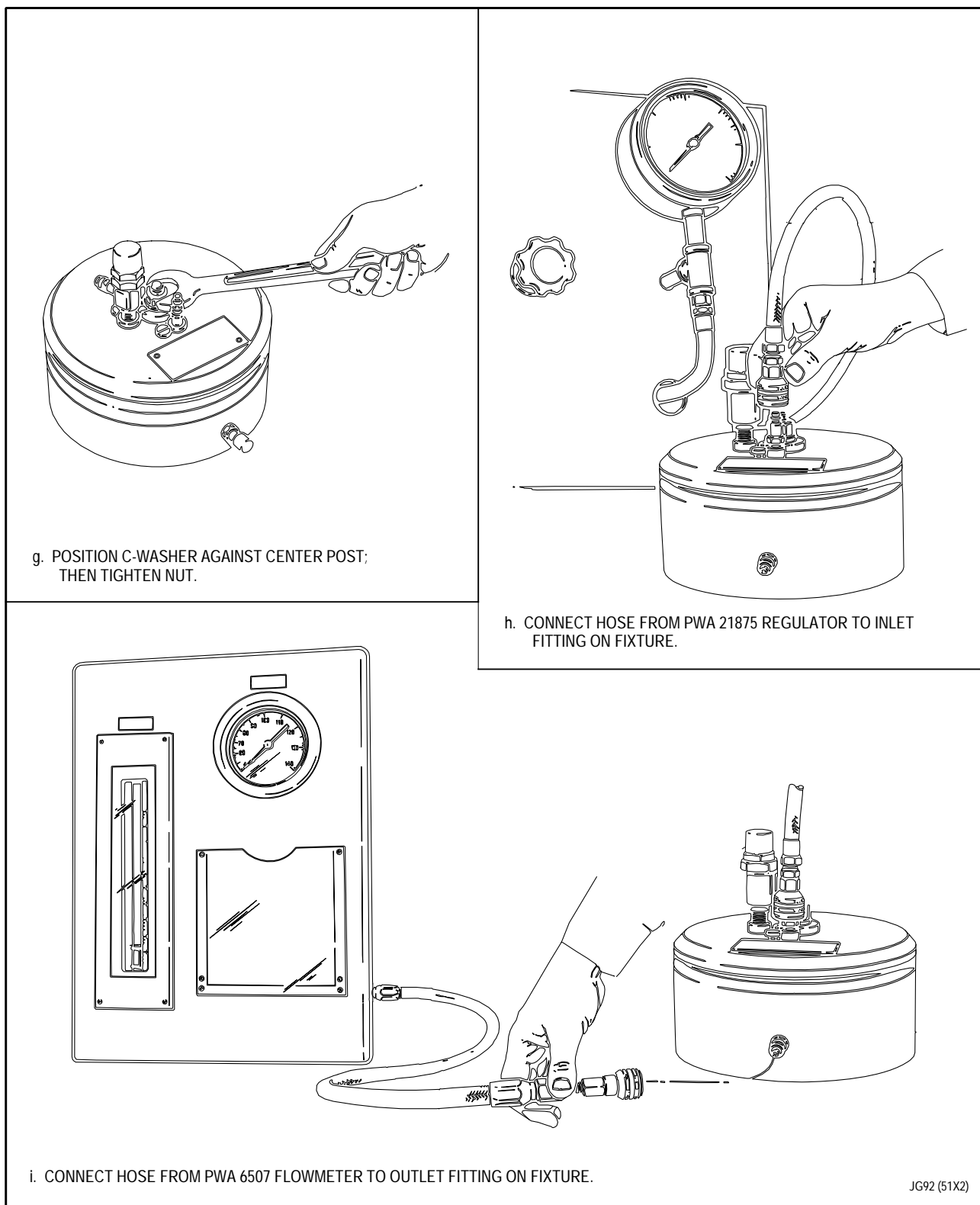


Figure 1. No. 2 and 3 Bearing Seal Assembly - Air Leak Check
(Sheet 3 of 4)

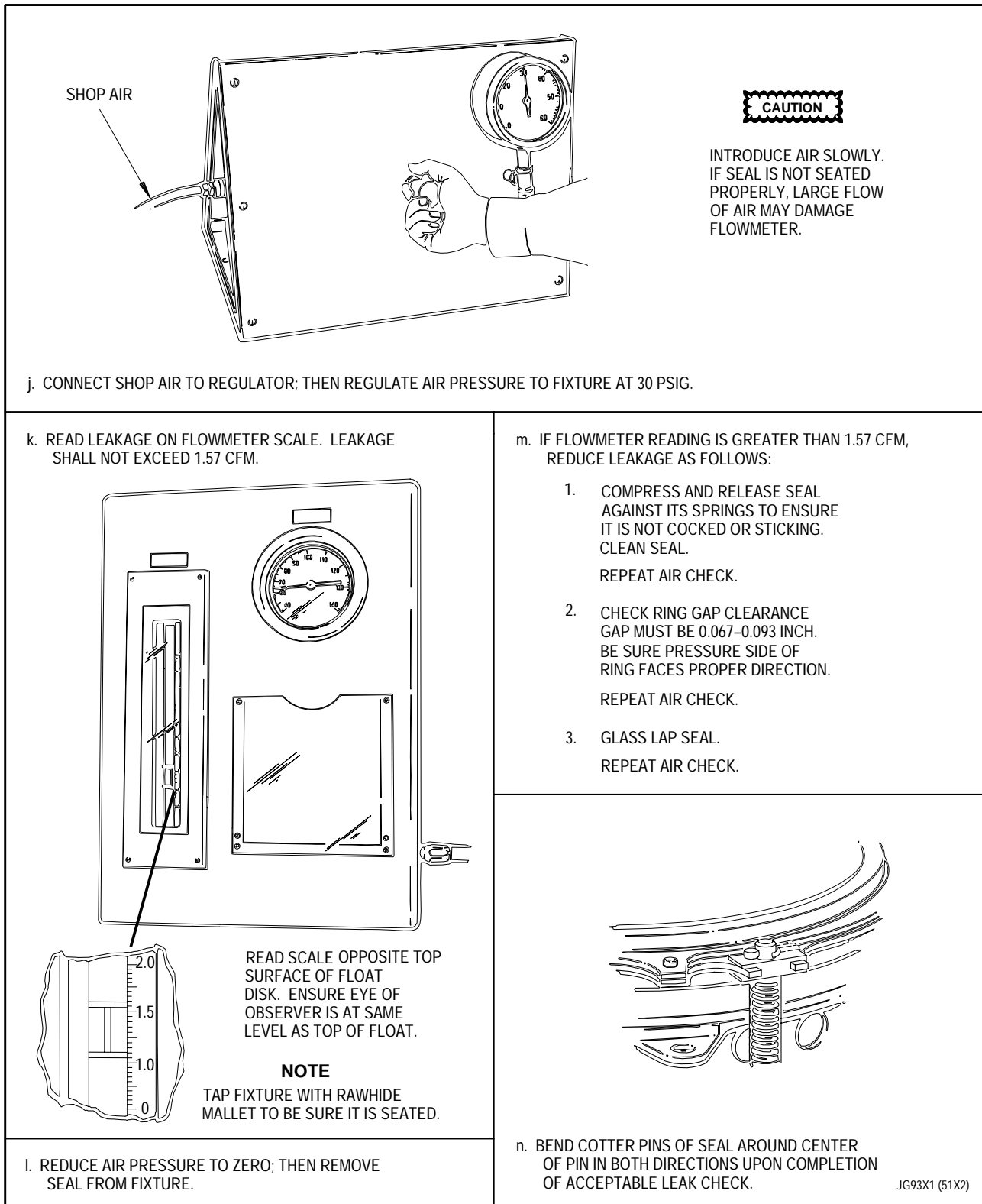


Figure 1. No. 2 and 3 Bearing Seal Assembly - Air Leak Check
(Sheet 4 of 4)

WORK PACKAGE

TECHNICAL PROCEDURES

**NO. 3 BEARING, NO. 3 BEARING SUPPORT AND
GEARBOX DRIVE BEVEL GEAR (NO. 3 BEARING PACKAGE) -**

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	4 - 5	0	6 - 8	29
2 - 3	7				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Gloves, lint-free	-
Lockwire (0.032 inch diameter)	MS9226-04
Oil, lubricating	MIL-L-7808

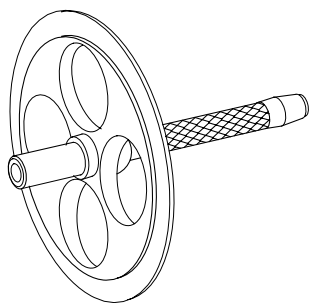
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

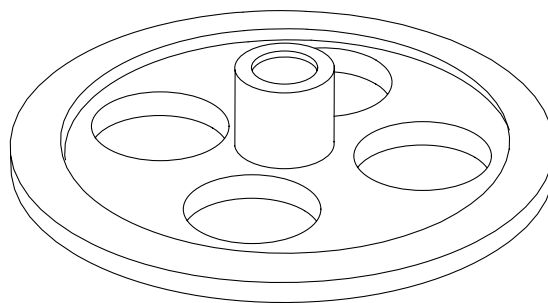
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing Outer Race - Installation	
	Drift, No. 3 bearing outer race - - - - -	PWA 50609
	Base, No. 3 bearing support - - - - -	PWA 50610
	Pin, Aligning (two required) - - - - -	PWA 50611
3	No. 3 Bearing, Inner Races and Balls - Installation	
	Base, No. 3 bearing bevel gear - - - - -	PWA 50612
	Pusher, No. 3 bearing sleeve and inner race - - - - -	PWA 56507
		or
	Drift, No. 3 bearing sleeve and inner race - - - - -	PWA 50613

ILLUSTRATED SUPPORT EQUIPMENT



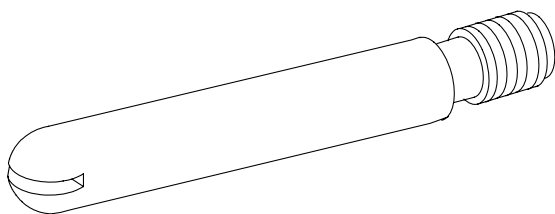
PWA 50609 -C

Figure T1. PWA 50609 Drift



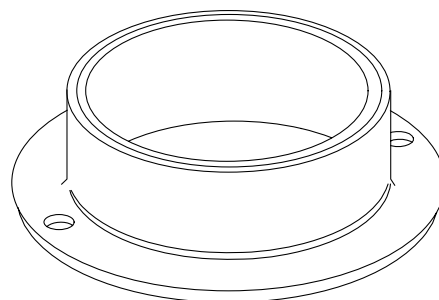
PWA 50610 -C

Figure T2. PWA 50610 Base



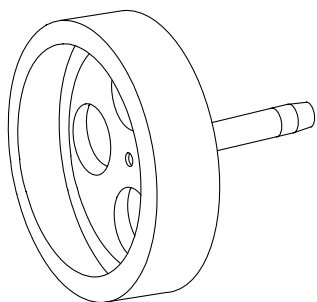
PWA 50611 -C

Figure T3. PWA 50611 Pin



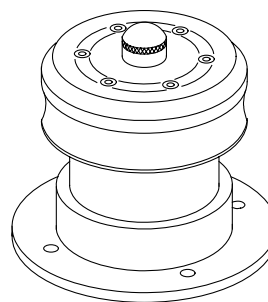
PWA 50612 -C

Figure T4. PWA 50612 Base



PWA 50613 -C

Figure T5. PWA 50613 Drift



PWA 56507 -C

Figure T6. PWA 56507 Pusher

1. INTRODUCTION.

- a. This work package contains instructions for assembly of the No. 3 bearing, No. 3 bearing support and gearbox drive bevel gear. Sometimes this assembly is also referred to as the No. 3 bearing package.

**2. NO. 3 BEARING OUTER RACE -
INSTALLATION.**

(See Figure 1.)

- a. Heat No. 3 bearing support(5, figure 1) in hot oil at 225° to 275°F (107° to 135°C) for 30 minutes.
- b. Place bearing support(5) into PWA 50610 base with large OD up.
- c. Install two PWA 50611 aligning pins into flange of support(5), 180 degrees apart.
- d. Install No. 3 bearing outer race(4) as follows:
 - (1) Install outer race(4) into support(5) with flanged end up. Engage boltholes of race with aligning pins in support.

- (2) Install PWA 50609 drift on outer race(4).

- (3) Seat outer race(4) with standard arbor press and PWA 50609 drift.

- e. Install and torque bolts(3) as follows:

- (1) Coat bolts(3) with MIL-L-7808 lubricating oil.

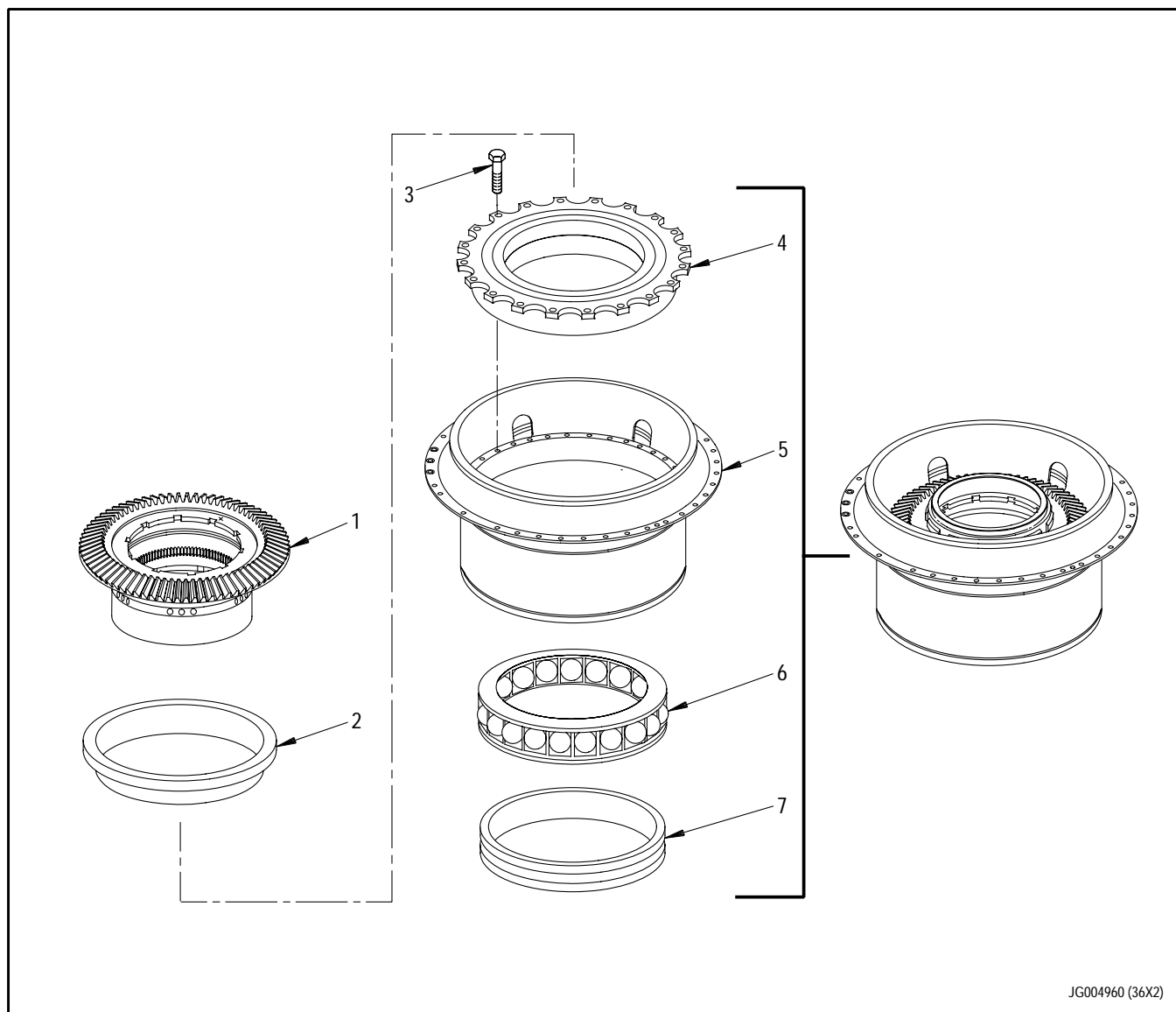
- (2) Remove PWA 50611 aligning pins and install bolts(3) in holes around flange of outer race(4).

- (3) Torque first pair of bolts(3), 180 degrees apart, 75 to 85 pound-inches.

- (4) Torque second pair of bolts(3) 90 and 270 degrees from first pair 75 to 85 pound-inches.

- (5) Torque all remaining bolts(3) 75 to 85 pound-inches.

- (6) Lockwire bolts(3) with PN MS9226-04 wire.



JG004960 (36X2)

Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Gearbox drive bevel gear	-	-	-
2.	No. 3 bearing inner race (front half)	-	-	-
3.	Bolt	Engine oil	75 to 85	MS9226-04
4.	No. 3 bearing outer race	-	-	-
5.	No. 3 bearing support	-	-	-
6.	No. 3 bearing cage and balls	-	-	-
7.	No. 3 bearing inner race (rear half)	-	-	-

Figure 1. No. 3 Bearing, No. 3 Bearing Support and Gearbox Drive Bevel Gear (No. 3 Bearing Package) - Assembly

3. NO. 3 BEARING INNER RACES AND BALLS - INSTALLATION ONTO GEARBOX DRIVE BEVEL GEAR.

(See figure 1 and Figures 2 and 3.)

- a. Measure following parts as shown in figures 1 and 3.
Measurements will be used to ensure proper bearing assembly in step g.

- (1) Measure axial thickness at X mark of front half of No. 3 bearing inner race(2, figure 1). Record measurement as Dimension A.
- (2) Measure axial thickness at X mark of rear half of No. 3 bearing inner race(7). Record measurement as Dimension B.
- (3) Measure total length at X mark of gearbox drive bevel gear(1) bearing journal from aft edge to rear face of inner bearing race seating surface. Record measurement as Dimension C.
- (4) Calculate and record Dimension D for future use using following formula:

$$\text{Dim D} = (\text{Dim A} + \text{Dim B}) - \text{Dim C}.$$

- b. Place No. 3 bearing inner races(2 and 7) in hot oil. Heat to 225° to 275°F (107° to 135°C) for 30 minutes.

NOTE

Front half of inner race(2) is half without a puller groove.

- c. Install front half of No. 3 bearing inner race(2) as follows:
- (1) Install gearbox drive bevel gear(6, figure 2) on PWA 50612 base(5).
 - (2) Find X-mark on No. 3 bearing inner race front half(3) and bevel gear(6).

- (3) Install inner race(3) on bevel gear(6) so X-marks align within five degrees. Tap race down until flush with end of gearshaft. This will prevent cocking when PWA 56507 pusher is used.
- (4) Install PWA 56507 pusher(1) so it fits on end of inner race(3).
- (5) Seat inner race(3) with standard arbor press and PWA 56507 pusher(1).
- (6) Maintain seating pressure on front half of bearing inner race(3) using standard arbor press for minimum of 1 minute until inner race and bevel gear are approximately same temperature.

- d. Install No. 3 bearing support(4) (with outer race installed) over bevel gear(6). Front flange of No. 3 bearing outer race(4, figure 1) goes down toward gear.



Failure to ensure proper seating of No. 3 bearing cage and ball assembly may result in installation damage and bearing failure.

NOTE

- Mating number on cage is up, when installing No. 3 bearing cage and balls(6).
 - Lift No. 3 bearing support(5) so bearing cage and balls(6) are not forced inward against No. 3 bearing inner race(2).
- e. Install No. 3 bearing cage and balls(7, figure 2) onto No. 3 bearing inner race front half(3). Ensure that cage and ball assembly does not hang up on inner or outer race edges by rotating cage and ball assembly after installation.

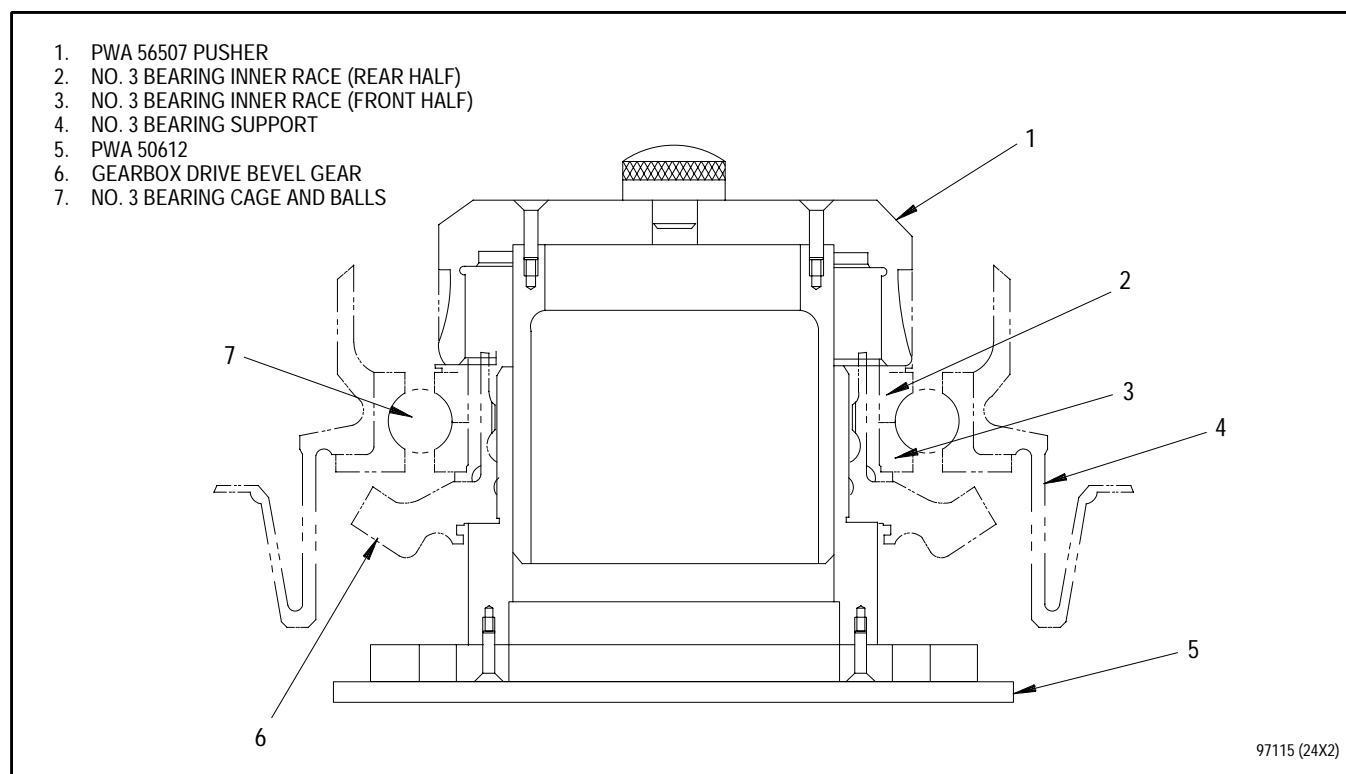


Figure 2. Inner Races and Balls - Installation Onto Gearbox Drive Bevel Gear

- f. Install No. 3 bearing inner race rear half(2) as follows:
- (1) Find X-mark on rear half of inner race(2).
 - (2) Install inner race(2) on gearbox drive bevel gear(6) so X-marks align within five degrees. Tap race down until it is flush with end of gearshaft. This will prevent cocking when PWA 56507 pusher(1) is used.
 - (3) Install PWA 56507 pusher(1) so it fits on end of inner race(2).
 - (4) Seat inner race(2) with standard arbor press and PWA 56507 pusher(1).
 - (5) Maintain seating pressure on rear half of bearing inner race(2) using standard arbor press for minimum of 1 minute until inner race and bevel gear are approximately same temperature.
 - (6) Place assembly on bench with bevel gear(6) down.

CAUTION

Failure to ensure proper seating of No. 3 bearing race may result in bearing failure.

- g. Measure distance between aft face of No. 3 bearing inner race rear half and aft face of gearbox drive bevel gear. Record this measurement as Dimension E. See figure 3. Compare Dimension E with Dimension D recorded in step a.(4). Dimension E must be less than or equal to Dimension D if bearing race is properly seated.

- h. If Dimension E is not less than nor equal to Dimension D, remove inner race, confirm Dimensions A, B, and C, and recalculate Dimension D. Reinstall or replace No. 3 bearing inner race per steps b. through g.

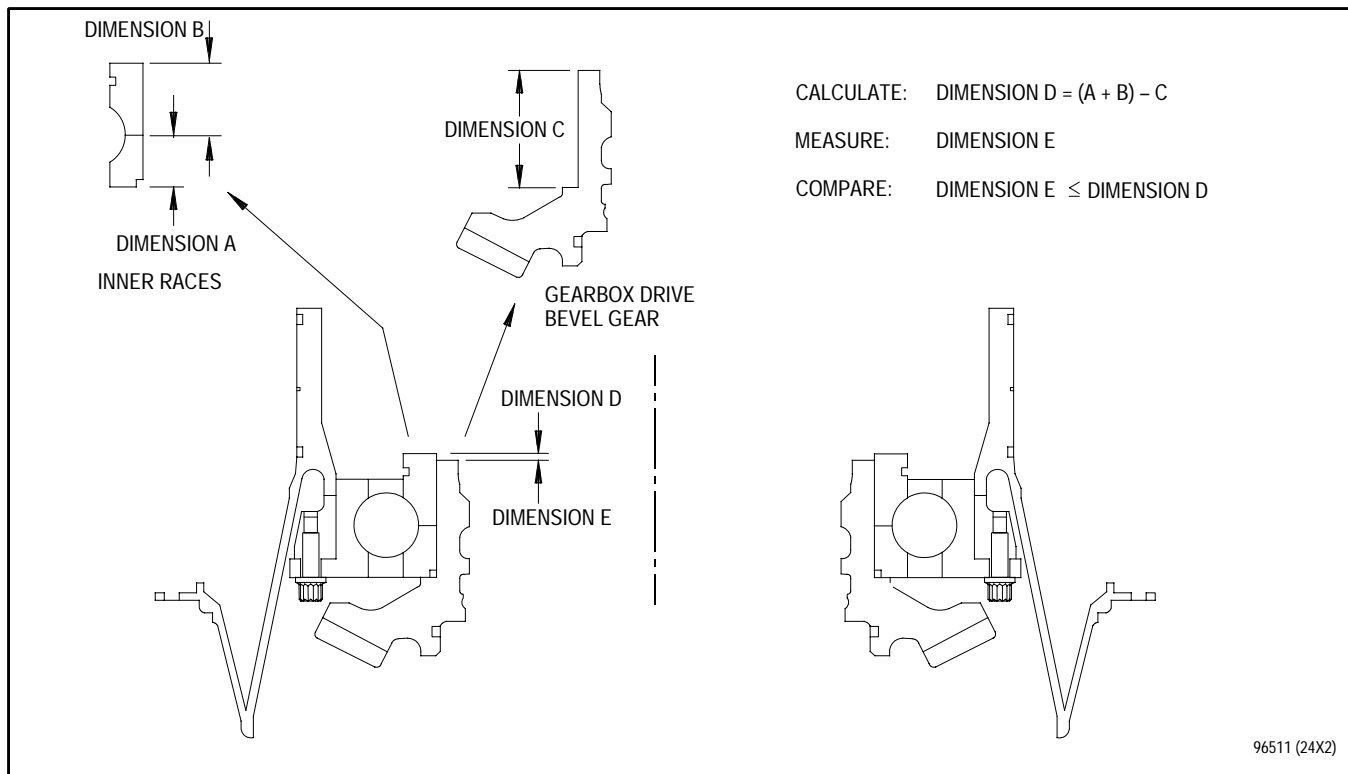


Figure 3. No. 3 Bearing Inner Races and Balls Installation on Gearbox Drive Bevel Gear - Seating Check

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, COMPRESSOR INTERMEDIATE -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 30

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	10A Added	4	16	29
2	16	10B Blank Added	4	17 - 21	0
3 - 4	20	11 - 13	5	22 - 22A	25
5 - 7	0	14	20	22B Blank	4
8 - 10	4	15	0	23 - 26	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 Jul 1995	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Acetone (PMC 9008)	O-A-51
Compound, antigalling (PWA 36545)	Everlube 382
Compound, antigalling (PWA 550)	Hi-T-650 or Lubri-Bond HT
Compound, sealing (PWA 36000-3) or (PWA 36000-2)	Hylomar - Universal Jointing SQ32M or SQ32H
Lockwire (0.032 inch diameter)	MS9226-04
Oil, lubricating or Petrolatum	MIL-L-7808 VV-P-236

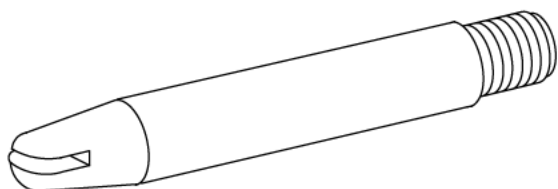
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Collar	ST2185-06	8
Gasket	4038728	1
Gasket	4070093	1
Gasket	4077235	1
Key washer	MS9276-10	8
Packing	AS3209-011	1
Packing	MS9386-013	1

APPLICABLE SUPPORT EQUIPMENT

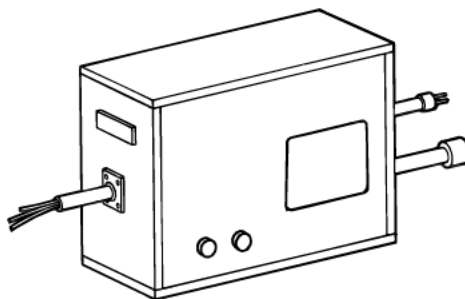
Paragraph	Function - Tool Nomenclature	Tool Number
3	NO. 3 BEARING REAR SEAL SUPPORT ASSEMBLY - INSTALLATION	
	HEATER, FAN CASE SHROUD - - - - -	PWA 56324
		OR
	HEATER, DIFFUSER CASE INNER REAR FLANGE - - - - -	PWA 52464
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
	PIN, ALIGNING, DIFFUSER CASE ASSEMBLY TO COMPRESSOR 6TH STAGE VANE AND SHROUD ASSEMBLY - - - - -	PWA 14383
5	INLET GUIDE VANE OUTER BUSHINGS - INSTALLATION	
	PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790

ILLUSTRATED SUPPORT EQUIPMENT



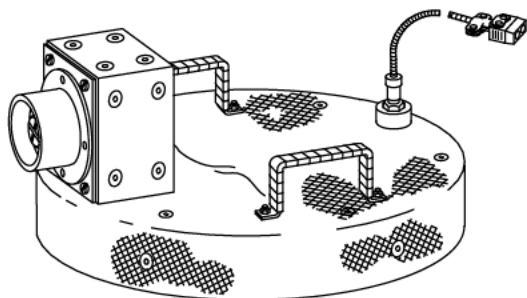
PWA 14383 -C

Figure T1. PWA 14383 PIN



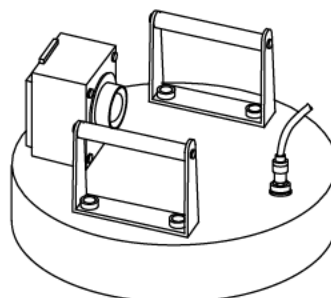
PWA 25672 -C

Figure T2. PWA 25672 CONTROL



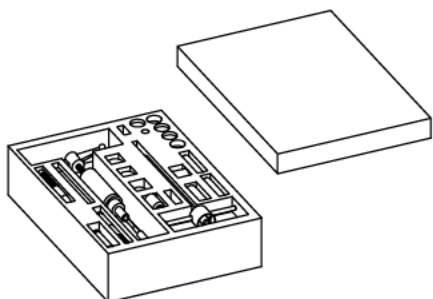
PWA 52464 -C

Figure T3. PWA 52464 HEATER



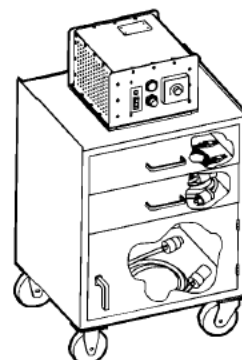
PWA 56324 -C

Figure T4. PWA 56324 HEATER



PWA 57790 -C

Figure T5. PWA 57790 PUSHER/PULLER



PWA 61685 -C

Figure T6. PWA 61685 CONTROL

1. INTRODUCTION.

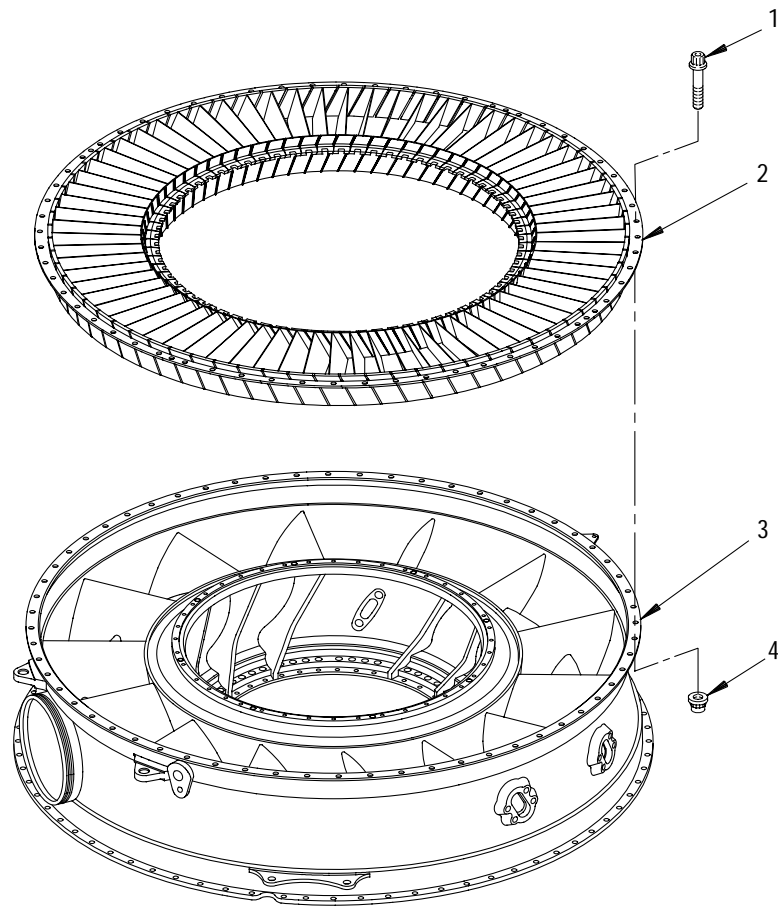
- a. This work package contains instructions for assembly of compressor intermediate case. Following major components or sections are assembled and installed:
- 3rd stage stator
 - No. 3 bearing rear seal support assembly
 - Internal pressure tube
 - Inlet guide vane outer bushings
 - Inlet guide vanes and synchronizing rings
 - Fan exit stator
 - 4th stage compressor case
 - Stator inlet shroud set
 - Inlet guide vane synchronizing ring brackets
 - Borescope plug
 - Data plate
 - Baffle assembly.

2. THIRD STAGE STATOR - INSTALLATION.

(See Figure 1.)

- a. Position intermediate case,
front side up.
- b. Chill and install 3rd stage
stator(2, figure 1) aligning
offset hole at 12 o'clock
position. Seat stator with four
equally spaced bolts(1) and
nuts(4).
- c. Remove bolts(1) and nuts(4)
after temperature normalizes.

1. BOLT
2. 3RD STAGE STATOR
3. INTERMEDIATE CASE - OUTER FLANGE
4. NUT



JG204X1 (37X2)

Figure 1. Third Stage Stator - Installation

3. NO. 3 BEARING REAR SEAL SUPPORT ASSEMBLY - INSTALLATION.

(See Figures 2, 3, and 3A.)

NOTE

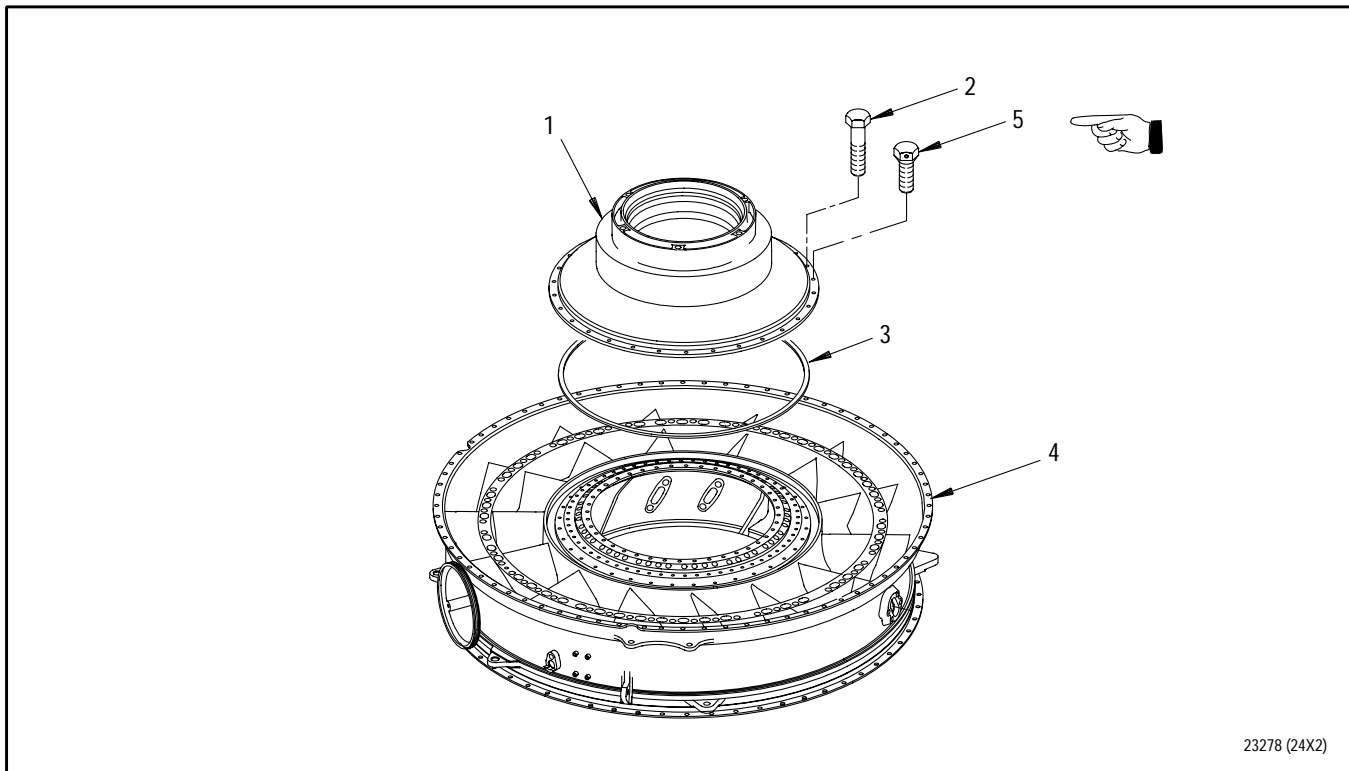
No. 3 bearing rear seal support assembly is assembled in WP 610 00 and air leak checked in WP 611 00 prior to installation.

- a. Position intermediate case(4, figure 2) front side down.

- b. Heat ID flange of intermediate case(4) where No. 3 bearing rear seal support assembly(1) will seat as follows:

- (1) Install PWA 56324 or PWA 52464 heater onto intermediate case(4).
- (2) Connect PWA 61685 or PWA 25672 heater control to heater.
- (3) Heat intermediate case(4) to 200°F (93°C) for 5 minutes.
- (4) Remove heater.

- c. Install gasket(3) onto intermediate case(4).



- | | |
|---|--|
| 1. No. 3 bearing rear seal support assembly | 4. Intermediate case |
| 2. Bolt (PN MS9741-07) | 5. Bolt (PN 4080809- countersunk head) |
| 3. Gasket | |

Figure 2. No. 3 Bearing Rear Seal Support-Installation

NOTE

PN 4075036-01 support assembly(1) is attached to intermediate case with 60 bolts(2).

d. For PN 4075036-01 No. 3 bearing rear seal support assembly(1), position support assembly(1) onto intermediate case(4) aligning dowel pin hole in seal support with dowel pin in intermediate case and attach as follows:

(1) Coat 30 workbolts with PWA 550 antigalling compound.

(2) Immediately install 30 workbolts with washers into every other hole of outer bolt circle of No. 3 bearing rear seal support assembly(1).

(3) Torque workbolts 32 to 36 pound-inches in sequence shown in figure 3 to seat flange.

(4) Install 19 workbolts from front side of intermediate case(4, figure 2) into No. 3 bearing rear seal support assembly(1) inner bolt circle.

(5) Torque workbolts 32 to 36 pound-inches in sequence shown in figure 3.

(6) Torque workbolts on inner and outer bolt circles 75 to 80 pound-inches in sequence shown in figure 3.

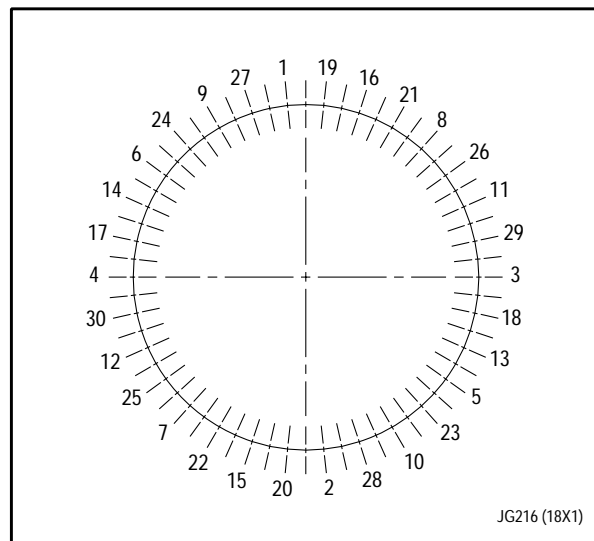


Figure 3. Workbolt Tightening and Final Torquing Sequence

- (7) Torque both inner and outer bolt circles alternately, until all workbolts maintain torque.
- (8) Apply a thin, even coat of PWA 36000-2 or PWA 36000-3 sealing compound to bolts(2, figure 2).
- (9) Install bolts(2) into remaining boltholes in No. 3 bearing rear seal support assembly(1) outer bolt circle.
- (10) Torque bolts 32 to 36 pound-inches as follows:
 - (a) Torque first two bolts 180 degrees apart.
 - (b) Torque second two bolts 90 degrees and 270 degrees from first bolt.
 - (c) Torque remaining bolts in clockwise direction.
 - (d) Torque bolts in clockwise direction, until all bolts maintain torque.
- (11) Remove 30 workbolts from No. 3 bearing rear seal support assembly(1) outer bolt circle.
- (12) Install remaining bolts(2) into outer bolt circle.
- (13) Torque bolts per step(10).
- (14) Lockwire bolts(2) using MS9226-04 wire.
- (15) Remove 19 workbolts from front side of intermediate case(4) inner bolt circle.

NOTE

PN 4068215 support assembly(1) is attached to intermediate case with 30 bolts(2) and 30 bolts(5).

- e. Install and attach PN 4068215 No. 3 bearing rear seal support assembly(1) as follows:

- (1) Install two PWA 14383 aligning pins in bolt circle where OD flange of rear seal assembly will mate.
- (2) Position assembly(1) onto intermediate case(4), aligning two groups of three holes in case with two groups of three holes in support per figure 3A.
- (3) Remove two aligning pins.
- (4) Coat 30 workbolts with PWA 550 antigalling compound.
- (5) Immediately install 30 workbolts with washers into unchamfered holes of outer bolt circle of No. 3 bearing rear seal support assembly(1).
- (6) Torque workbolts 32 to 36 pound-inches in sequence shown in figure 3 to seat flange.
- (7) Install 19 workbolts from front side of intermediate case(4, figure 2) into No. 3 bearing rear seal support assembly(1) inner bolt circle.

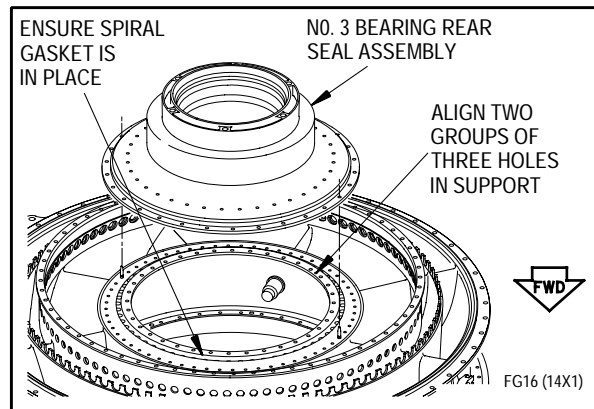


Figure 3A. Installation of No. 3 Bearing Rear Seal Assembly (PN 4068215)

- (8) Torque workbolts 32 to 36 pound-inches in sequence shown in figure 3.
- (9) Torque workbolts on inner and outer bolt circles 75 to 80 pound-inches in sequence shown in figure 3.
- (10) Torque both inner and outer bolt circles alternately, until all workbolts maintain torque.
- (11) Apply a thin, even coat of PWA 36000-2 or PWA 36000-3 sealing compound to bolts(5, figure 2).
- (12) Install bolts(5) into chamfered boltholes in No. 3 bearing rear seal support assembly(1) outer bolt circle.
- (13) Torque bolts 32 to 36 pound-inches as follows:
 - (a) Torque first two bolts 180 degrees apart.
 - (b) Torque second two bolts 90 degrees and 270 degrees from first bolt.
 - (c) Torque remaining bolts in clockwise direction.
 - (d) Torque bolts in clockwise direction, until all bolts maintain torque.
- (14) Remove 30 workbolts from No. 3 bearing rear seal support assembly(1) outer bolt circle.
- (15) Install remaining bolts(2) into outer bolt circle.
- (16) Torque bolts per step(13).
- (17) Lockwire bolts(2 and 5) using MS9226-04 wire.
- (18) Remove 19 workbolts from front side of intermediate case(4) inner bolt circle.

4. NO. 2 AND 3 BEARING INTERNAL PRESSURE TUBE - INSTALLATION.

(See Figure 4.)

- a. Install gasket(3, figure 4) onto No. 2 and 3 bearing oil pressure tube(2).



Improper installation of No. 2 and 3 bearing internal pressure tube(2) could cause external tube attachment difficulty and tube failure.

- b. Install tube(2) into strut at approximately 9 o'clock position, viewed from rear, on intermediate case(5). Ensure that threaded fitting is positioned toward aft flange of intermediate case. See view A, figure 4.
- c. Lubricate four bolts(1) with MIL-L-7808 lubricating oil.
- d. Secure tube(2) to intermediate case(5) using four bolts(1).
- e. Ensure run-on torque of each bolt(1). Bolts shall have a minimum run-on torque of 2 pound-inches. If minimum torque is not met, discard and use new bolts.
- f. Lubricate packing(4) with MIL-L-7808 lubricating oil.
- g. Install packing(4) into No. 2 and 3 bearing elbow(7).
- h. Install gasket(6) on No. 2 and 3 bearing elbow(7).
- i. Install elbow(7) on end of tube(2) from inside of intermediate case(4).
- j. Lubricate two bolts(8) with MIL-L-7808 lubricating oil.
- k. Secure elbow(7) to intermediate case(5) using two bolts(8).
- l. Ensure run-on torque of each bolt(8). Bolts shall have a minimum run-on torque of 2 pound-inches. If minimum torque is not met, discard and use new bolts.
- m. Torque bolts(8) 85 to 95 pound-inches.
- n. Torque bolts(1) 27 to 30 pound-inches.

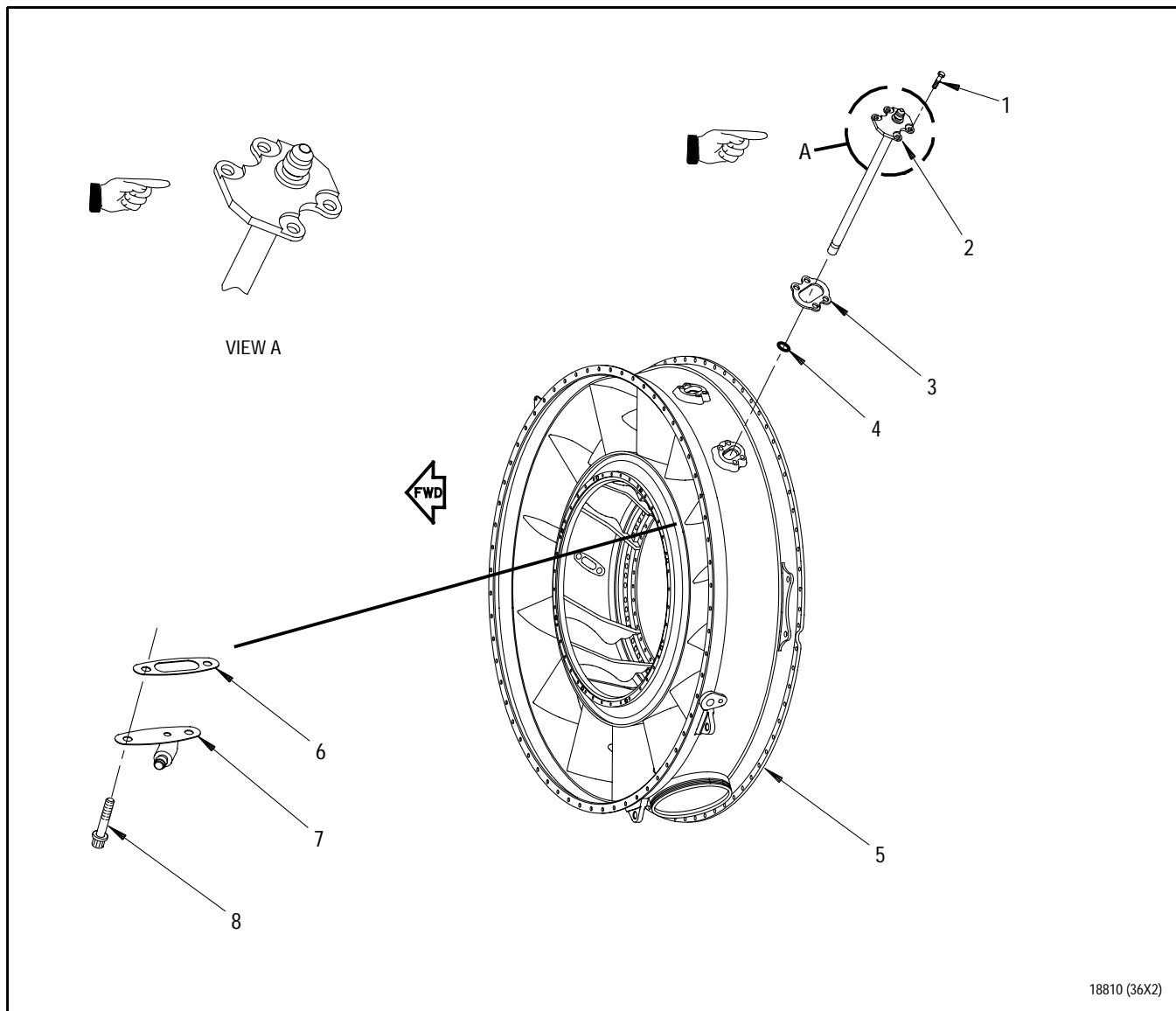


Figure 4. No. 2 and 3 Bearing Internal Pressure Tube - Installation

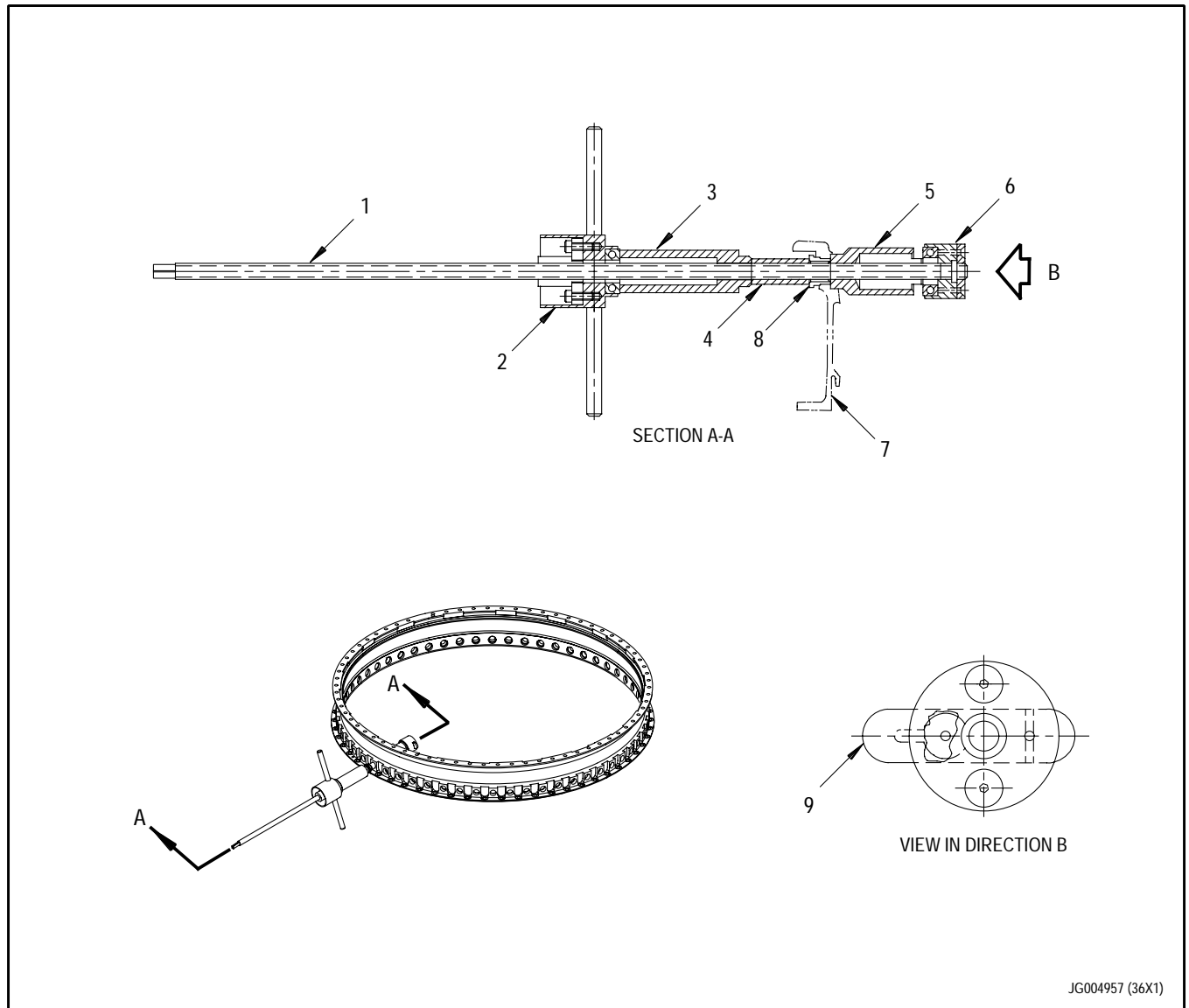
Legend for figure 4

Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Bolt	MIL-L-7808	27 to 30	-
2.	No. 2 and 3 bearing oil pressure tube	-	-	-
3.	PN 4077235 Gasket	-	-	-
4.	PN AS3209-011 Packing	MIL-L-7808 or VV-P-236	-	-
5.	Intermediate case	-	-	-
6.	PN 4070093 Gasket	-	-	-
7.	No. 2 and 3 bearing elbow	-	-	-
8.	Bolt	MIL-L-7808	85 to 95	-

**5. INLET GUIDE VANE OUTER BUSHINGS -
INSTALLATION.**

(See Figure 5.)

- a. Clean bushings(8, figure 5) and bushing holes in fourth stage case(7) with acetone.
- b. Install PWA 57790 pusher/puller, detail-1 ball screw(1) into detail-4 cover assembly(2).
- c. Install detail-9 spacer(3) on ball screw(1).
- d. Install detail-21 sleeve(4) on ball screw(1).
- e. Install bushing(8) on ball screw(1) and insert into case(7).
- f. Install detail-28 spacer(5) on ball screw(1).
- g. Install detail-17 end cap assembly(6) on end of ball screw(1) and slide detail-18 slider(9) to engage groove in end of ball screw.
- h. Hold ball screw(1) and turn cover assembly(2), handle clockwise to push bushing(8) into case(7).



- | | |
|-------------------|----------------------|
| 1. Ball screw | 6. End cap assembly |
| 2. Cover assembly | 7. Fourth stage case |
| 3. Spacer | 8. Bushing |
| 4. Sleeve | 9. Slider |
| 5. Spacer | |

Figure 5. Inlet Guide Vane Outer Bushings - Installation

6. INLET GUIDE VANES AND SYNCHRONIZING RINGS - INSTALLATION.

(See Figure 6.)

NOTE

Maximum of 10 inlet guide vanes may have leading or trailing edge blends.

- a. Install thrust washer(2, figure 6) on stem of each inlet guide vane(1) and insert stem of vane outward through bushings(4).
- b. Install bumpers(13) at eight locations around upper and lower synchronizing ring halves(5 and 14) as follows:
 - (1) Position bumpers(13) in synchronizing ring halves(5 and 14) to obtain maximum gap between fourth stage compressor case(3) and bumpers.
 - (2) Install bushings(12) handtight.
 - (3) Secure bumpers(13) and bushings(12) with 0.019-32 worknuts.
- c. Install 58 stator vane arms(6) (pin end into OD of ring, slotted end down) into synchronizing ring halves(5 and 14).
- d. Verify all stator vane arms(6) are free to rotate.
- e. Secure stator vane arms(6) in synchronizing ring halves(5 and 14) with tape.

- f. Rotate inlet guide vanes(1) so slots in vane stems are in an axial position.

NOTE

Top center of fourth stage compressor case is marked X at forward end of case. Center of upper synchronizing ring is marked TOP FRONT. Center of lower synchronizing ring is marked BOTTOM FRONT.

- g. Position synchronizing ring halves(5 and 14) around fourth stage compressor case(3). Ensure center of each synchronizing ring half(5 and 14) is in line with top or bottom center of fourth stage compressor case(3).
- h. Align slotted end of each stator vane arm(6) with slots in its mating vane stem.
- i. Tap synchronizing ring halves(5 and 14) over vane stems to align bolthole in vane arms with threaded hole in vane stems.
- j. Apply PWA 36545 antigalling compound to 58 bolts(7) and install. Check run-on (thread friction) torque of self-locking bolts. Minimum run-on torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches.
- k. Verify there is zero clearance between vane stems and stator vane arms(6), and bolts(7) are seated.

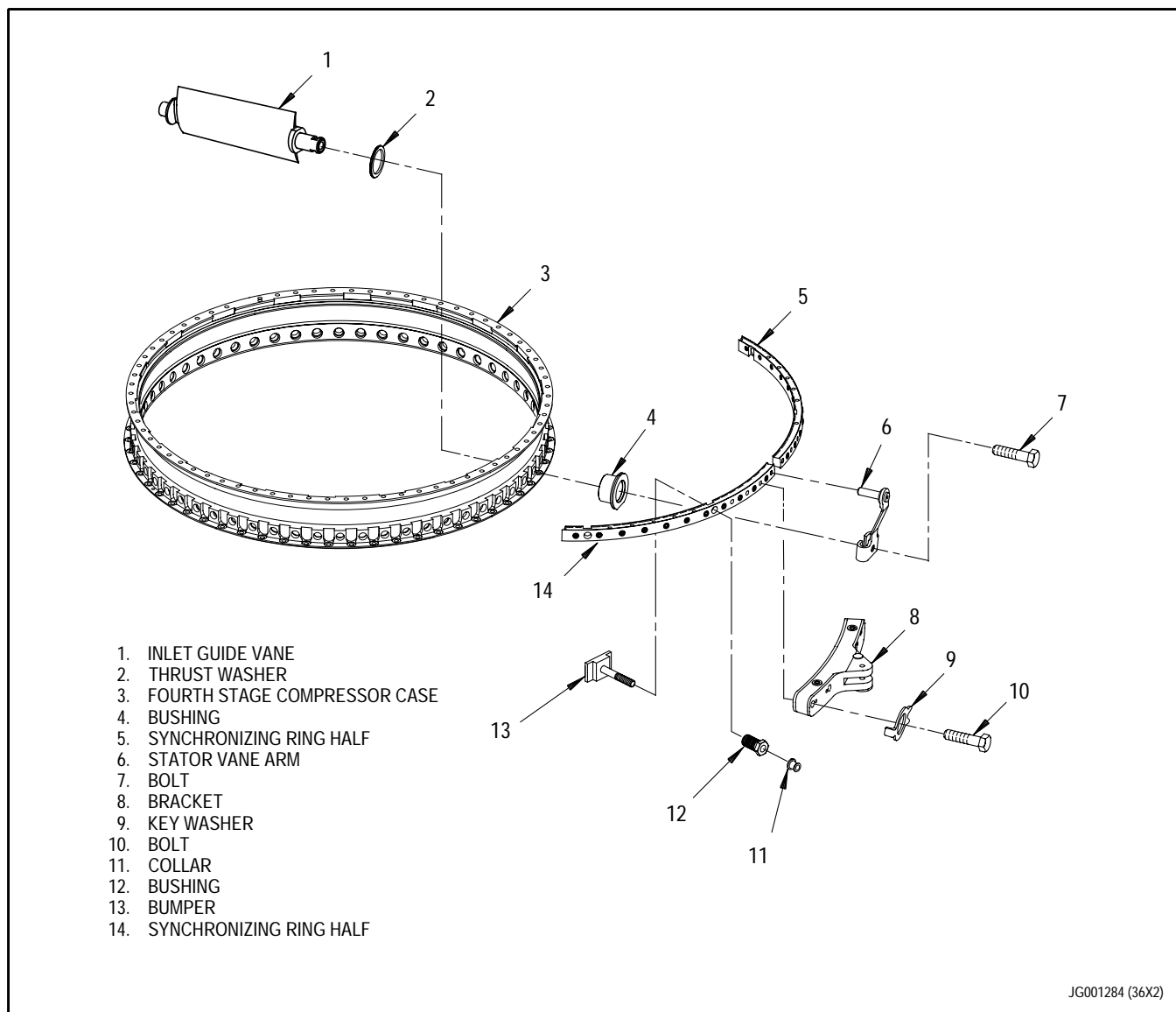


Figure 6. Inlet Guide Vanes and Synchronizing Rings - Installation

7. FAN EXIT STATOR, FOURTH STATOR COMPRESSOR CASE, AND STATOR INLET SHROUD SET - INSTALLATION.

(See figure 3 and Figures 7 and 8.)

- a. Position fan exit stator(2, figure 7) on intermediate case(7) aligning dowel pin hole in fan exit stator with dowel pin in intermediate case.

NOTE

Dowel pin hole in stator inlet shroud (inner front) must be at 12 o'clock position in order to align with dowel pin in stator inlet shroud (inner rear) when it is installed.

- b. Position stator inlet shroud (inner front) (6) on intermediate case(7) with cutouts facing up and dowel pin hole at 12 o'clock position.

- c. Position fourth stage compressor case(1) on intermediate case(7) aligning dowel pin hole in fourth stage case with dowel pin in intermediate case.
- d. Install bearings(4) on inner ends of inlet guide vanes(5) and seat in stator inlet shroud (inner front) (6).

Legend for figure 7

- | | |
|-------------------------------------|--------------------------------------|
| 1. Fourth stage compressor case | 6. Stator inlet shroud (inner front) |
| 2. Fan exit stator | 7. Intermediate case |
| 3. Stator inlet shroud (inner rear) | 8. Bolt |
| 4. Bearing | 9. Bolt |
| 5. Inlet guide vane | |

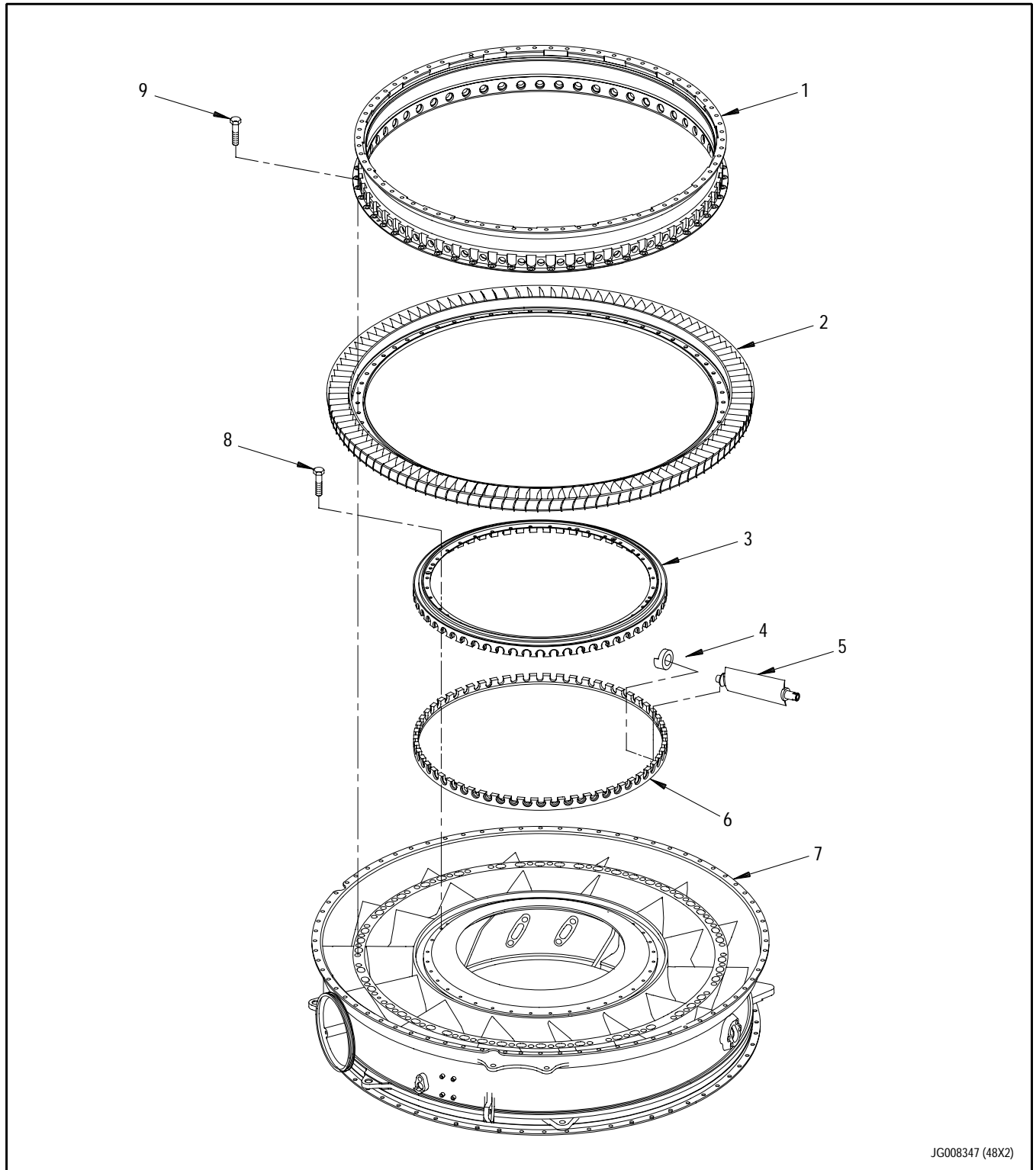
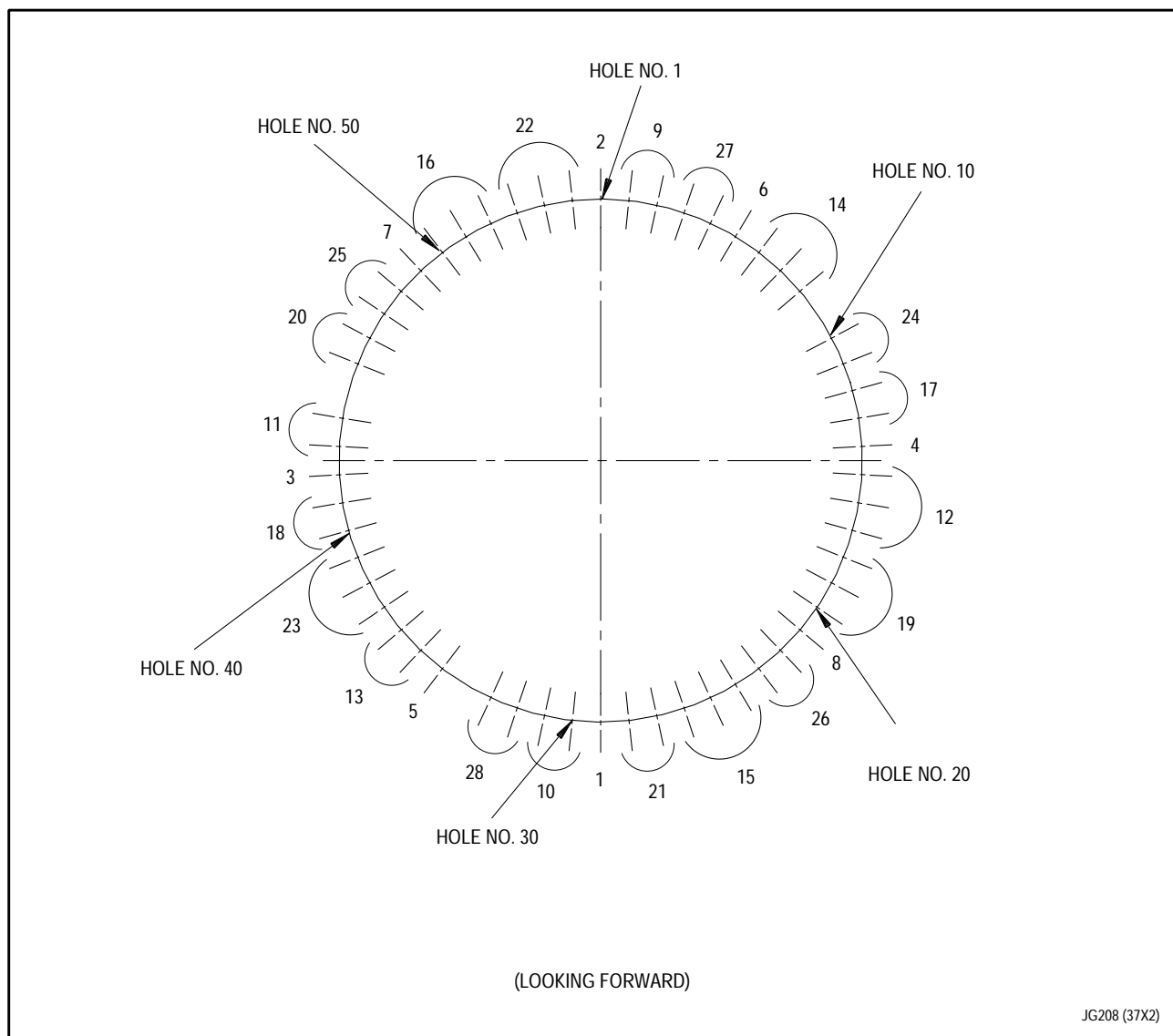


Figure 7. Fourth Stage Compressor Case - Installation

- e. Lubricate bolts(9) with PWA 550 antigalling compound and install. Torque bolts 75 to 80 pound-inches in sequence shown in figure 8.
- f. Position stator inlet shroud (inner rear) (3, figure 7) on intermediate case(7) aligning dowel pin hole in shroud with dowel pin in intermediate case.
- g. Ensure dowel pin in stator inlet shroud (inner rear) (3) aligns with dowel pin hole in stator inlet shroud (inner front) (6) at 12 o'clock position.
- h. Apply a thin even coat of PWA 36000-2 or PWA 36000-3 sealing compound to bolts(8).
- i. Install bolts(8) and torque 32 to 36 pound-inches in sequence shown in figure 3.
- j. Retorque bolts(8, figure 7) in same sequence until all bolts maintain specified torque. Remove excessive sealing compound.
- k. Verify shrouds(3 and 6) are seated using 0.001 feeler stock.
- l. Lockwire bolts(8) with MS9226-04 wire.

**Figure 8. Torque Sequence**

8. INLET GUIDE VANES SYNCHRONIZING RING BRACKETS - INSTALLATION.

(See figure 6 and Figure 8A.)

NOTE

The following instructions apply to both sides of case.

a. Install bracket(8, figure 6) as follows:

- (1) Apply PWA 550 antigalling compound to threads of four bolts(10).
- (2) Position bracket(8) between upper and lower synchronizing ring halves(5 and 14) to align boltholes in bracket with threaded holes in synchronizing ring halves.
- (3) Install four bolts(10) and key washers(9). Torque bolts 54 to 60 pound-inches and bend tab of key washers.

b. Adjust inlet guide vane synchronizing ring bumpers(13) as follows:



Failure to use non-metallic feeler stock to measure gap between case and bumpers will result in damage to bumper pads.

- (1) Remove worknuts securing bumpers(13) and bushings(12) at eight locations around upper and lower synchronizing rings(5 and 14).

- (2) Keep vane arms(6) pointing in axial direction. Adjust bushings(12) in sequence shown in figure 8A, 180 degrees apart, to obtain 0.006 to 0.008 inch gap between case bumper pads and bumper(13, figure 6) using plastic gage at each bumper location. Keep non-metallic shim stock under all eight bumper locations during adjustments.
- (3) Position upper and lower synchronizing ring halves(5 and 14) so inner diameter of rings are concentric to case bumper pads within 0.015 inch of each other, at locations 1 and 2 and locations 3 and 4, per figure 8A. Measure gap between ring and case bumper pad at four places. If ring is not concentric, adjust by tightening one side and loosening opposite side, then return to step b.(2).
- (4) Install collars(11, figure 6) to secure bumpers(13) and bushings(12). While holding bushing(12), tighten collars until they shear.
- (5) Remove shim stock with moderate hand force only. If moderate hand force will not remove shim stock, return to step b.(2) above.
- (6) Verify that vane arms rotate freely in each direction from center with no binding or hesitation.

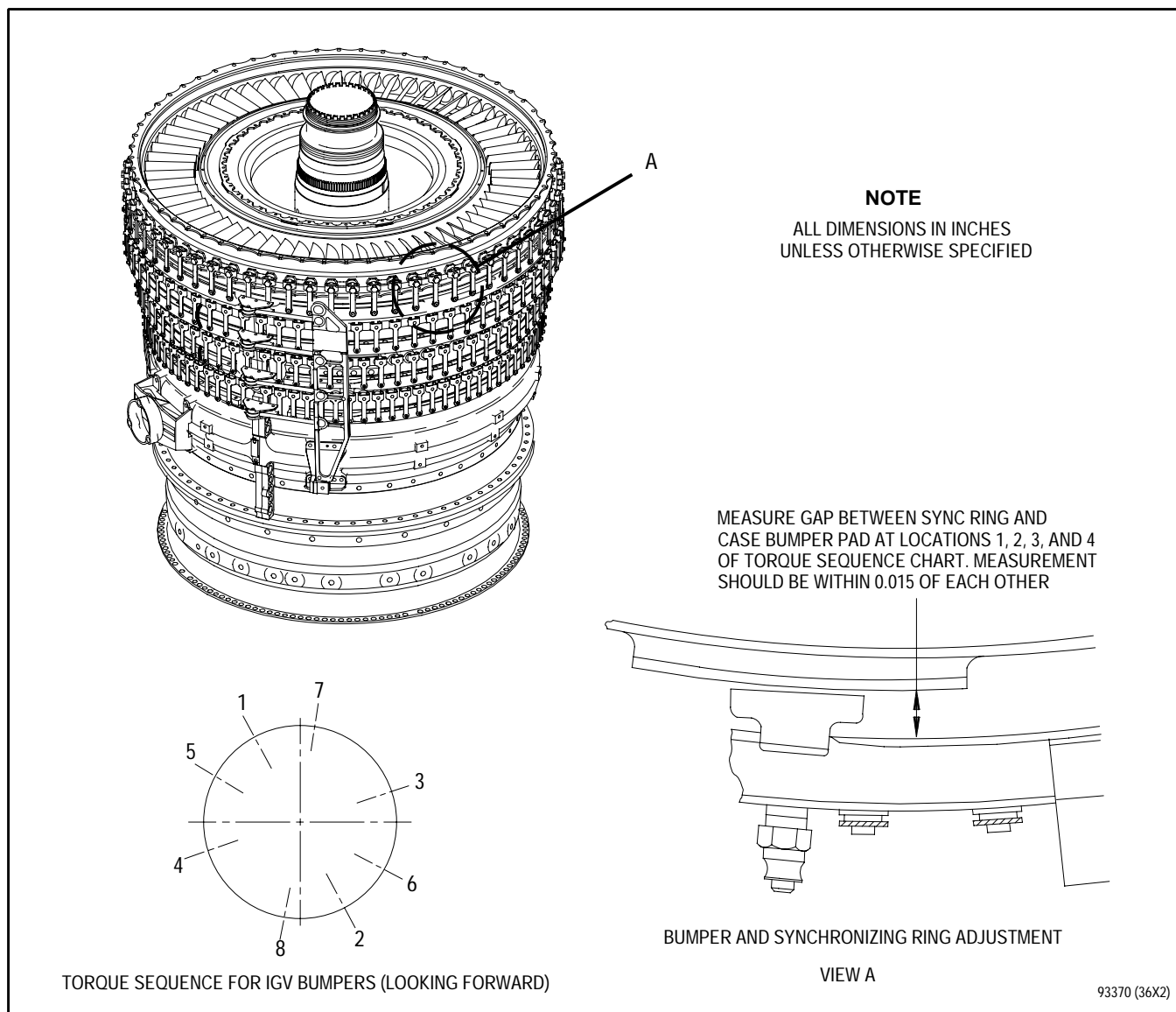
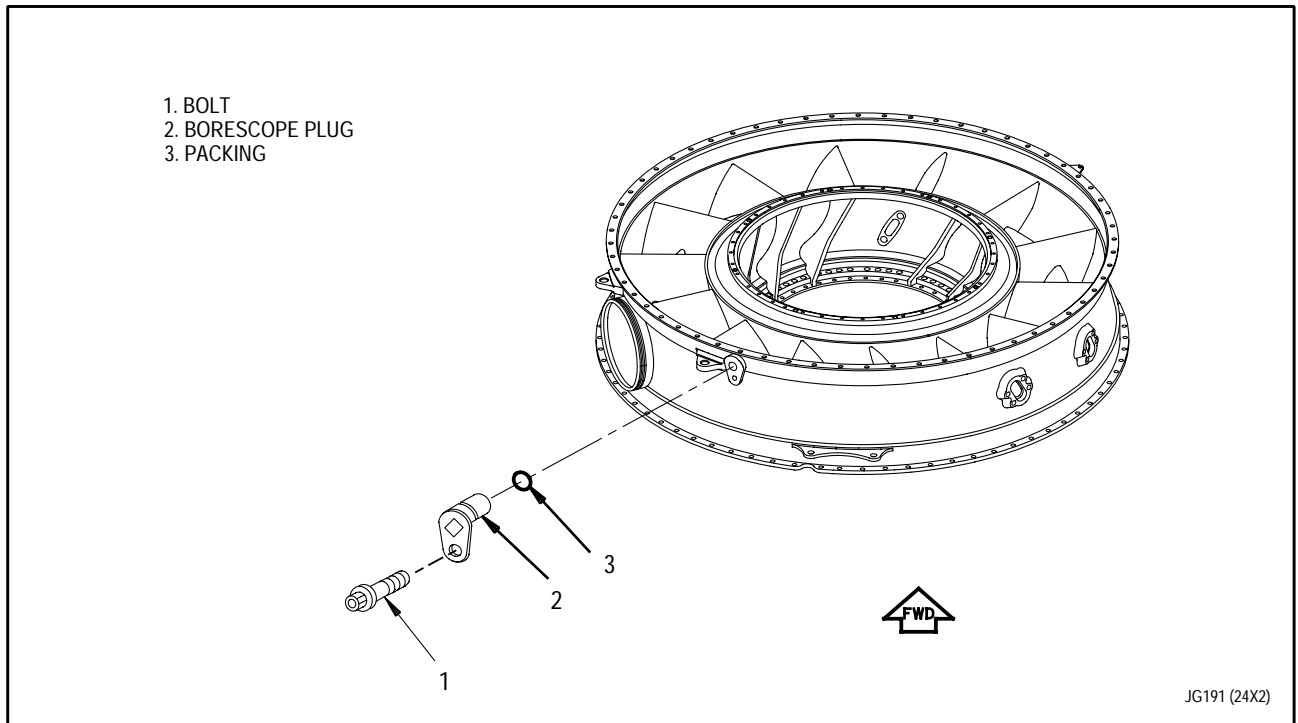


Figure 8A. Inlet Guide Vane Synchronizing Ring - Bumper Adjustment

9. BORESCOPE PLUG - INSTALLATION.

(See Figure 9.)

- a. Lubricate packing(3, figure 9) with MIL-L-7808 lubricating oil and install on borescope plug(2).
- b. Apply MIL-L-7808 lubricating oil to bolt(1).
- c. Insert borescope plug(2) into intermediate case and secure with bolt(1). Torque bolt 27 to 30 pound-inches.

**Figure 9. Installation of Borescope Plug**

10. DATA PLATE - INSTALLATION.

(See Figure 10.)

- a. Install data plate(2, figure 10) onto intermediate case(1) at approximately 7 o'clock position, viewed from rear.
- b. Secure data plate(2) with four screws(3).
- c. Torque screws 8.5 to 11.5 pound-inches.
- d. Lockwire screws(3) using PN MS9226-04 (0.032 inch) wire.

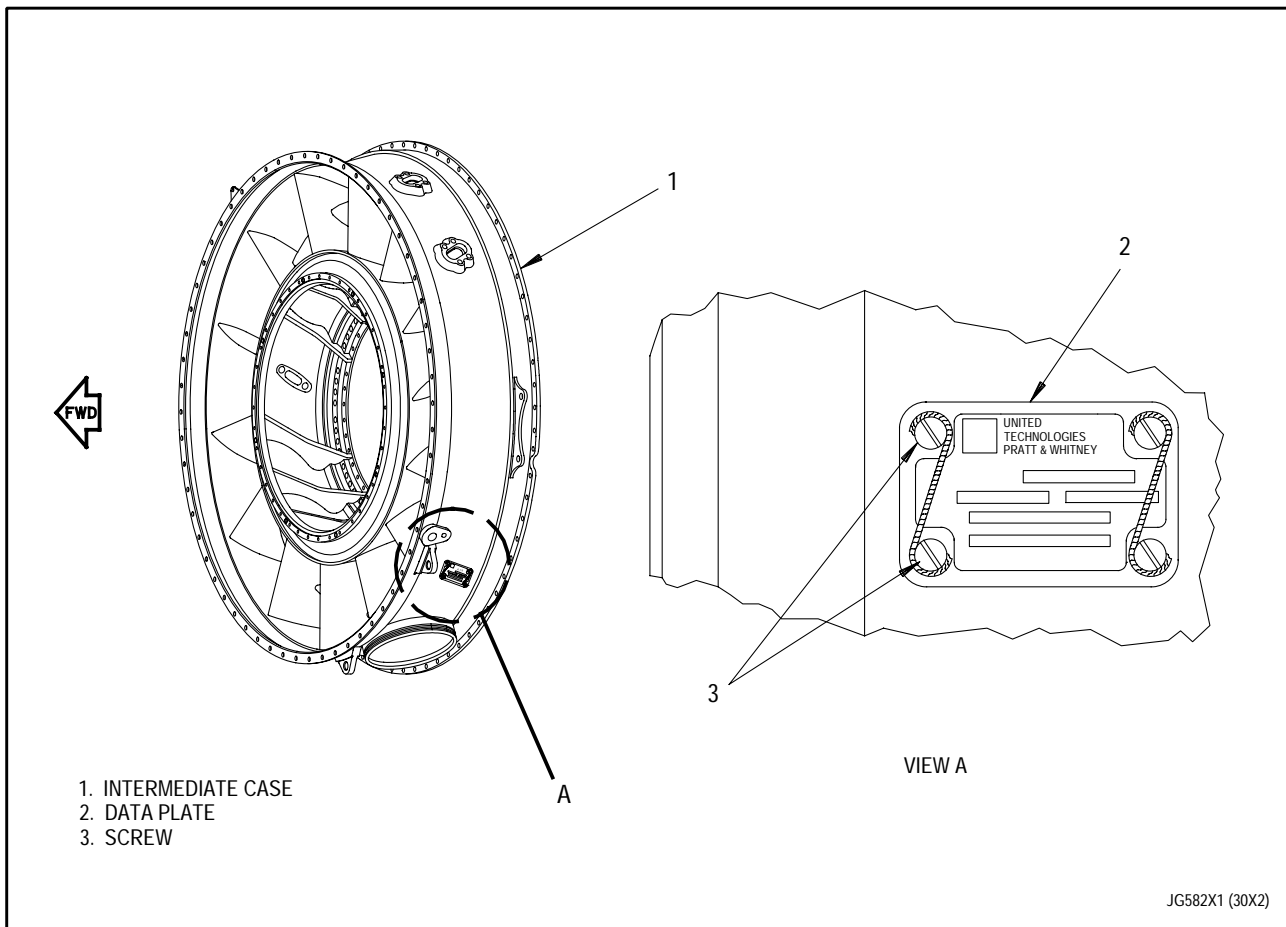


Figure 10. Data Plate - Installation

11. BAFFLE ASSEMBLY - INSTALLATION.

(See Figure 11.)

- a. Position baffle assembly(3, figure 11), convex side inward, into gearbox opening in intermediate case(1).
- b. Apply a thin even coat of PWA 36000-2 or PWA 36000-3 sealing compound to three bolts(2).
- c. Secure baffle assembly(3) to intermediate case(1) with three bolts(2).
- d. Torque bolts(2) 23 to 26 pound-inches.
- e. Remove excess sealing compound.
- f. Lockwire bolts(2) with MS9226-04 wire.

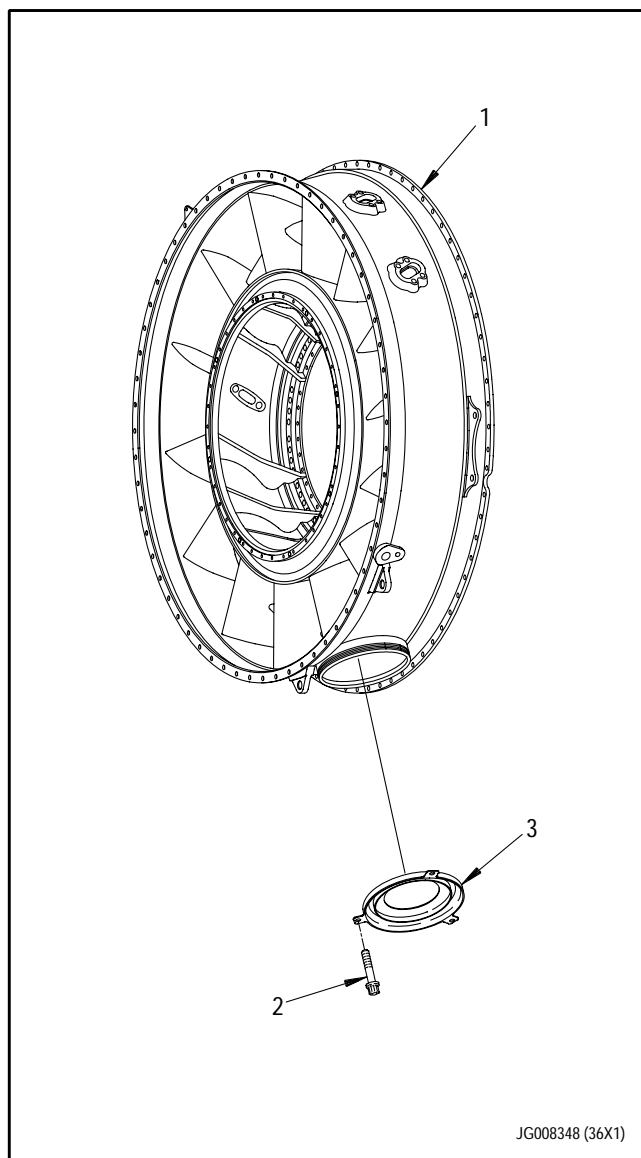


Figure 11. Baffle Assembly - Installation

1. Intermediate case
2. Bolt
3. Baffle assembly

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 3 BEARING REAR -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	17	3	15	5	0
2	16	4	17	6 - 8	16

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal Assembly, No. 3 Bearing Rear - Air Leak Check - - -	WP 611 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 July 1995	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Paper, Kraft, 50#	Medium Duty Draft St. Regis Paper Co.

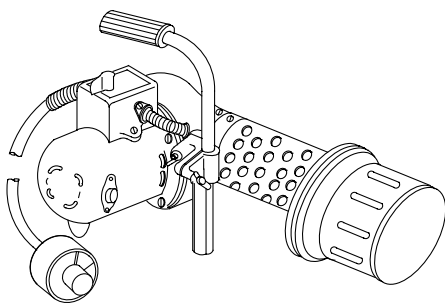
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Pin, cotter	MS9245-23	3
Washer, key	4042849	6

APPLICABLE SUPPORT EQUIPMENT

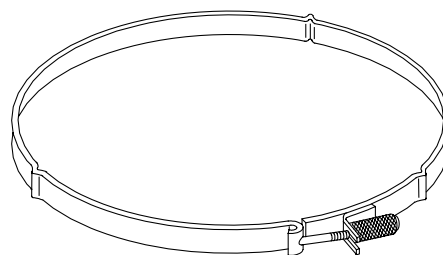
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 3 Bearing Rear Seal Assembly (PN 4075036-01) - Assembly Compressor, No. 3 bearing rear seal assembly rings - - - - - Heater - - - - -	PWA 52843 PWA 51932
3	No. 3 Bearing Rear Seal Assembly (PN 4068215) - Assembly Compressor, No. 3 bearing rear seal assembly rings - - - - -	PWA 52843

ILLUSTRATED SUPPORT EQUIPMENT



PWA 51932 -C

Figure T1. PWA 51932 Heater



PWA 52843 -C

Figure T1A. PWA 52843 Compressor

1. INTRODUCTION.

- a. This work package contains instructions for assembling No. 3 bearing rear seal assembly.

2. NO. 3 BEARING REAR SEAL ASSEMBLY (PN 4075036-01) - ASSEMBLY.

See Figure 1.)

- a. Place clean piece of paper on work bench.
- b. Put No. 3 bearing seal support assembly(8, figure 1) on bench so large OD flange is facing down.
- c. Install No. 3 bearing baffle(10) over ends of No. 3 bearing seal pins(9).
- d. Install six spacers(11) onto pins(9).
- d1. Heat No. 3 bearing heat shield(14) to 500°F (260°C) maximum using PWA 51932 heater or equivalent.
- e. Install No. 3 bearing shield(14) over ends of pins(9), ensure shield is seated.
- f. Secure shield(14) to seal support assembly(8) with six key washers(12) and nuts(13).
- g. Torque nuts(13) 32 to 36 pound-inches.
- h. Bend key washer(12) tabs against nut. Inspect for maximum gap of 0.010 inch between key washer tabs and nut.
- i. Put No. 3 bearing seal support assembly(8) on bench so large OD flange is facing up.
- il. Select standard or oversize metal seal rings(6) as follows:

- (1) Check seal ring holder for oversize marking in area of part number marking.

- (2) If piston ring grooves were machined oversize, part will be marked:
USE OVERSIZE RING P5, P10, P15, P20, P25, or P30.

- (3) If part is marked for oversize rings, sum of values of two oversize rings shall match value marked on seal ring holder.

Example: Seal ring holder is marked USE OVERSIZE RING P15. A P10 oversize ring may be used with P5, or P15 oversize ring with standard size ring. Assembly position, when using two rings of different width, is not important.

- j. Install metal seal ring(6) into lower ring groove of seal support assembly(8). Widest side of seal ring faces down.
- k. Install spring washer(7) into ring groove against seal ring(6).
- l. Install second metal seal ring(6) into ring groove against spring washer(7). Widest side of seal ring faces up.
- m. Turn two metal seal rings(6) so gaps are 180 degrees apart.
- n. Install PWA 52843 compressor around metal seal rings. Ensure knob of compressor can be removed without hitting springs after seal is assembled.
- o. Install compression spring seats(5) and springs(4) over each of six pins on rear seal support assembly(8).
- p. Install three No. 3 bearing seal guides(2) into three slots on seal assembly(3). Flat side of guides face outward.

- q. Install seal assembly(3) and guides(2) into seal support assembly(8). Align seal assembly with pins(9) on seal support assembly.
- r. Tighten knob on PWA 52843 compressor and push seal assembly(3) down so assembly goes over metal seal rings(6) in seal support assembly(8).
- s. Install cotter pins(1) into pins(9) of seal support assembly(8) to secure seal assembly(3). Heads of cotter pins go toward right hand side.

NOTE

Cotter pins will be fully bent after leak check of seal.

- t. Slightly bend cotter pins(1).
- u. Remove PWA 52843 ring compressor.
- v. Perform air leakage check per WP 611 00.
- w. Ensure cotter pins(1) are bent after acceptable air leak check.

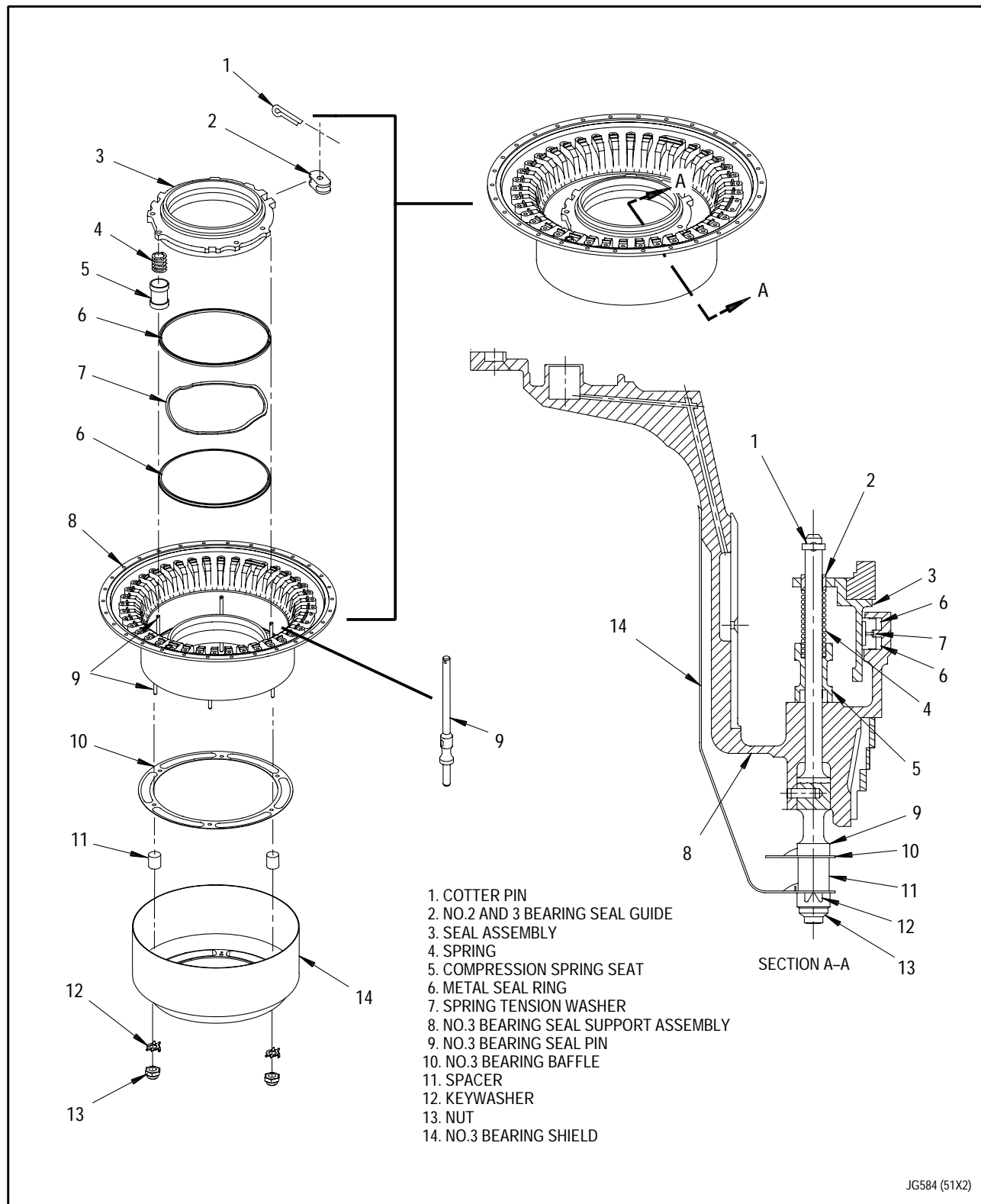


Figure 1. No. 3 Bearing Rear Seal Assembly (Typical PN 4075036-01) - Assembly

3. NO. 3 BEARING REAR SEAL ASSEMBLY (PN 4068215) - ASSEMBLY.

(See Figure 2.)

- a. Place a clean piece of paper on work bench.
- b. Put rear seal support assembly(8, figure 2) on bench so that six pins are up.
- bl. Select standard or oversize metal seal ring as follows:
 - (1) Check seal ring holder for oversize marking in area of part number marking.
 - (2) If piston ring grooves were machined oversize, part will be marked:
USE OVERSIZE RING P5, P10, P15, P20, P25, or P30.
 - (3) If part is marked for oversize rings, sum of values of two oversize rings shall match value marked on seal ring holder.

Example: Seal ring holder is marked USE OVERSIZE RING P15. A P10 oversize ring may be used with P5, or P15 oversize ring with standard size ring. Assembly position, when using two rings of different width, is not important.
- c. Install metal seal ring(6) into lower groove on seal ring holder. Widest side of seal ring goes down.
- d. Install spring washer(7) into groove against seal ring that was just installed.
- e. Install second metal seal ring(6) into groove against

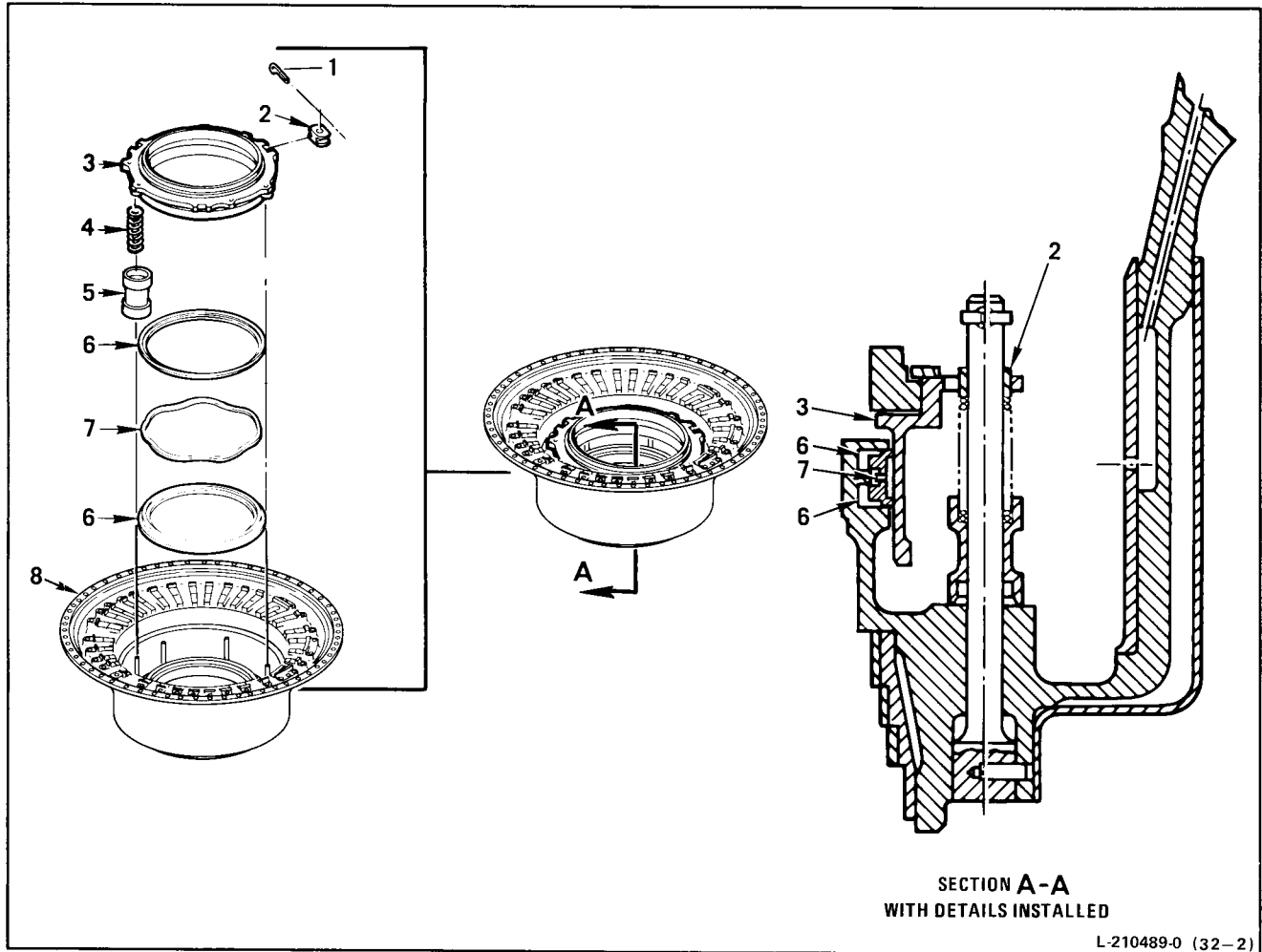
spring washer. Widest side of seal ring goes up.

- f. Turn two seal rings so that gaps are exactly opposite (180 degrees apart).
- g. Install PWA 52843 compressor around metal seal rings. Be sure that knob of compressor can be removed without hitting springs after seal is assembled.
- h. Install spring seats(5) and springs(4) over each of six pins on seal support assembly(8).
- i. Install three guides(2) into three slots on face seal assembly(3). Flat sides of guides face outward.
- j. Install face seal assembly(3) and guides(2) on seal support assembly(8). Align rear face seal with pins on seal support assembly.
- k. Tighten knob on PWA 52843 compressor and push face seal down so that body goes over seal rings(6) in seal support assembly.
- l. Install cotter pins(1) into pins of seal support assembly to secure face seal assembly. Heads of cotter pins go toward right hand side.

NOTE

Cotter pins will be fully bent after leak check of seal.

- m. Slightly bend cotter pins.
- n. Remove PWA 52843 ring compressor.
- o. Perform air leakage check per WP 611 00.



- 1. PN MS9245-23 cotter pin, 3 required
- 2. Guide, 3 required
- 3. Rear carbon face seal assembly
- 4. Spring, 6 required
- 5. Spring seat, 6 required
- 6. Metal seal ring
- 7. Spring washer
- 8. Rear seal support assembly PN 4068182

Figure 2. No. 3 Bearing Rear Seal Assembly (Typical PN 4068215) - Assembly

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 3 BEARING REAR -

AIR LEAK CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	19	2 - 6	17	7 - 8	19

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
PETROLATUM, WHITE (PMC 9609)	VV-P-236

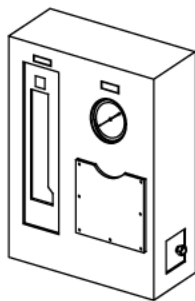
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

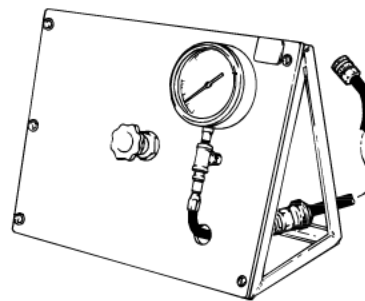
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 3 BEARING REAR SEAL ASSEMBLY - AIR LEAKAGE CHECK	
	FIXTURE-LEAK CHECK, NO. 3 BEARING REAR SEAL ASSEMBLY - - - - -	PWA 56574
	FIXTURE-LEAK CHECK, NO. 3 BEARING REAR SEAL ASSEMBLY - - - - -	OR PWA 57432
	REGULATOR - - - - -	PWA 21875
	FLOWMETER, AIR SEAL ASSEMBLY AIRFLOW CHECK - - - - -	PWA 6507

ILLUSTRATED SUPPORT EQUIPMENT



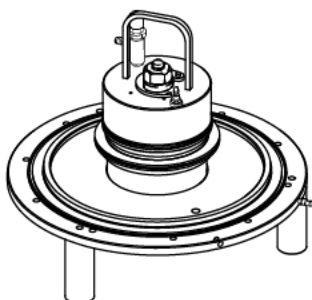
PWA 6507-C

Figure T1. PWA 6507 FLOWMETER



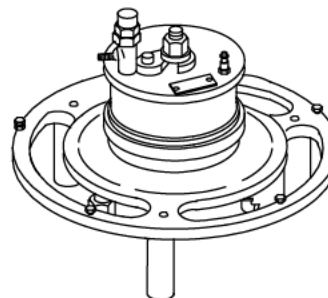
PWA 21875 -C

Figure T2. PWA 21875 REGULATOR



PWA 56574 -C

Figure T3. PWA 56574 FIXTURE



PWA 57432 -C

Figure T4. PWA 57432 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for performing air leakage check of No. 3 bearing rear seal assembly using PWA 56574 fixture.
- b. Total air leakage is measured at two locations:
 - Forward seal ring
 - Rear seal ring
- c. Total air leakage at forward seal ring includes leakage past carbon seal and forward seal ring. Maximum allowable leakage at this point is 0.62 cfm.
- d. Total air leakage at rear seal ring includes leakage past carbon seal and rear seal ring. Maximum allowable leakage at this point is 1.12 cfm.

**2. NO. 3 BEARING REAR SEAL ASSEMBLY -
AIR LEAKAGE CHECK.**

(See Figure 1.)

- a. Loosen nut(3, figure 1) on top of detail-7 cap(6) on PWA 56574 fixture; move swing C-washer(4) out of way; then remove cap(6).
- b. Remove 10 bolts(10).
- c. Inspect packings(2, 7, and 9) and ring(8). Do not use fixture if these items are not serviceable.

NOTE

Petrolatum coating ensures firm bond between ring(8) and carbon seal of No. 3 bearing rear seal assembly.

- d. Apply thin coating of VV-P-236 petrolatum to contact surface of ring(8) and packings(2, 7, and 9).

NOTE

Ring(8) is reversible with each side marked for applicable engine model.

- e. Install ring(8) onto fixture with side marked THIS SIDE UP FOR -229 facing up.



Legend for figure 1

1. Relief valve
2. Packing
3. Nut
4. Swing C-washer
5. Coupling plug
6. Cap
7. Packing
8. Ring
9. Packing
10. Bolt
11. Coupling plug
12. Relief valve
13. Base assembly

f. Install No. 3 bearing rear seal assembly onto fixture with carbon seal against ring(8).

g. Install 10 bolts(10) to secure seal assembly to detail-1 base assembly(13). Torque bolts 5 to 10 pound-inches in an alternating pattern until all 10 bolts have been torqued.

h. Install detail-7 cap(6) onto fixture; then position swing C-washer(4) and tighten nut(3) to seat carbon seal on ring(8).

i. Check visually for sealing of packing(7).

j. Measure airflow past rear seal ring as follows:

- (1) Ensure regulator valve is off and gage on PWA 21875 regulator is reading zero.
- (2) Connect shop air to PWA 21875 regulator.
- (3) Connect hose from PWA 21875 regulator to coupling plug(5) on top of PWA 56574 fixture.

(4) Connect hose from PWA 6507 flowmeter to coupling plug(11) on bottom of fixture.



If carbon seal is not seated properly, a large flow of air may damage flowmeter.

(5) Slowly open PWA 21875 regulator to get 30 psi.

NOTE

If leakage is high, fixture may be tapped with rawhide mallet to ensure carbon seal is seated.

(6) Read total airflow leakage past rear seal ring in cfm on PWA 6507 flowmeter. Leakage shall not be more than 1.12 cfm. If leakage is more than 1.12 cfm, proceed to step m.

k. Turn off air supply from PWA 21875 regulator.

1. Measure airflow past forward seal ring as follows:
 - (1) Ensure regulator valve is off and gage on PWA 21875 regulator is reading zero.
 - (2) Connect hose from PWA 21875 regulator to coupling plug(11) on bottom of PWA 56574 fixture.
 - (3) Connect hose from PWA 6507 flowmeter to coupling plug(5) on top of fixture.



If carbon seal is not seated properly, a large flow of air may damage flowmeter.

- (4) Slowly open PWA 21875 regulator to get 10 psi.

NOTE

If leakage is high, fixture may be tapped with rawhide mallet to ensure carbon seal is seated.

- (5) Read total airflow leakage past forward seal ring in cfm on PWA 6507 flowmeter. Leakage shall not be more than 0.62 cfm. If leakage is more than 0.62 cfm proceed to step m.

NOTE

Air leakage check shall be repeated after each corrective action.

- m. If leakage past either of the seal rings was high, proceed as follows:
 - (1) Compress and release seal against its springs to ensure it was not cocked or sticking.
 - (2) Clean seal assembly. Refer to T.O. 2-1-111.
 - (3) Ensure pressure side of seal ring faces proper direction. Refer to WP 610 00.
 - (4) Check seal ring (two rings) side clearance per WP 801 00, Reference 3299.
 - (5) Glass lap carbon seal. Refer to T.O. 2-1-111.
- n. Remove No. 3 bearing rear seal assembly from PWA 56574 fixture.
- o. Bend cotter pins in No. 3 bearing rear seal assembly around contour of seal pin after acceptable air leak check.

WORK PACKAGE**TECHNICAL PROCEDURES****SEAL ASSEMBLY, NO. 4 BEARING FRONT(AND AIR SEALING RING) -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1		5			
2 - 3		0			
4		5			
5 - 9		0			
10 Blank		0			

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal Assembly, No. 4 Bearing Front - Air Leak	
Check - - - - -	WP 613 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

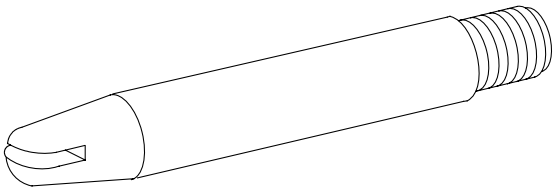
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Pin, cotter	MS9245-23	3

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
5	No. 4 Bearing Front Air Sealing Ring - Installation Onto No. 4 Bearing Front Seal Assembly	
	Pin, Aligning No. 4 bearing front seal support and seal ring holder (two required) - - - - -	PWA 14383

ILLUSTRATED SUPPORT EQUIPMENT



PWA 14383 -C

Figure T1. PWA 14383 Pin

1. INTRODUCTION.

- a. This work package contains instructions for assembling the No. 4 bearing front seal assembly and installation of the No. 4 bearing front air sealing ring.
- b. First, the No. 4 bearing front seal is assembled into front seal support; then the seal assembly is leak checked per T.O. 2J-F100-53-7, WP 613 00, before installation of front air sealing ring. After successful leak check, the front air sealing ring is installed.

2. NO. 4 BEARING FRONT SEAL ASSEMBLY - ASSEMBLY.

(See Figure 1.)

a. Check metal seal ring gap as follows:

- (1) Place face seal assembly on protected area of bench carbon seal down.
- (2) Install metal seal ring into face seal assembly. Pressure side (large OD up) of seal ring goes toward flange of face seal. (See figure 1.)
- (3) Check metal seal ring end gap. Gap shall be 0.087 to 0.113 inch.
- (4) Remove metal seal ring from face seal.

b. Assemble front seal assembly as follows:



Be careful when handling front seal support assembly. It has a thin wall which can be easily damaged.

- (1) Place front seal support assembly on bench so flange is up.

- (2) Install metal seal ring into stepped groove of support. Be sure pressure side (large OD down) of ring is up, and metal seal ring gap is at 12 o'clock position. (See figure 1.)
- (3) Install 12 helical springs into front seal support assembly.
- (4) Place face seal assembly on bench with carbon seal face up.
- (5) Install bushings on face seal assembly at three slotted locations.

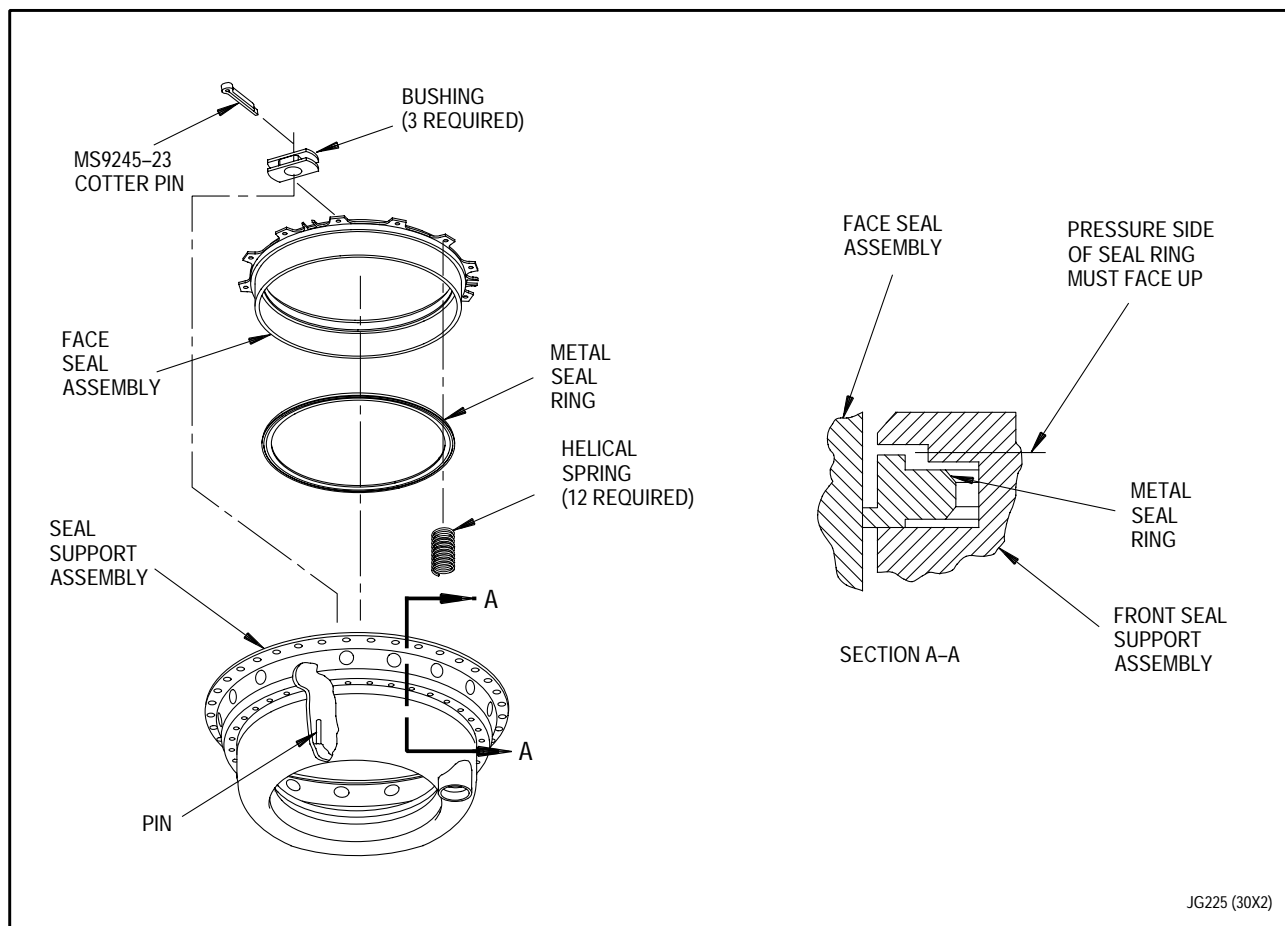


Figure 1. No. 4 Bearing Front Seal Assembly - Assembly

- (6) Install face seal (carbon face up) into front seal support. Align bushings with pins in front seal support.
- (7) Ensure springs are properly seated.
- (8) Carefully push face seal down past metal seal ring in front seal support.
- (9) Carefully push face seal down to compress springs, then install cotter pins.

NOTE

Do not fully bend cotter pins. This will be done after seal is leak checked.

- (10) Slightly bend legs of cotter pins.

**3. NO. 4 BEARING FRONT SEAL ASSEMBLY -
ASSEMBLY CLEARANCE CHECKS.**

(See Figures 2 and 3.)

a. Check clearance between face seal assembly and seal support as follows:

- (1) Do not compress face seal downward while checking gap.
- (2) Use a feeler gage 0.002 inch thick with maximum end width of 0.125 inch.
- (3) Apply a light outward hand pressure to ID of face seal assembly. (See figure 2.)
- (4) Check clearance between ID of face seal and OD of seal support opposite from point where outward pressure is applied. This gap must be 0.002 inch minimum.
- (5) Check all the way around assembly, always checking gap opposite from point where hand pressure is applied. Gap shall always be 0.002 inch minimum.
- (6) If gap is within limits go to step c. If gap is not within limits go to step b.

b. If clearance check in step a. was not acceptable, proceed as follows:

- (1) Remove face seal assembly from seal support.

- (2) Reposition face seal 120 degrees clockwise and install it per paragraph 2 of this work package.
- (3) Repeat clearance check per step a. If necessary disassemble face seal; reposition it another 120 degrees and repeat clearance check.
- (4) If clearance check is still unacceptable, replace face seal assembly and repeat clearance check. If necessary, reposition face seal 120 degrees at a time.
- (5) If clearance check is still unacceptable replace seal support assembly and repeat clearance check. If necessary, reposition face seal 120 degrees at a time.
- (6) After acceptable clearance between ID of face seal and OD of seal support is attained go to step c.

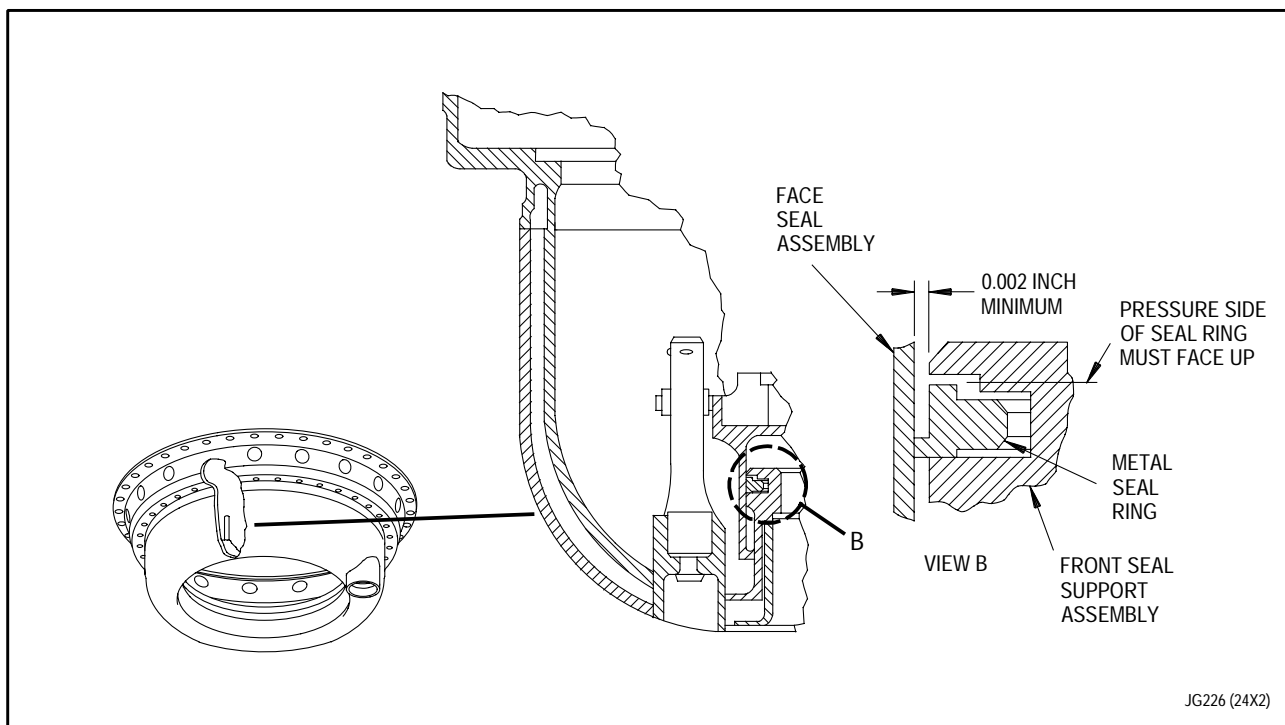


Figure 2. Clearance Between Face Seal and Seal Support

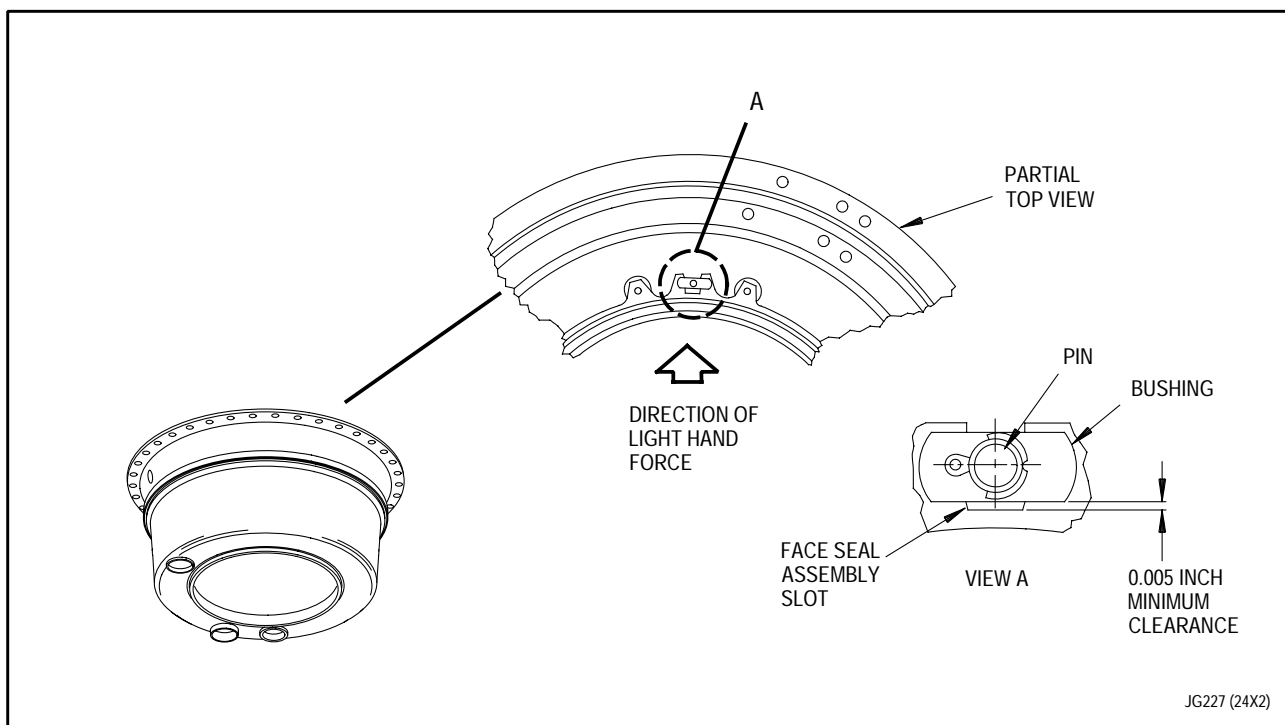


Figure 3. Clearance Between Bushings and Slots

- c. Check clearance between inner edge of bushings and outer edge of slots on face seal as follows:

- (1) Apply light outward hand pressure at bushing location being checked. (See figure 3.)
- (2) Check clearance as shown with 0.005 inch feeler gage. Clearance shall be 0.005 inch minimum.
- (3) Check clearance at the other two locations. Be sure to apply outward hand pressure as each bushing is checked.
- (4) If clearance is less than 0.005 inch at any of the three locations replace front seal support assembly.

4. NO. 4 BEARING FRONT SEAL ASSEMBLY - AIR LEAK CHECK.

- a. Front seal assembly shall be leak checked before front air sealing ring is installed (paragraph 5).
- b. Perform air leakage check on No. 4 bearing front seal assembly per WP 613 00.

5. NO. 4 BEARING FRONT AIR SEALING RING - INSTALLATION ONTO NO. 4 BEARING FRONT SEAL ASSEMBLY.

(See Figure 4.)

- a. Install two PWA 14383 aligning pins at 3 and 7 o'clock positions in air sealing ring (figure 4). Do not use any of the three equally spaced holes.
- b. Heat air sealing ring in oven 250° to 350°F (121° to 177°C) for 20 minutes.
- c. Install air sealing ring on seal support assembly with dowel pin hole aligned with dowel pin and alignment pins aligned with holes in flange.
- d. Using non-metallic drift and mallet, tap OD flange of air sealing ring to seat on seal support assembly.
- e. Remove PWA 14383 aligning pins and wrap assembly in protective paper.

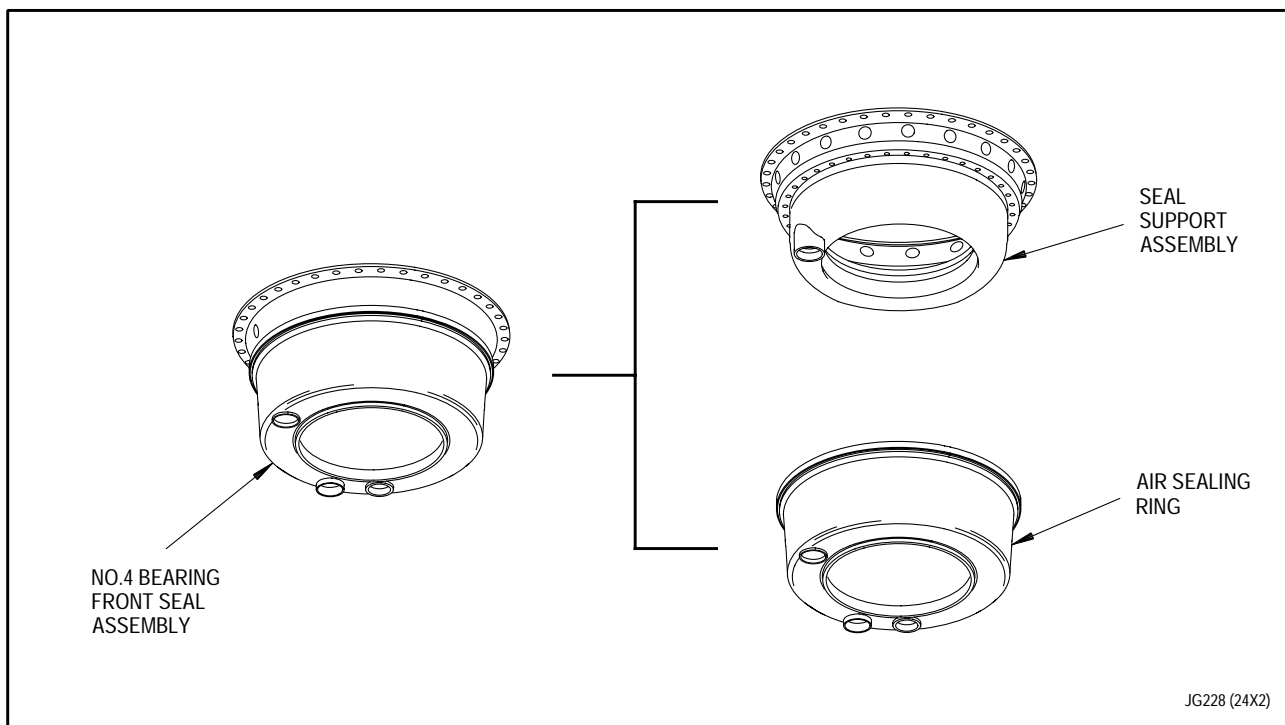


Figure 4. No. 4 Bearing Front Air Sealing Ring - Installation

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 4 BEARING FRONT -

AIR LEAK CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	15	5	0	6 Blank	0
3 - 4	8				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229-560	30 April 1995	O/I	Reoperation of PWA 57742, No. 4 Bearing Front Seal Assembly Leak Check Fixture, F100-PW-229 Engine, F-15/F-16 Aircraft. (ECP 93QC001AR1)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Oil, lubricating	MIL-L-7808

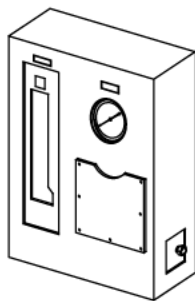
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

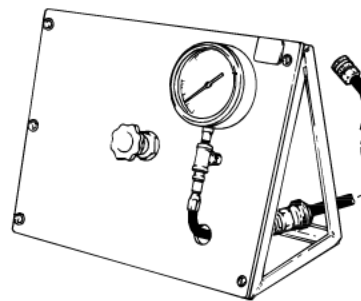
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 4 Bearing Front Seal Assembly - Air Leak Check	
	Flowmeter, Air seal assembly airflow check - - - - -	PWA 6507
	Regulator - - - - -	PWA 21875
	Fixture, Air leak check No. 4 bearing front carbon seal assembly - - - - -	PWA 57799 or PWA 57742

ILLUSTRATED SUPPORT EQUIPMENT



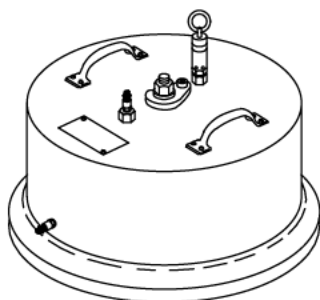
PWA 6507-C

Figure T1. PWA 6507 Flowmeter



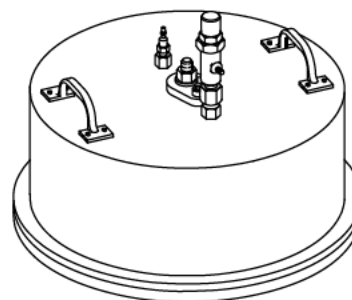
PWA 21875 -C

Figure T2. PWA 21875 Regulator



PWA 57742 -C

Figure T3. PWA 57742 Fixture



PWA 57799 -C

Figure T4. PWA 57799 Fixture

1. INTRODUCTION.

- a. This work package contains instructions for performing air leak check on No. 4 bearing front seal assembly.
- b. This procedure checks total air leakage past carbon seal and metal seal ring inside No. 4 bearing front seal assembly. Total leakage limit is 1.0 cfm.

2. NO. 4 BEARING FRONT SEAL ASSEMBLY - AIR LEAK CHECK.

- a. Inspect preformed packings and seal seat inside PWA 57799 fixture. Do not use fixture if these items are not serviceable.
- b. Loosen collar nut on top of cover on PWA 57799 fixture; move C-washer out of way and remove cover.

NOTE

Do not use engine seal seat in PWA 57799 fixture.

- c. Install fixture spacer (seal seat) in PWA 57799 fixture.

- d. Apply light coat MIL-L-7808 to position fixture spacer and carbon seal.

NOTE

No. 4 bearing front seal will not fit in fixture if No. 4 bearing front air sealing ring is installed.

- e. Install No. 4 bearing front seal assembly so carbon seal goes against fixture seal seat.
- f. Install cover over No. 4 bearing front seal; position C-washer and tighten collar nut to secure.
- g. Connect shop air to PWA 21875 regulator and zero gage on regulator; connect hose from regulator to inlet fitting on PWA 57799 fixture.
- h. Connect hose from outlet fitting on fixture to PWA 6507 flowmeter.



Open PWA 21875 regulator slowly, a sudden large flow of air could damage the PWA 6507 flowmeter if carbon seal is not seated.

- i. Open PWA 21875 regulator to get 30 psig.

NOTE

If leakage is high, tap fixture with a mallet to be sure carbon seal is seated.

- j. Read total leakage on PWA 6507 flowmeter. Leakage shall not be more than 1.0 cubic foot per minute. If leakage is high go to step k. for corrective action.
- k. Turn off air supply from PWA 21875 regulator and remove tooling.
- l. If leakage was high proceed as follows:
 - (1) Compress and release seal against its springs to be sure it was not cocked or sticking.

- (2) Clean seal assembly. Refer to T.O. 2-1-111.
 - (3) Glass lap carbon seal. Refer to T.O. 2-1-111.
 - (4) Recheck ring end gap clearance. Installed gap clearance shall be 0.087 to 0.113 inch. Refer to T.O. 2J-F100-53-7, WP 612 00.
 - (5) Be sure pressure side of ring faces proper direction (up). Refer to T.O. 2J-F100-53-7, WP 612 00.
 - (6) Repeat air check.
- m. Bend cotter pins at seal ring bushings in opposite directions around bushings.

WORK PACKAGE**TECHNICAL PROCEDURES****CASE ASSEMBLY, DIFFUSER -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 42

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	30	12 - 13	0	25 - 28	0
2	29	14	2	29	30
3	25	15	30	30 - 33	0
4	24	16 - 18A	25	34 - 36	18
5 - 6	18	18B Blank	24	37	25
7 - 8	24	19 - 21	25	38	18
8A - 8B	29	22	0	39 - 49 Deleted	18
9	0	23 - 24	2	50 Blank Deleted . . .	18
10 - 11	14				

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Air Flow Check Using PWA 50047 Pneumatic Test Set - General Procedures - - - - -	WP 025 00
Air Flow Check Using Habco 1093005 Portable Air Flow Checker - General Procedures - - - - -	SWP 025 01
General Procedures Oil Nozzle Assembly, Air or Visual Flow Check - - - - -	WP 026 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Oil Nozzles, No. 4 Bearing - Air Flow Check - - - - -	WP 615 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-514	15 JUN 98	D	Retrofit of PN 4077913 Rear Compressor Exit Stator Assembly Featuring PN 4077422 Compressor Damper, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 89QA728)
2J-F100229(II)-532	30 NOV 95	O/I	Remove and Replace No. 4 Bearing Oil Pressure Transfer Tube, B-Nut, and Install Conical Seal, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 91QA245C2)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ADHESIVE	PERMABOND 910
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
COMPOUND, ANTISEIZE (PWA 36053-3)	LOCTITE NICKEL ANTISEIZE 771
FLUID, LEAK CHECK	MIL-L-25567C
LOCKWIRE (0.025 INCH DIAMETER)	MS9226-03
LOCKWIRE (0.032 INCH DIAMETER)	MS9226-04
LUBRICANT, DRY FILM	FEL-PRO C-300
OIL, LUBRICATING	MIL-L-7808
PETROLATUM	VV-P-236
WAX, PARAFFIN	VV-W-95

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
CLAMP	4066513	1
GASKET	ST2284-04	1
GASKET	ST2284-07	1
GASKET	ST2284-12	1
GASKET	ST2284-14	1
SEAL RING - METAL	4036929	1
SEAL RING - METAL	4036955	4
SEAL RING - METAL	4077821	2
SEAL RING - METAL	4077824	1
WASHER - KEY	4076272	8

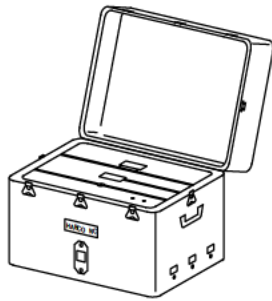
APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 4 BEARING INTERNAL PRESSURE TUBE ASSEMBLY - SEATING CHECK BEFORE INSTALLATION	
	COMPRESSOR, TUBE END GASKET - - - - -	PWA 56629 OR
	CRIMPER, TUBE GASKET - - - - -	PWA 56320
3	NO. 4 BEARING INTERNAL PRESSURE TUBE ASSEMBLY - PARTIAL INSTALLATION	
	STAND, ASSEMBLY AND TRANSPORT - - - - -	PWA 56593 OR
	STAND, ASSEMBLY AND TRANSPORT - - - - -	PWA 16868
	ADAPTER - - - - -	PWA 10356
	SLING, THREE CABLE - - - - -	PWA 14175
	ADAPTER, RING - - - - -	PWA 57714
4	NO. 4 BEARING INTERNAL SCAVENGE TUBE - SEAL RING AND CONICAL GASKET INSTALLATION	
	COMPRESSOR, TUBE END GASKET - - - - -	PWA 56629 OR
	CRIMPER, TUBE GASKET - - - - -	PWA 56320
	GAGE, RING, GASKET, NO. 4 BEARING LEFT INTERNAL SCAVENGE TUBE - - - - -	PWA 52625

APPLICABLE SUPPORT EQUIPMENT (continued)

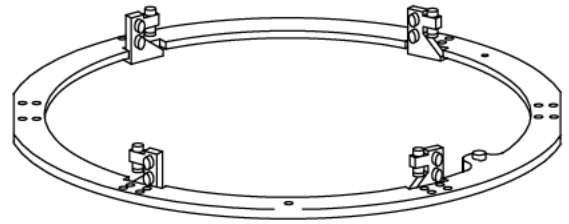
Paragraph	Function - Tool Nomenclature	Tool Number
7	NO. 4 BEARING FRONT SEAL ASSEMBLY - INSTALLATION	
	HEATER, DIFFUSER CASE INNER REAR FLANGE - - - - -	PWA 56324
		OR
	HEATER, DIFFUSER CASE INNER REAR FLANGE - - - - -	PWA 52464
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
8	NO. 4 BEARING INTERNAL PRESSURE TUBE - FINAL ASSEMBLY	
	TORQUE ADAPTER, NO. 4 BEARING OIL PRESSURE TUBE - - -	PWA 57542
	WRENCH, NO. 4 BEARING OIL PRESSURE NUT - - - - -	PWA 51944
	COMPRESSOR, TUBE END GASKET - - - - -	PWA 56629
		OR
	CRIMPER, TUBE GASKET - - - - -	PWA 56320
9	NO. 4 BEARING INTERNAL SCAVENGE TUBE - INSTALLATION	
	TORQUE ADAPTER, NO. 4 BEARING SCAVENGE TUBE NUT - - -	PWA 57734
12	NO. 4 BEARING INTERNAL PRESSURE TUBE ASSEMBLY, INTERNAL OIL PRESSURE MANIFOLD, AND INTERNAL SCAVENGE TUBE - LEAK CHECK	
	TEST SET, PNEUMATIC - - - - -	PWA 50047
		OR
	CHECKER, PORTABLE AIR FLOW - - - - -	HABCO 1093005
	FIXTURE, AIR LEAK CHECK, DIFFUSER CASE OIL TUBES - -	PWA 53370
	ADAPTER, AIR FLOW CHECK - - - - -	PWA 52614

ILLUSTRATED SUPPORT EQUIPMENT



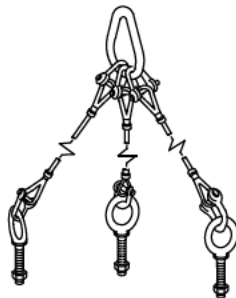
HABCO 1093005 -C

Figure T1. HABCO 1093005 CHECKER



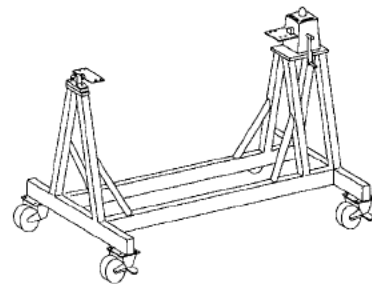
PWA 10356-C

Figure T2. PWA 10356 ADAPTER



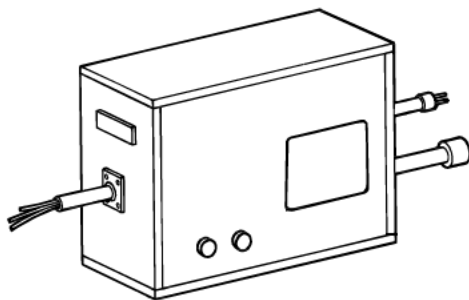
PWA14175-C

Figure T3. PWA 14175 SLING



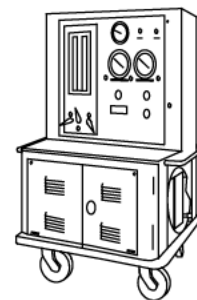
PWA 16868 -C

Figure T4. PWA 16868 STAND



PWA 25672 -C

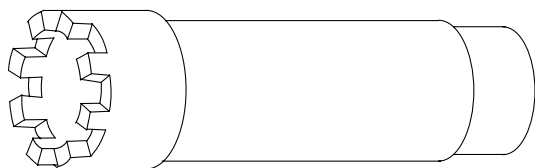
Figure T5. PWA 25672 CONTROL



PWA 50047 -C

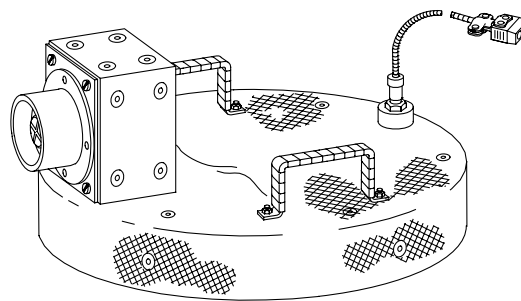
Figure T6. PWA 50047 TEST SET

ILLUSTRATED SUPPORT EQUIPMENT (continued)



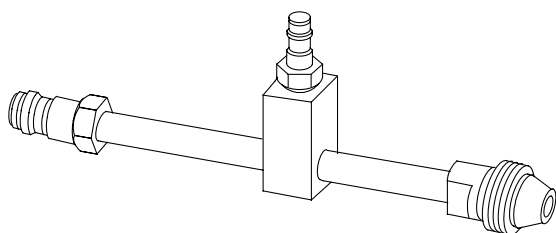
PWA 51944 -C

Figure T7. PWA 51944 WRENCH



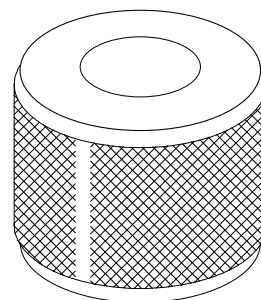
PWA 52464 -C

Figure T8. PWA 52464 HEATER



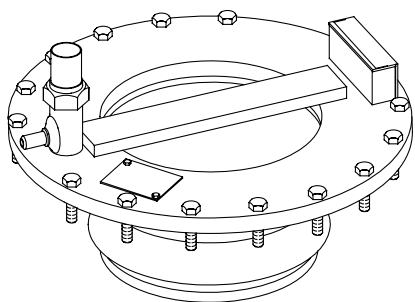
PWA 52614 -C

Figure T9. PWA 52614 ADAPTER



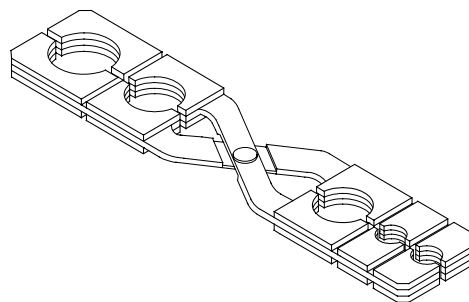
PWA 52625 -C

Figure T10. PWA 52625 GAGE



PWA 53370 -C

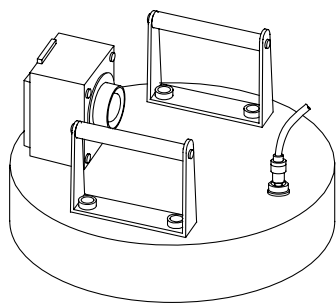
Figure T11. PWA 53370 FIXTURE



PWA 56320 -C

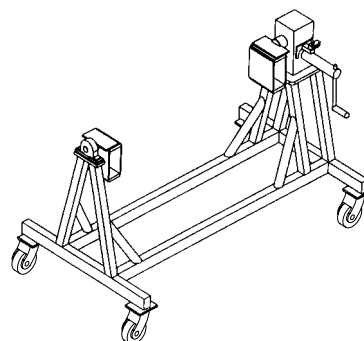
Figure T12. PWA 56320 CRIMPER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



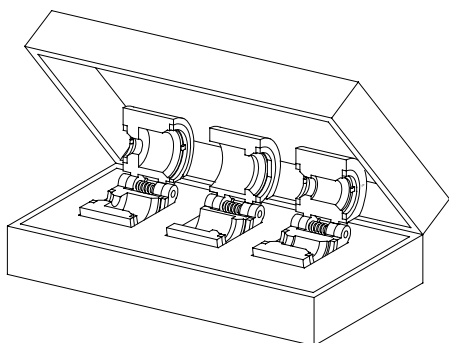
PWA 56324 -C

Figure T13. PWA 56324 HEATER



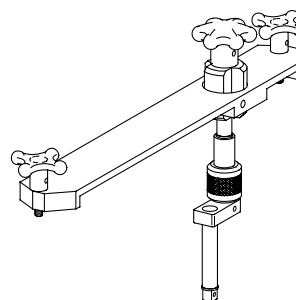
PWA 56593 -C

Figure T14. PWA 56593 STAND



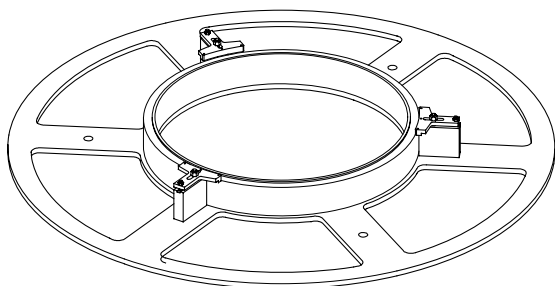
PWA 56629 -C

Figure T15. PWA 56629 COMPRESSOR



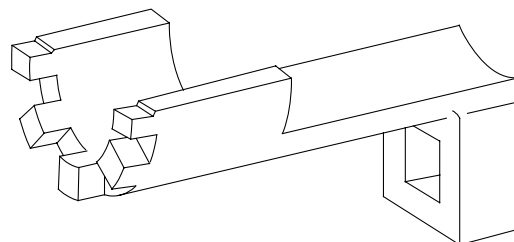
PWA 57542 -C

Figure T16. PWA 57542 TORQUE ADAPTER



PWA 57714 -C

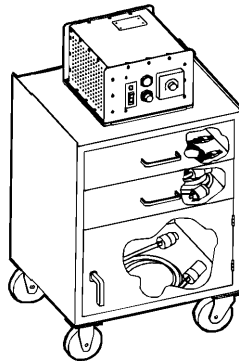
Figure T17. PWA 57714 ADAPTER



PWA 57734 -C

Figure T18. PWA 57734 TORQUE ADAPTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 61685 -C

Figure T19. PWA 61685 CONTROL

1. INTRODUCTION.

a. This work package contains instructions for assembly of the diffuser case. Highlights of these instructions are as follows:

- No. 4 bearing internal pressure tube seating measurement and partial installation.
- No. 4 bearing front air sealing ring and No. 4 bearing air sealing ring flange installation.
- No. 4 bearing internal vent tubes installation.
- No. 4 bearing front seal assembly installation.
- No. 4 bearing internal pressure tube final installation.
- No. 4 bearing scavenge tube and seal air supply tube installation.
- No. 4 bearing internal oil pressure manifold temporary installation.
- Leak check of tubes installed in diffuser case.
- Compressor exit stator installation.

2. NO. 4 BEARING INTERNAL PRESSURE TUBE ASSEMBLY - SEATING CHECK BEFORE INSTALLATION.

(See Figure 1.)

- a. Inspect conical sealing surface of No. 4 bearing internal pressure tube assembly for nicks, scratches, dents, or gouges. If any are present, replace tube assembly.



- Failure to properly install conical gasket to No. 4 bearing internal pressure tube assembly may cause oil leak and severe engine damage.
- Gaskets are very fragile. Use extreme care when handling.

NOTE

Gaskets shall remain in plastic bags until ready for installation. Discard once compressed or damaged.

- b. Install gasket(4, figure 1) on conical seat of tube assembly(3) as follows:

- (1) Position gasket on conical seat of tube assembly fitting.

NOTE

PWA 56629 compressor produces two dimples on gasket, 180 degrees apart. Crimping is performed several times to provide equally spaced crimps all around.

- (2) Position PWA 56629 compressor over gasket.

- (3) While holding gasket and PWA 56629 compressor firmly against conical seat, form circumferential crimp at fitting shoulder.
- (4) Crimp gasket large OD into groove of tube assembly all around. Crimped gasket must not exceed 0.975 inch diameter.



Gasket shall be seated properly to prevent incorrect measurements.

- c. Ensure conical gasket is crimped securely to tube assembly prior to installation.
- d. Install tube assembly into No. 4 bearing front seal support(1) and secure with nut(5) fingertight.
- e. Using a 1.000 to 2.000 inch depth micrometer with 6 inch base, measure dimension(2) as shown. Record as Dimension X.
- f. Disassemble parts and keep them together as a set for later installation.

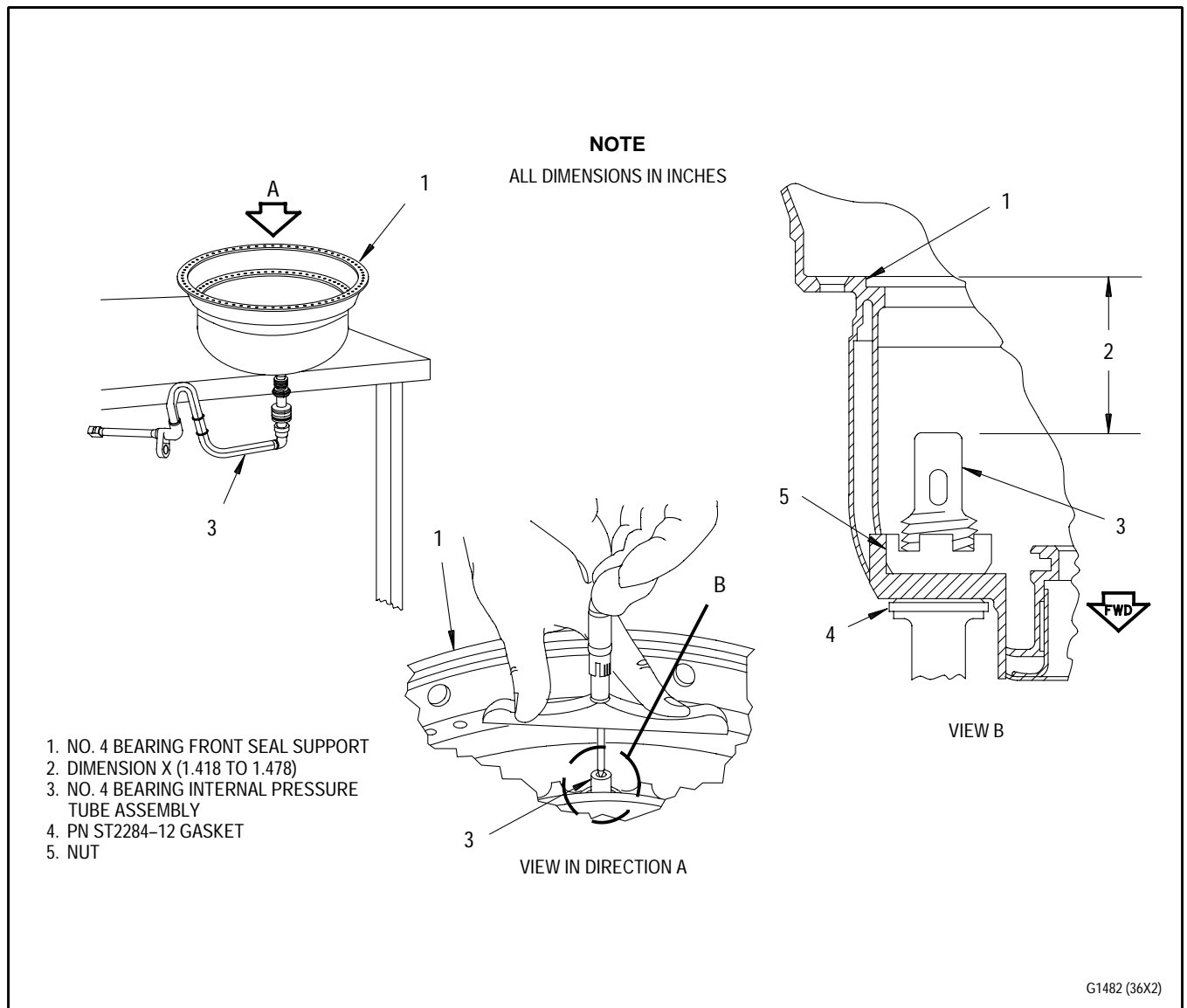


Figure 1. No. 4 Bearing Internal Pressure Tube Assembly - Seating Check Before Installation

**3. NO. 4 BEARING INTERNAL PRESSURE
TUBE ASSEMBLY - PARTIAL INSTALLATION.**

(See Figures 2 through 4.)

NOTE

Any case which receives a used tube shall have fewer total equivalent cycles remaining before next scheduled depot inspection than module from which tube was removed.

- a. Install diffuser case into PWA 56593 stand per figure 2, and as follows:

- (1) Attach two standard lifting straps, 180 degrees apart, to PWA 10356 adapter ring .
- (2) Connect lifting straps to hoist.
- (3) Position PWA 10356 adapter onto PWA 56593 stand and secure with detail bolts and nuts.
- (4) Install PWA 14175 three cable sling equally spaced to rear flange of diffuser case. Secure with detail nuts.

- (5) Position diffuser case onto PWA 57714 adapter ring.

- (6) Secure diffuser case front flange to PWA 57714 adapter ring using three detail-8 clamps.

- (7) Position PWA 57714 adapter ring with diffuser case on PWA 10356 and secure with detail nuts and bolts.

- (8) Remove PWA 14175 three-cable sling.

- b. See figure 3 to identify a new tube from a used tube.

NOTE

This procedure loosely installs tube so No. 4 bearing front air sealing ring assembly can be installed. Tube is secured in paragraph 8.

- c. Ensure gasket(1) is installed on conical seat of tube fitting per paragraph 2.

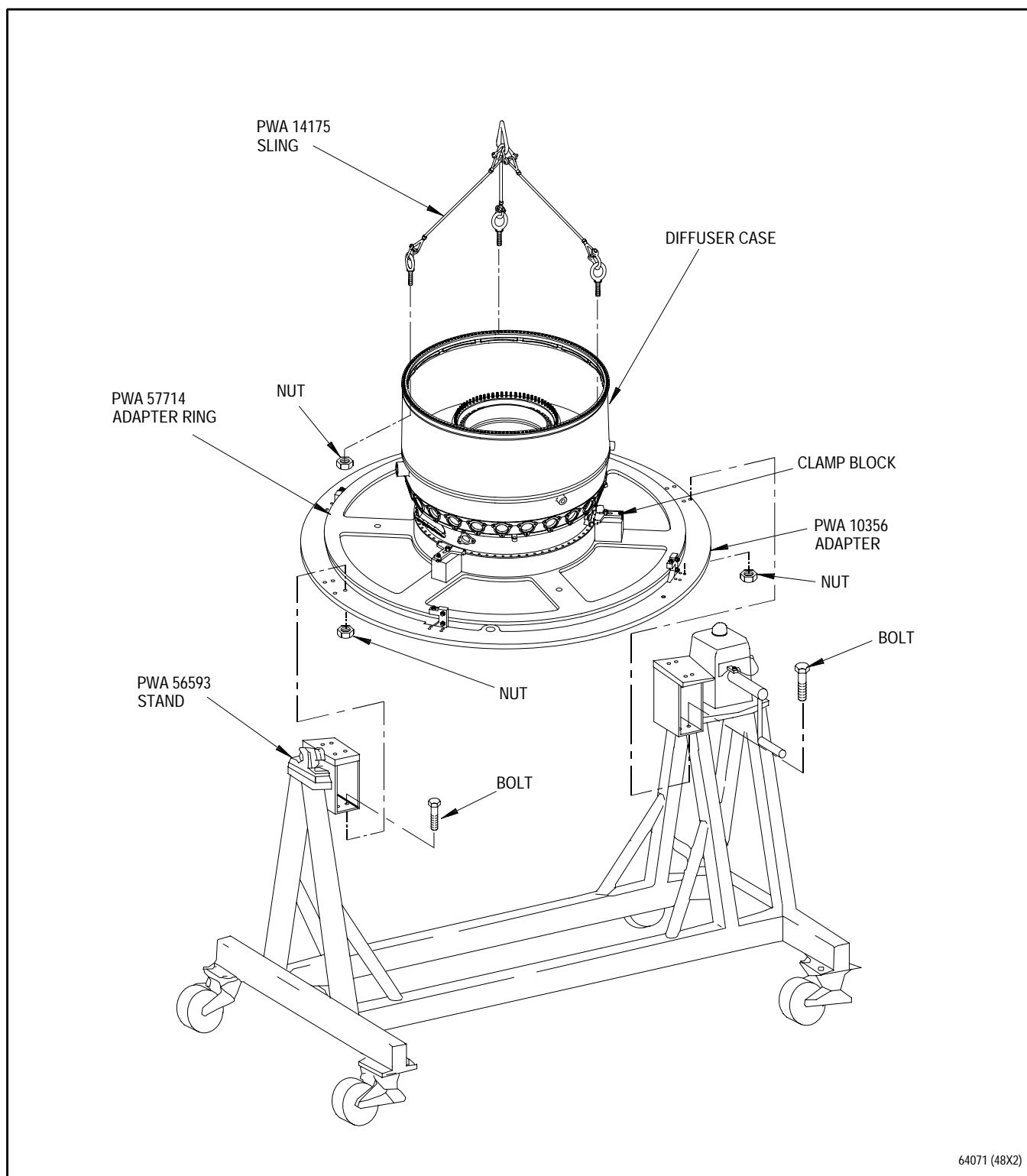


Figure 2. Diffuser Case Installation Into PWA 56593 Stand

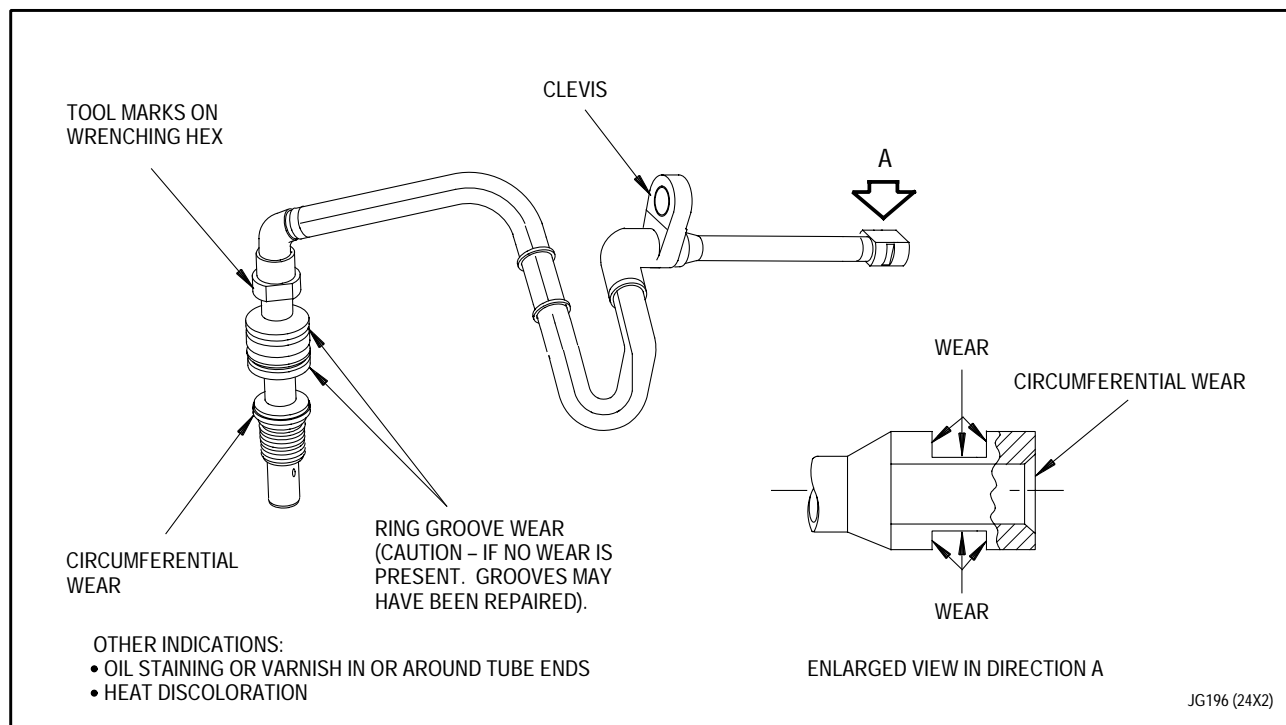


Figure 3. Methods to Determine If No. 4 Bearing Internal Pressure Tube Assembly Is New or Has Been Used/Repaired



When installing tube assembly, always use a new clamp(5). Installing a used clamp can result in inadequate retention or tube distress.

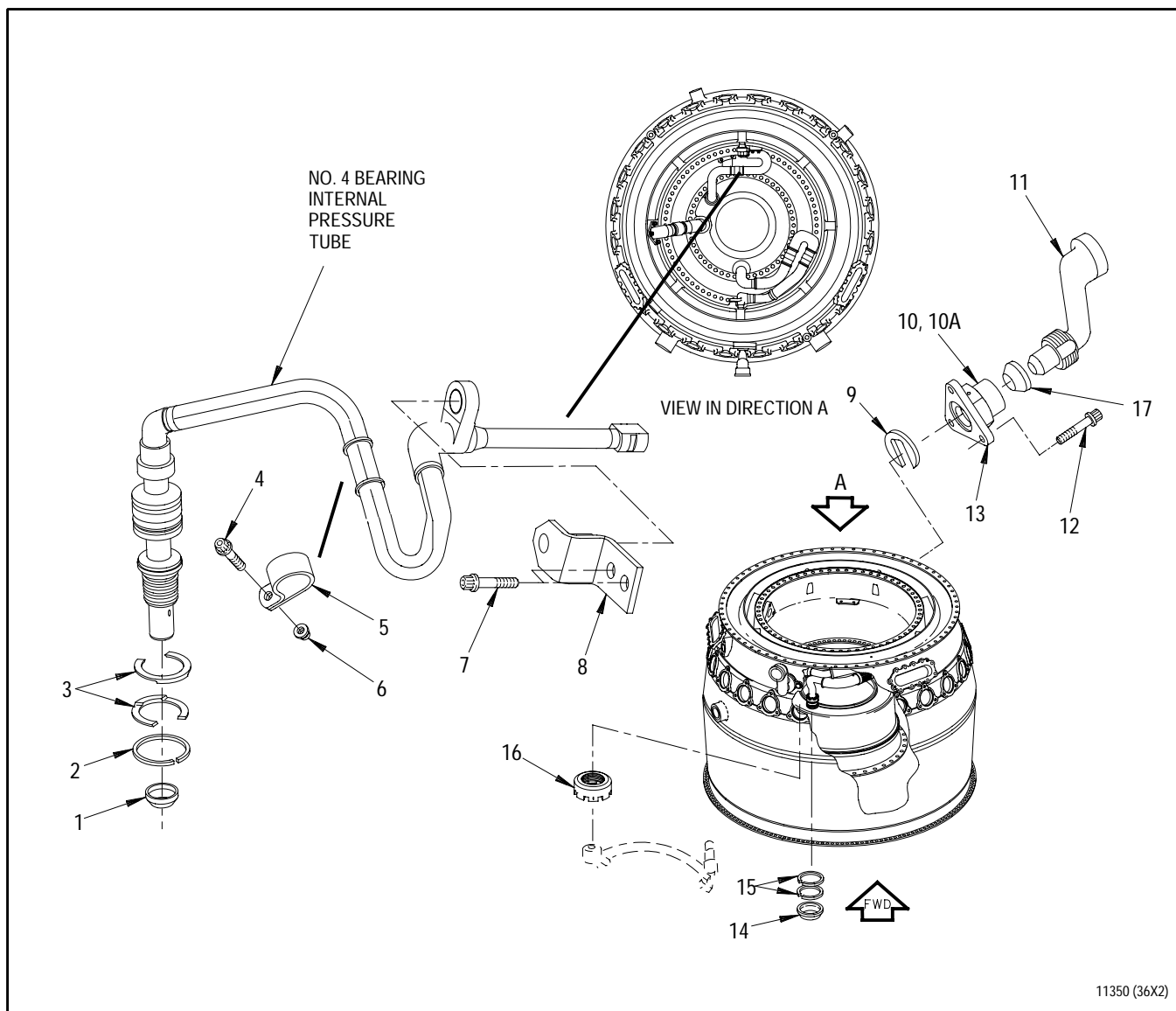
d. Install a new clamp(5) on tube assembly as follows:

- (1) Find small diameter at threaded tube connector between piston ring retaining lands and hex nut.
- (2) Open clamp(5) only enough to snap over small diameter of tube connector.
- (3) Install clamp(5), slide over hex nut and into position on tube.

NOTE

- Diffuser case should be positioned front end up.
 - Tube must be loose and free to move.
- e. Install small end of tube through pad at 12 o'clock position on diffuser case. Do not secure tube at this time.

- f. Align tube assembly and install bracket(8) with pin through bushing in elbow of tube assembly.
- g. Lubricate bolts(7) with Fel-Pro C-300 lubricant.
- h. Install two bolts(7). Do not tighten; leave loose.
- i. Position tube assembly to accept tube retaining plate(9).
- j. Install tube retaining plate(9).
- k. Lubricate bolt(4) with Fel-Pro C-300 lubricant.
- l. Align loop clamp bracket with bracket on diffuser case. Install bolt(4) and nut(6). Do not tighten; leave loose.



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Figure 4. No. 4 Bearing Internal Pressure Tube - Installation

Legend for figure 4

Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	PN ST2284-12 Gasket	-	-	-
2.	Metal Seal Ring	-	-	-
3.	Metal Seal Ring	-	-	-
4.	Bolt	Fel-Pro C-300	-	-
5.	Clamp	-	-	-
6.	Nut	-	27 to 30	-
7.	Bolt	Fel-Pro C-300	32 to 36	MS 9226-04
8.	Bracket	-	-	-
9.	Tube Retaining Plate	-	-	-
10.	Coupling Nut (PN 360583)	-	400 to 450	MS 9226-04
10A.	Coupling Nut (PN ST2100-12)	-	500 to 550	MS 9226-04
11.	No. 4 Bearing Pressure Tube	-	-	-
12.	Bolt	Fel-Pro C-300	36 to 40	MS 9226-04
13.	Diffuser Case Adapter	-	-	-
14.	PN ST2284-14 Gasket	-	-	-
15.	Metal Seal Ring	-	-	-
16.	Nut	Fel-Pro C-300	300 to 335	MS 9226-03
17.	PN ST2284-07 Gasket	-	-	-

4. NO. 4 BEARING INTERNAL SCAVENGE TUBE - SEAL RING AND CONICAL GASKET INSTALLATION.

(See figure 4.)



Failure to protect and secure diffuser case may cause damage to case.

- a. Place diffuser case on workbench on its side. Ensure diffuser case is protected and secured.

NOTE

If metal seal rings(15, figure 4) were not removed from No. 4 bearing internal scavenge tube proceed to step c.

- b. Install metal seal rings(15) into grooves on end of internal scavenge tube. Turn seal rings so that gaps are opposite (180 degrees apart).



- Failure to properly install conical gasket to No. 4 bearing internal pressure tube assembly may cause oil leak and severe engine damage.
- Careless handling of gaskets may damage gaskets.

NOTE

- Gaskets are very fragile and shall remain in plastic bags until ready for installation.
 - Damaged or previously compressed gaskets are discarded.
- c. Install gasket(14, figure 4) on conical seat of No. 4 bearing internal pressure tube assembly as follows:
- (1) Discard any damaged or previously compressed gaskets. Position new gasket(14) on conical seat of tube fitting.

NOTE

PWA 56629 compressor produces two dimples on gasket, 180 degrees apart. Crimping is performed three times to provide equally spaced crimps all around.

- (2) Position PWA 56629 compressor over gasket(14).
- (3) While holding gasket(14) and PWA 56629 compressor firmly against conical seat, form circumferential crimp at fitting shoulder.

- (4) Crimp gasket(14) large OD into groove of tube three places equally spaced.

- (5) Check crimp by passing PWA 52625 ring gage over gasket. Gage shall pass freely over gasket.

5. NO. 4 BEARING AIR SEALING RING FLANGE - INSTALLATION.

(See figure 4 and Figures 5 through 8.)

- a. Chill No. 4 bearing air sealing ring flange in a freezer or in dry ice for 20 to 25 minutes or in liquid nitrogen for 4 to 4 1/2 minutes.
- b. Install metal seal rings(3, figure 4) into top groove at end of No. 4 bearing internal oil pressure tube. Position rings so they are flush with each other and centered in the groove. Use paraffin wax to hold metal seal rings in place.



Tool marks on metal seal ring or No. 4 bearing internal oil pressure tube may cause oil leakage.

- c. Install metal seal ring(2) into lower ring groove and compress ring enough to completely close the end gap. No tool marks permitted on metal seal ring or No. 4 bearing internal oil pressure tube. Center ring on tube and glue in position using Permabond 910 or equivalent.

- d. Ensure gasket(1) is installed on conical seat of tube fitting per paragraph 2.

ST2327-09, or ST2328-09).
Replace nut if PN cannot be verified.



- Careless handling when engaging air sealing ring on No. 4 bearing internal pressure tube and on left internal scavenge tube, may bend tube(s) or damage seal rings or seal ring grooves.
 - Use of incorrect nut may cause bolt failure.
- d1. If nut on bolt at disassembly was PN 4302197 (nut option: ST2325-09, ST2326-09, ST2327-09, or ST2328-09), bolt may be reused only if in good condition. Replace bolt if previously used nut PN cannot be verified.
- d2. Use only silver plated nuts. Verify by PN 4302197 (nut option: ST2325-09, ST2326-09,



Use of incorrect lubricant may cause bolt failure.

- d3. Use only MIL-L-7808 lubricating oil or equivalent. Do not use anti-seize or anti-gallant.

- e. Install No. 4 bearing air sealing ring flange as follows (see figure 5):

- (1) Align alignment hole in No. 4 bearing air sealing ring flange with alignment pin in diffuser case flange.
- (2) Position large holes in No. 4 bearing air sealing ring flange over No. 4 bearing internal pressure tube and internal scavenge tube.

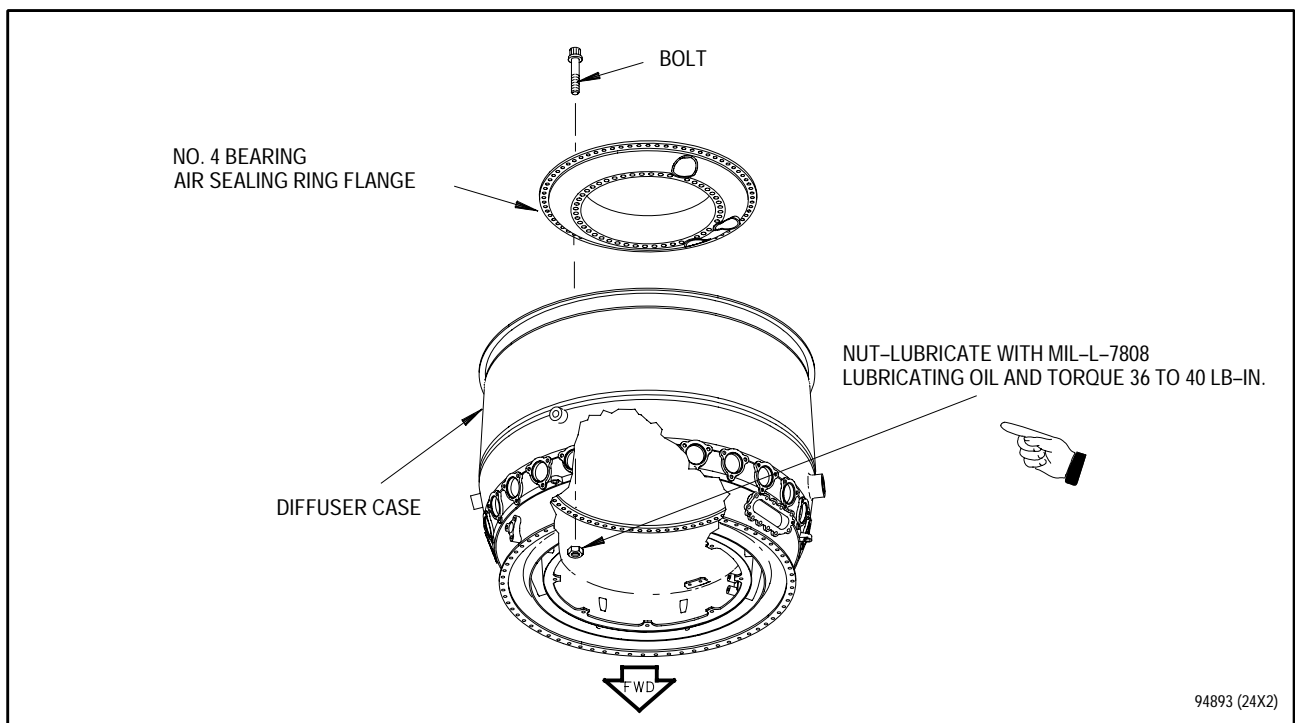


Figure 5. No. 4 Bearing Air Sealing Ring Flange - Installation

- (3) Install No. 4 bearing air sealing ring flange on diffuser case flange.
- (4) Using an inspection mirror, check that seal rings on tube connector are properly positioned (see figure 6). Ring farthest from threaded end shall be free on connector where it extends past air sealing ring flange.

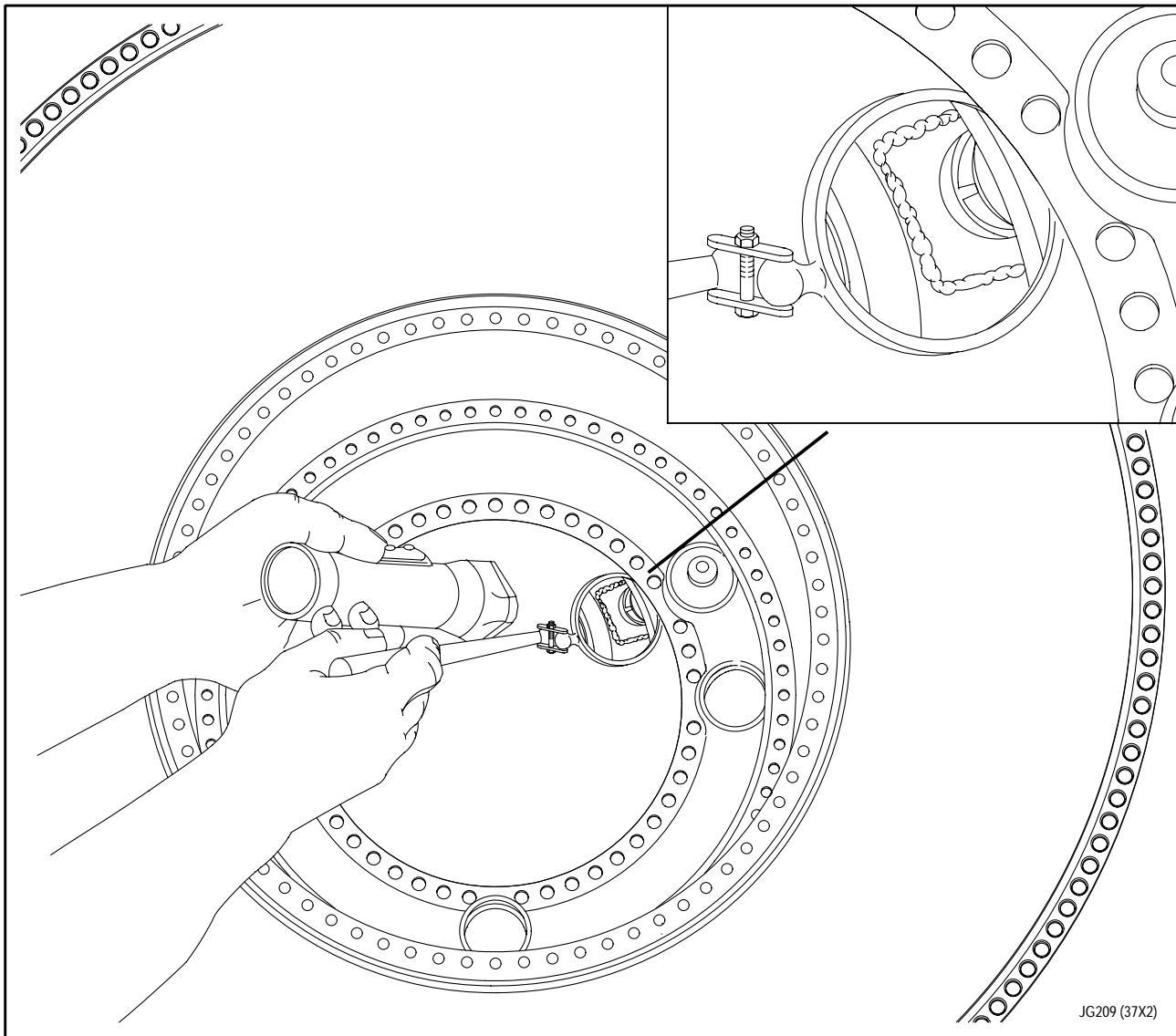


Figure 6. Diffuser Case Assembly - Oil Pressure Tube Metal Seal Ring Check

- (5) Seat No. 4 bearing air sealing ring flange by lightly tapping ring with mallet.
- (6) Apply MIL-L-7808 lubricating oil to mounting bolt threads and nut washer faces.
- (7) Do not install bolts next to No. 4 bearing internal air vent tube hole. See figure 7.

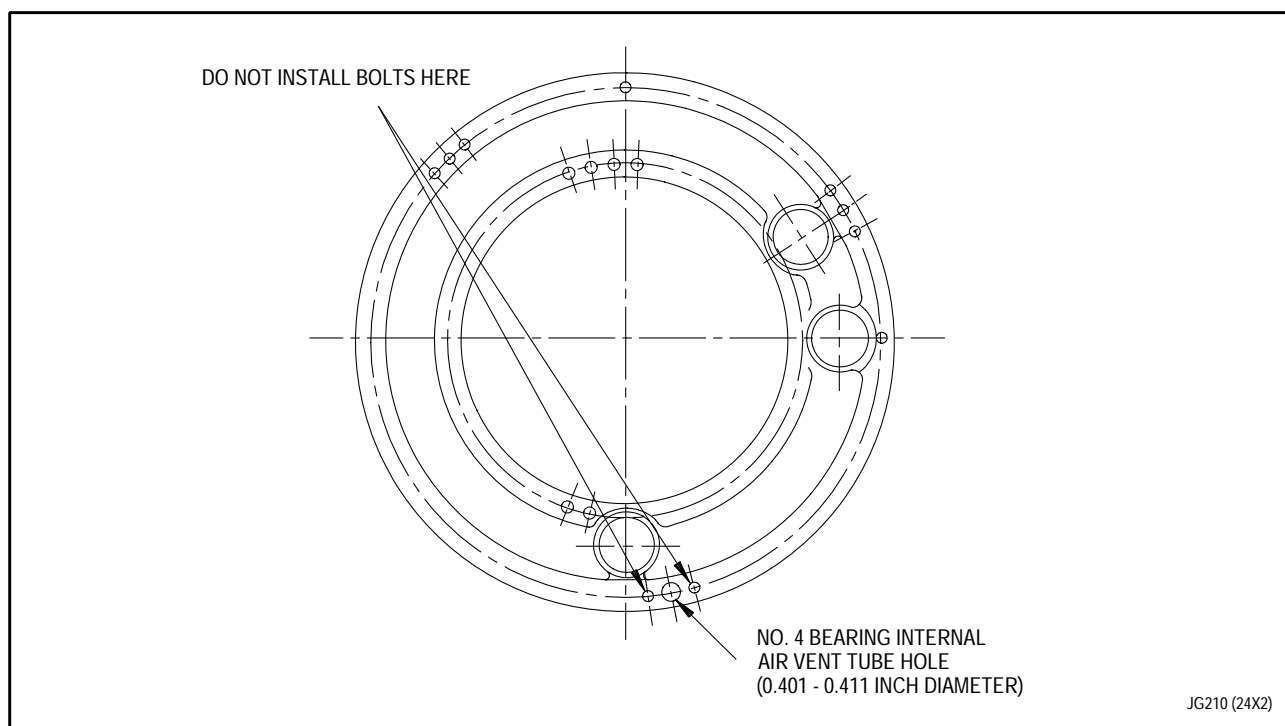
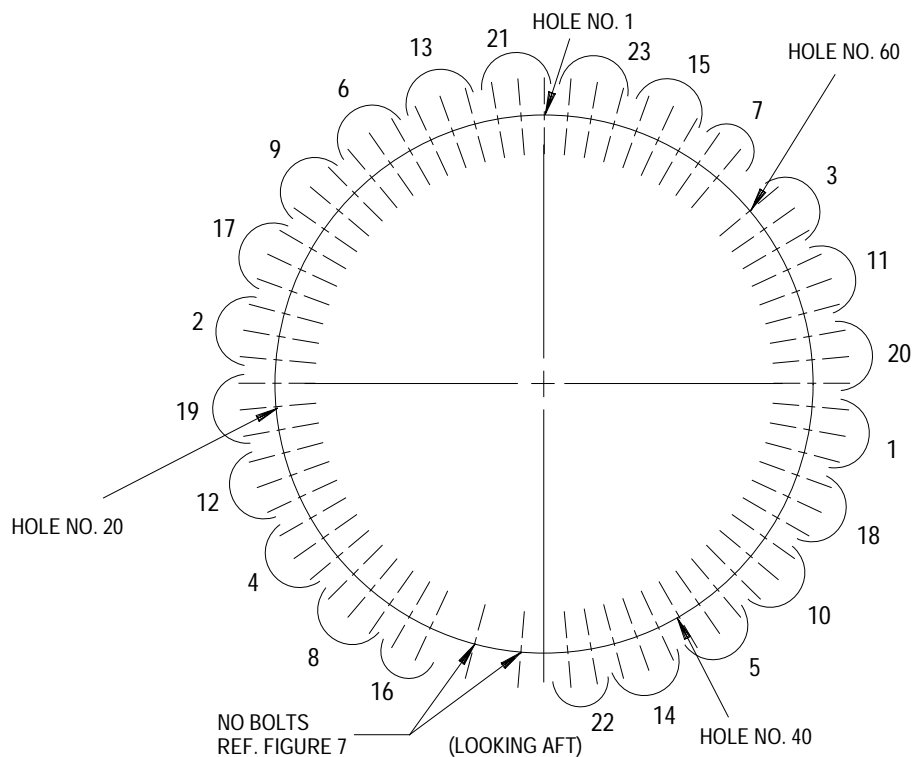


Figure 7. No. 4 Bearing Internal Air Vent Tube Locations

NOTE

- DO NOT INSTALL BOLTS ADJACENT TO NO. 4 BEARING INTERNAL AIR VENT TUBE.
- TORQUE NUTS 36 TO 40 LB-IN.



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Figure 8. No. 4 Bearing Air Sealing Ring Flange - Nut Torquing Sequence

- (8) Install bolts, (bolt heads rearward) and nuts. Torque nuts 36 to 40 pound-inches in sequence shown in figure 8.

6. NO. 4 BEARING INTERNAL AIR VENT TUBES - INSTALLATION.

(See Figure 9.)

- a. Install No. 4 bearing internal air vent tube (rear) through hole at approximately 6 o'clock position in No. 4 bearing air sealing ring flange from front side. See figure 9.

CAUTION

Use of incorrect nut may cause bolt failure.

- b. For bolts(10) and nuts(9), proceed as follows:
 - (1) If nut on bolt at disassembly was PN 4302197 (nut option: ST2325-09, ST2326-09, ST2327-09, or ST2328-09), bolt may be reused only if in good condition. Replace bolt if previously used nut PN cannot be verified.
 - (2) Use only silver plated nuts. Verify by PN 4302197 (nut option: ST2325-09, ST2326-09, ST2327-09, or ST2328-09). Replace nut if PN cannot be verified.

CAUTION

Use of incorrect lubricant may cause bolt failure.

- (3) Use only MIL-L-7808 lubricating oil or equivalent. Do not use anti-seize or anti-gallant.
 - (4) Lubricate bolts(10) and flat face of nuts(9) with MIL-L-7808 lubricating oil.
 - (5) Install bolts(10) with heads rearward, and nuts(9). Torque nuts 36 to 40 pound-inches. Wipe off excess lubricant.
- c. Install clamp(11) on tube. Lubricate bolt(12) with

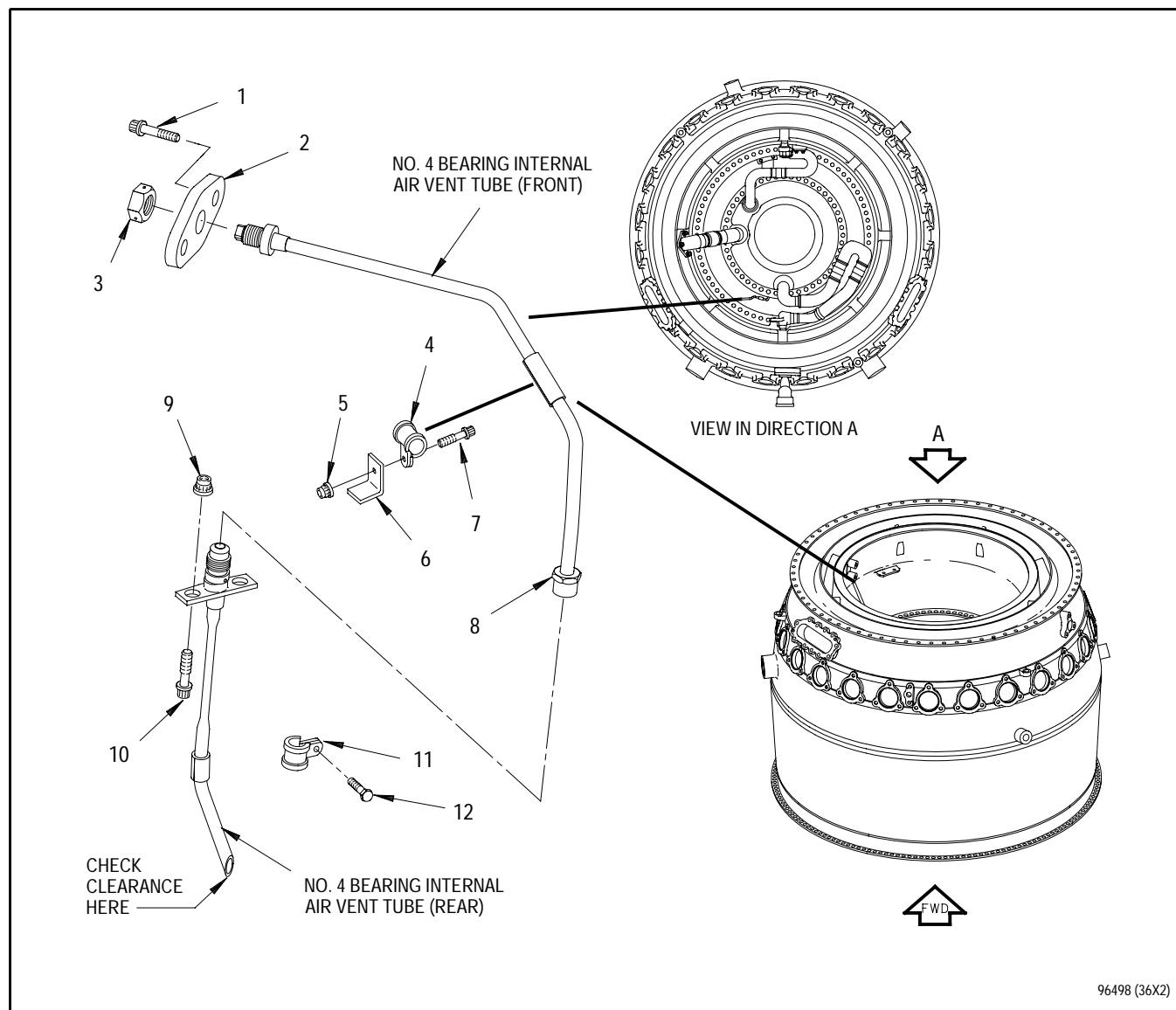
Fel-Pro C-300 lubricant; secure clamp to diffuser case using bolt(12). Torque 23 to 26 pound-inches and lockwire with PN MS9226-04 wire.

- d. Check clearance between angled end of tube and diffuser case. Clearance shall be 0.060 to 0.100 inch.
- e. Install No. 4 bearing internal air vent tube (front) from ID to OD of diffuser case.

NOTE

Tube nut is lockwired in paragraph 9 after installation of No. 4 bearing left internal scavenge tube.

- f. Lubricate tube nut(8) with Fel-Pro C-300 lubricant and connect tube nut to rear internal air vent tube. Torque nut 65 to 75 pound-inches.
- g. Install plate(2) and secure with bolts(1).
- h. Torque bolts(1) 32 to 36 pound-inches.
- i. Lubricate nut(3) with Fel-Pro C-300 lubricant, install on tube from outside of diffuser case.
- j. Torque nut(3) 35 to 45 pound-inches.
- k. Lockwire nut(3) and bolts(1) together using PN MS9226-04 (0.032 inch) wire.
- l. Lubricate nut(5) with PWA 36053-3 nickel antiseize compound.
- m. Install clamp(4) and secure to bracket(6) with bolt(7) and nut(5).
- n. Torque nut(5) 27 to 30 pound-inches.



INDEX NO.	DESCRIPTION	LUBRICATION	TORQUE (LB-IN)	LOCKWIRE
1.	Bolt	PWA 36053-3	23-26	-
2.	Plate	-	-	-
3.	Nut	Fel-Pro C-300	35-45	MS9226-04
4.	Clamp	-	-	-
5.	Nut	PWA 36053-3	27-30	-
6.	Bracket	-	-	-
7.	Bolt	-	-	-
8.	Tube nut	Fel-Pro C-300	65-75	MS9226-04
9.	Nut	MIL-L-7808	36-40	-
10.	Bolt	MIL-L-7808	-	-
11.	Clamp	-	-	-
12.	Bolt	Fel-Pro C-300	23-26	MS9226-04

Figure 9. No. 4 Bearing Internal Air Vent Tubes - Installation

7. NO. 4 BEARING FRONT SEAL ASSEMBLY - INSTALLATION.

(See figures 4,6,7, and Figure 10.)

- a. Position diffuser case rear flange up.

NOTE

Seal assembly may be chilled for 20 minutes as an option to steps b. through d. (heating flange). Ensure carbon seal is protected while chilling.

- b. Install PWA 56324 or PWA 52464 heater onto diffuser case inner flange.
- c. Connect PWA 61685 or PWA 25672 heater control. Ensure thermocouple probe on heater contacts diffuser case flange.
- d. Heat inner flange of diffuser case at 250°F (121°C), then remove heater.



Use care when installing No. 4 bearing front seal assembly to prevent damage to tube and metal seal rings.

- e. Install front seal support assembly into diffuser case as follows:
 - (1) Engage No. 4 bearing internal oil pressure tube and left internal scavenge tube (figure 4) and align bosses at front of seal with bosses in front seal support assembly.
 - (2) As front end of support begins to engage the No. 4 bearing internal oil pressure tube and left internal scavenge tube, gently rock support or tubes from side to side. This will help prevent damaging tubes or metal seal rings.

- (3) Align small diameter hole in outer bolt circle of front seal support assembly with dowel pin in diffuser case flange.



Seal support assembly is easily seated to diffuser case by gentle tapping, if metal seal rings are properly positioned. Do not use work nuts to seat seal support assembly to diffuser case, otherwise serious engine damage may occur.

- f. Using rubber mallet and nylon drift, gently tap seal support assembly outer flange all around to seat seal support assembly to diffuser case. Support assembly is seated when there is no gap between seal support assembly flange and diffuser case flange.
- g. If seal support assembly is not seated 360 degrees around, remove seal support assembly and inspect support assembly, tubes, and metal seal rings for damage. Replace damaged parts.
- h. Install oversize nuts and work nuts on studs and tighten evenly (do not exceed 170 pound-inches) to secure seal support assembly during installation of countersunk screws.

- i. Visually inspect tube seal rings from front side of air sealing ring to ensure that they are properly seated. Rings should be well below the surface of the air sealing ring hole and lead-in chamfer should be visible.
- j. Tap lightly, if necessary, using plastic drift and mallet on sealing groove flange.
- k. Check to ensure metal seal rings are properly positioned as follows:
 - (1) Using an inspection mirror and light source, inspect area between air sealing ring and No. 4 front seal support (see figure 6).
 - (2) Confirm that air sealing rings are properly engaged by looking at area between air sealing ring and support area.
 - (3) Improperly engaged seal rings may be visible in this area, if so, remove tube and replace tube and seal rings.

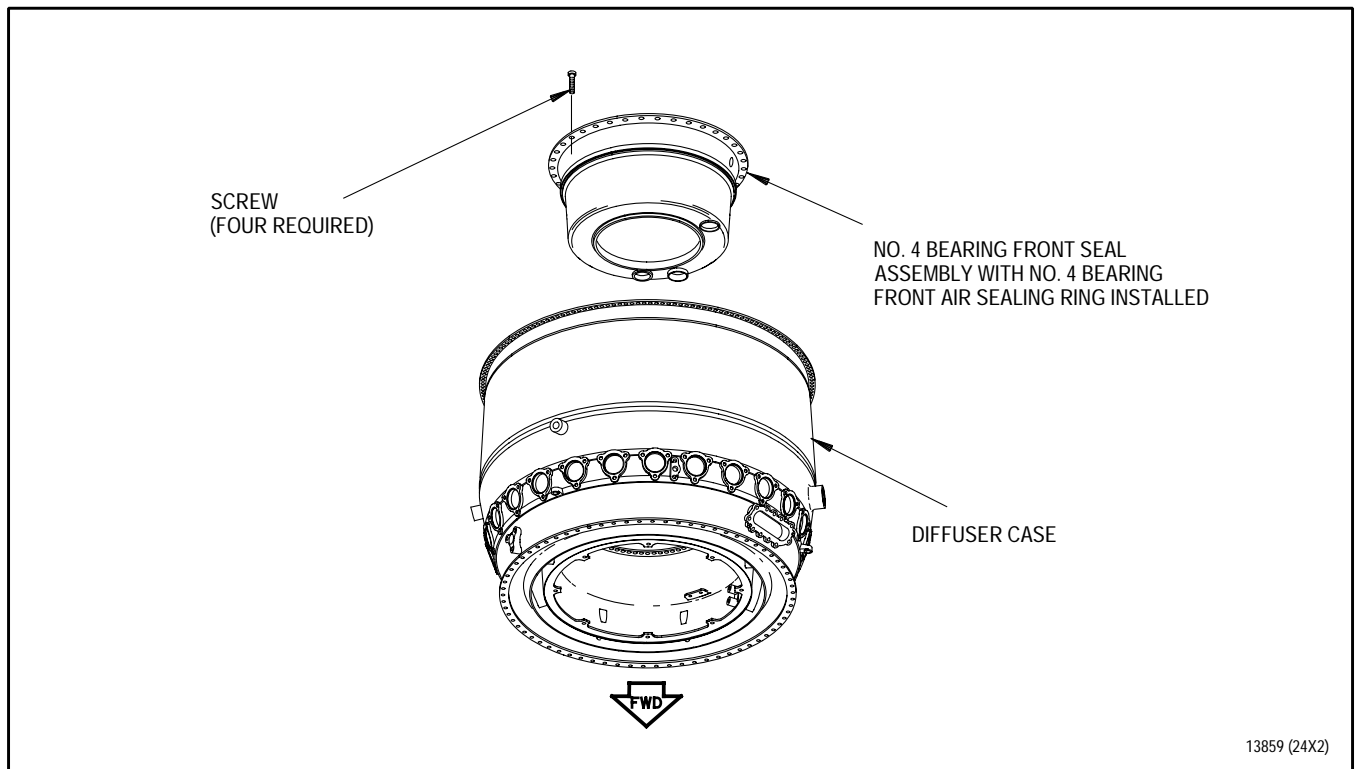


Figure 10. No. 4 Bearing Front Seal - Installation

NOTE

There are two PN countersunk screws and corresponding PN clinch nuts on diffuser case. They must be used in sets.

- l. (Preferred) For PN ST2563-10 countersunk screws with corresponding silver plated clinch nuts (PN 4079798) on diffuser case:
 - (1) Install screws in countersunk holes and torque 36 to 40 pound-inches. (See figure 10.)
- m. For PN ST2178-10 countersunk screws with corresponding non-silver plated clinch nut (PN 4069778) on diffuser case:
 - (1) Lubricate four countersunk screws with Fel-Pro C-300 antigalling compound.
 - (2) Install screws in countersunk holes and torque 23 to 26 pound-inches. (See figure 10.)
- n. Remove work nuts from studs.
- o. Tape paper over opening of assembly to protect carbon seal.

8. NO. 4 BEARING INTERNAL PRESSURE TUBE - FINAL ASSEMBLY.

(See figures 1, 4 and Figure 11.)

NOTE

- Any case which receives a used tube must have fewer total equivalent cycles remaining before next scheduled depot inspection than module from which tube was removed.
- Do not attempt to correct misalignment between bolt holes of diffuser case adapter(13), and mating holes in diffuser case. Rotation of adapter to align holes can induce stress in the No. 4 bearing internal pressure tube, and may result in cracks. If adapter will not align, No. 4 bearing internal pressure tube shall be replaced.
 - a. Lubricate threads of nut(16, figure 4) with Fel-Pro C-300 lubricant. Install nut on end of No. 4 bearing internal pressure tube handtight.
 - b. Install diffuser case adapter(13) on diffuser case.
 - c. Lubricate bolts(12) with Fel-Pro C-300 lubricant. Install bolts. Do not fully tighten at this time.
 - d. Make sure metal seal rings(2 and 3) are installed in tube grooves. Use an inspection mirror to see rings.

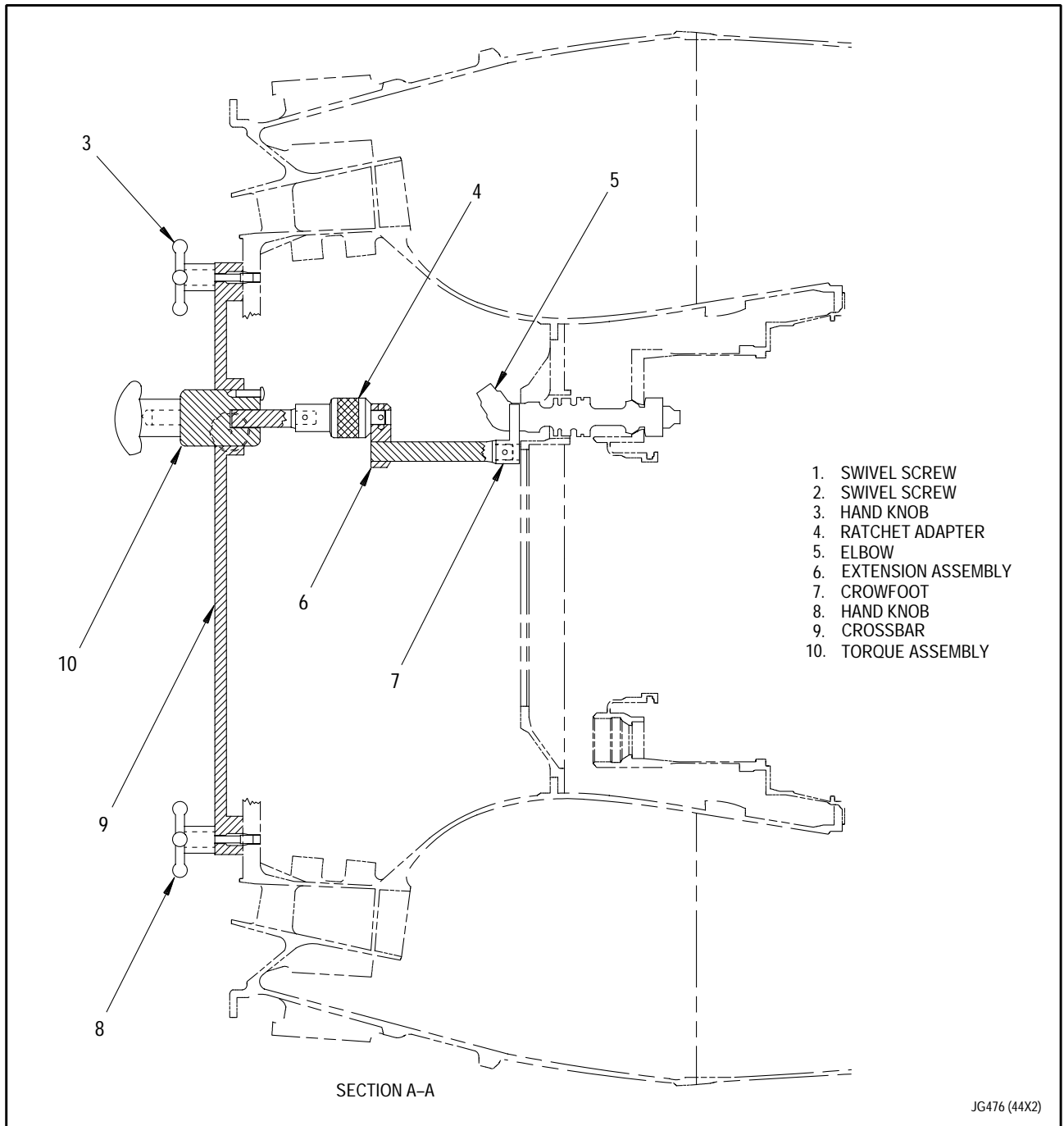


If support is not provided during tightening of nut(16), stress can be induced in No. 4 bearing internal pressure tube that may result in cracks and subsequent bore fire.

e. Install No. 4 bearing internal pressure tube nut(16) as follows:

- (1) Position PWA 57542 torque adapter, detail-1 crossbar(9, figure 11) on inside forward flange of diffuser case with arrow on crossbar pointing to top center of diffuser case.





**Figure 11. No. 4 Bearing Internal Pressure Tube Nut -
Installation Using PWA 57542 Torque Adapter (Sheet 2 of 2)**

- (2) Hand tighten detail-8 knobs(3 and 8).
- (3) Assemble ratchet adapter(4) and detail-3 extension assembly(6) and install on detail-2 torque assembly(10).
- (4) Install crowfoot(7) on detail-3 extension assembly(6) and position on back-up flats of elbow(5).
- (5) With crowfoot(7) down, position button on ratchet adapter(4) clockwise.
- (6) Loosen left swivel screw(1).
- (7) While holding crowfoot(7) on elbow(5), tighten right swivel screw(2) until it contacts detail-2 torque assembly(10) then tighten an additional 1/4 turn.
- (8) Torque nut(16, figure 4) with PWA 51944 wrench 300 to 335 pound-inches.
- (9) Remove PWA 57542 torque adapter.

- f. Using a 1.000 to 2.000 inch depth micrometer with 6 inch base, check dimension(2, figure 1) as shown. Record as Dimension Y.
- g. Compare Dimension Y with Dimension X recorded in paragraph 2. Dimension Y shall be less than or equal to Dimension X.
- h. If Dimension Y is not within limits, remove No. 4 bearing front seal support. Inspect internal pressure tube for damage and check metal seal rings for proper positioning in grooves.

NOTE

Nut(16, figure 4) is not lockwired until after No. 4 bearing internal pressure manifold is installed per WP 706 00.

- i. Torque bolts(12) 36 to 40 pound-inches.



- Failure to properly install conical gasket to burner pressure transfer tube may cause oil leak and severe engine damage.
- Gaskets are very fragile. Use extreme care when handling.

NOTE

Gaskets shall remain in plastic bags until ready for installation. Discard once compressed or damaged.

- j. If PN 4071508 pressure tube(11, figure 4) is being installed, install conical gasket(17) into groove in tube as follows:

- (1) Position gasket(17) on conical seat of tube fitting(11).

NOTE

PWA 56629 compressor produces two dimples on gasket, 180 degrees apart. Crimping is performed two times to provide equally spaced crimps all around.

- (2) Position PWA 56629 compressor over gasket(17).
- (3) While holding gasket(17) and compressor firmly against conical seat, form circumferential crimp at fitting shoulder.
- (4) Crimp gasket(17) large OD into groove of tube(11) two places equally spaced. Crimped gasket must not exceed 0.565 inch diameter.
- k. Ensure conical gasket(17, figure 4) is crimped securely to pressure tube(11) prior to installation.
- l. Install No. 4 bearing pressure tube(11) and secure with coupling nut(10 or 10A).
- m. Torque PN 360583 nut(10) 400 to 450 pound-inches.
- n. Torque PN ST2100-12 nut(10A) 500 to 550 pound-inches.
- o. Lockwire nut(10) using PN MS9226-04 (0.032 inch) wire.
- p. Torque bolts(7) 32 to 36 pound-inches.
- q. Lockwire bolts(7) using PN MS9226-04 (0.032 inch) wire.
- r. Torque nut(6) 27 to 30 pound-inches to bolt(4) to secure loop clamp(5).

**9. NO. 4 BEARING INTERNAL SCAVENGE
TUBE - INSTALLATION.**

(See Figure 12.)

- a. Determine which lockwire hole in externally threaded ring(11, figure 12) to use to prevent lockwire from coming in contact with No. 4 bearing internal scavenge tube. (See figure 12, View B.)

NOTE

No. 4 bearing internal scavenge tube is permanently brazed into diffuser case.

- b. Cut a 6 to 7 inch piece of PN MS9226-04 lockwire and install in externally threaded ring(11). Twist wire three or four times.
- c. Lubricate fitting at 6 o'clock position in front air sealing ring with Fel-Pro C-300 lubricant. Install externally threaded ring(11) into No. 4 bearing front seal support assembly and torque 600 to 675 pound-inches with PWA 57734 torque adapter.



Ensure lockwire does not contact No. 4 bearing internal scavenge tube.

- d. Finish lockwiring externally threaded ring(11) to No. 4 bearing air vent tube nut.
- e. Lubricate bolts(3) and install with nuts(7) to secure brackets(4 and 9) to diffuser case. Torque nuts 32 to 36 pound-inches.
- f. Lubricate nuts(2 and 8) and install with bolts(1 and 6) to secure clamps(5 and 10) to brackets(4 and 9). Torque nuts 32 to 36 pound-inches.

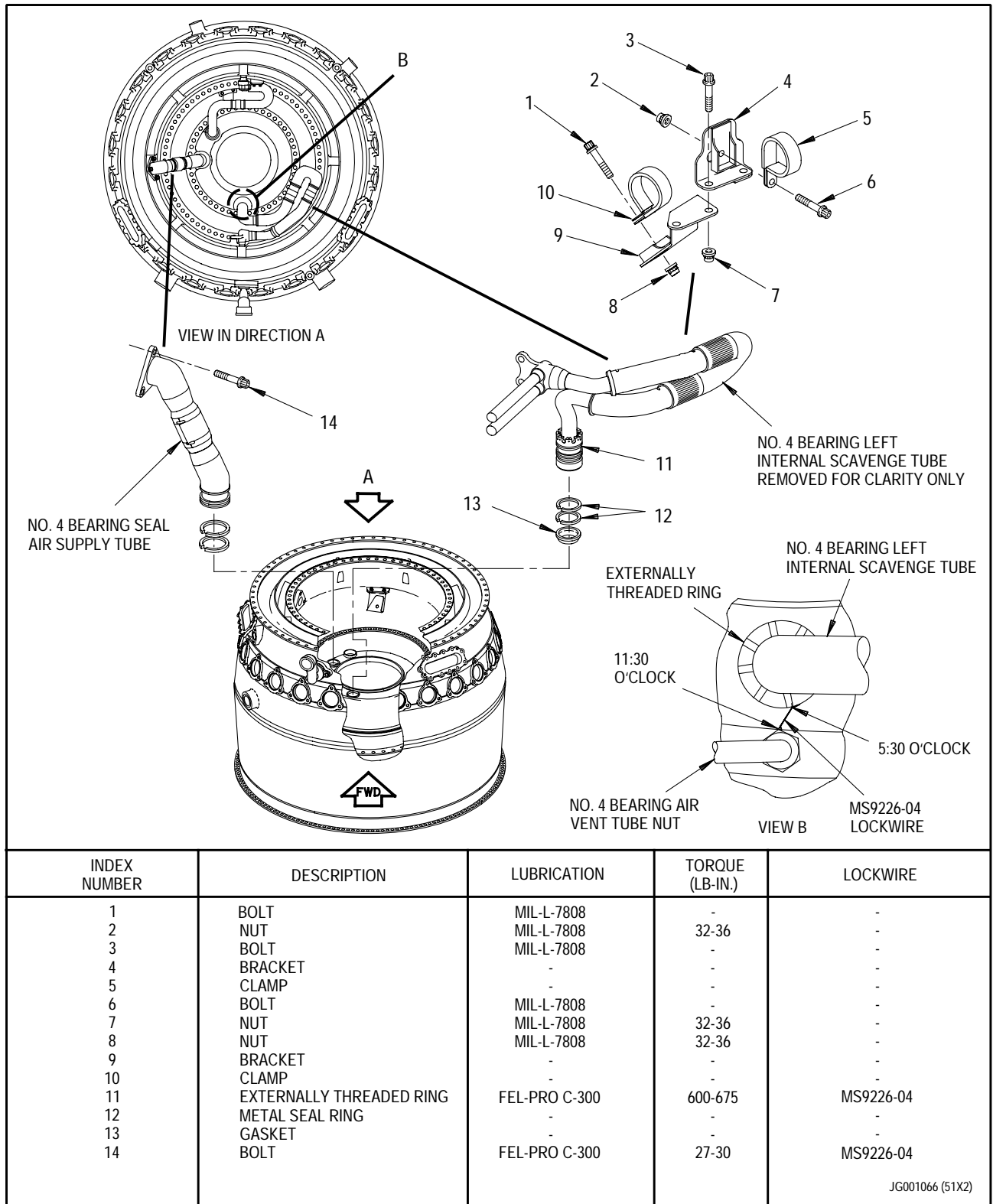


Figure 12. No. 4 Bearing Internal Scavenge Tube and No. 4 Bearing Seal Air Supply Tube - Installation

10. NO. 4 BEARING SEAL AIR SUPPLY TUBE - INSTALLATION.

(See figure 12 and Figure 13.)

- a. Install metal seal rings(12, figure 12) into grooves on end of air supply tube. Ensure metal seal ring gaps are 180 degrees apart.
- b. Install tube into diffuser case so end with seal rings fits into No. 4 bearing front seal.
- c. Lubricate bolts(14) with Fel-Pro C-300 lubricant. Install bolts to secure triangular end to boss inside diffuser case. Torque bolts 27 to 30 pound-inches. Lockwire bolts with PN MS9226-04 wire.
- d. Check clearance between tube and diffuser case. (See figure 13.) Clearance shall be 0.030 inch minimum.

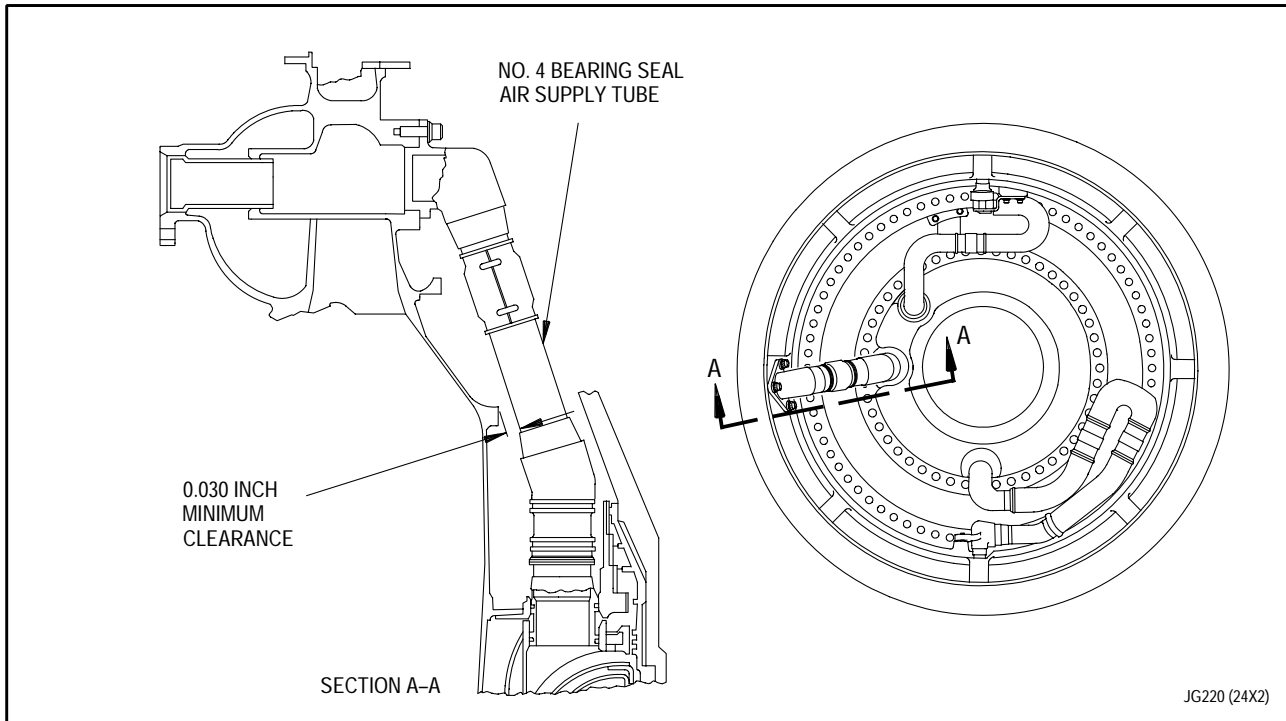


Figure 13. Clearance Check Between Diffuser Case Stiffener and No. 4 Bearing Seal Air Supply Tube

11. NO. 4 BEARING INTERNAL OIL PRESSURE MANIFOLD - INSTALLATION (TEMPORARY).

(See Figure 14.)

NOTE

No. 4 bearing internal oil pressure manifold is only temporarily installed in this paragraph. After No. 4 bearing nozzles (on both ends of manifold) are air flow checked per WP 615 00, manifold is removed.

- a. Air flow check No. 4 bearing internal oil pressure manifold per T.O. 2J-F100-53-1, WP 026 00.

- b. Install internal oil pressure manifold so it fits on end of No. 4 bearing internal oil pressure tube. Align tab on manifold with threaded pad on inner diameter of seal assembly. (See figure 14.)
- c. Apply MIL-L-7808 lubricating oil to bolt and install to secure manifold clamp to diffuser case. Torque bolt 24 to 36 pound-inches. Do not lockwire at this time.
- d. Apply MIL-L-7808 lubricating oil to bolt and install to secure manifold to internal pressure tube. Torque bolt 24 to 36 pound-inches. Do not lockwire at this time.

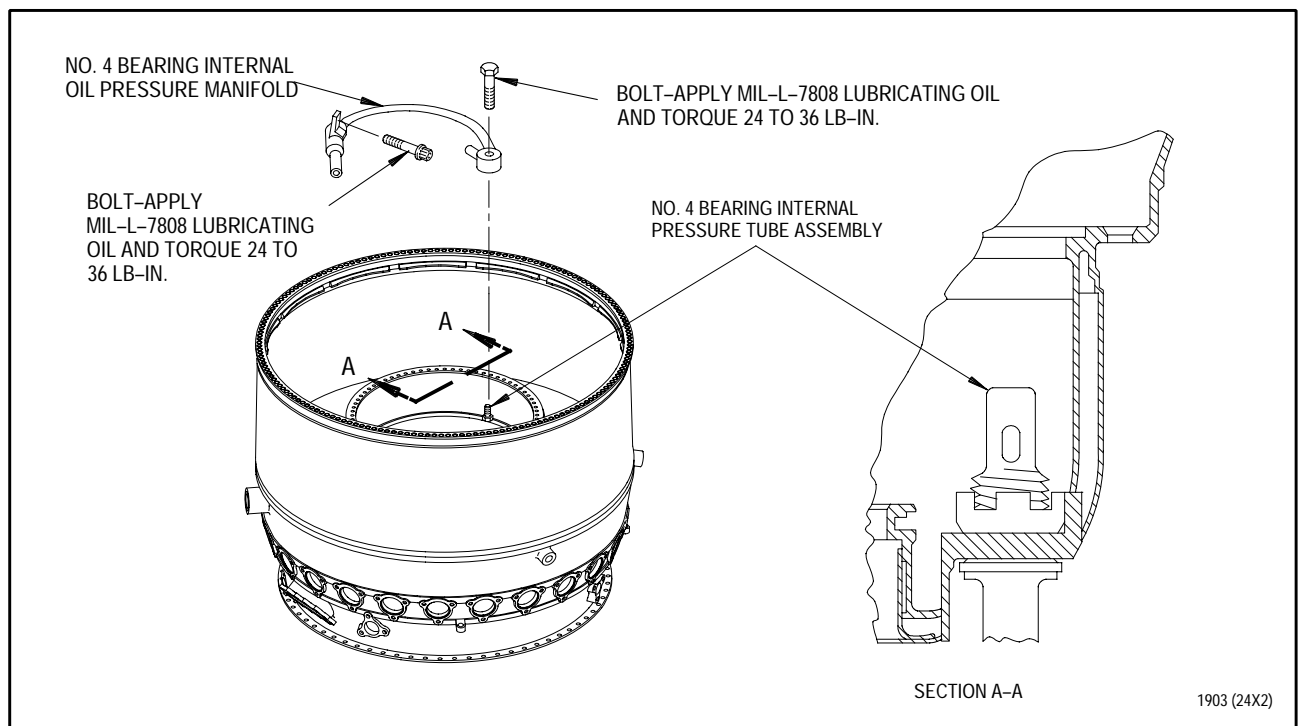


Figure 14. No. 4 Bearing Internal Oil Pressure Manifold - Temporary Installation

**12. NO. 4 BEARING INTERNAL PRESSURE
TUBE ASSEMBLY, INTERNAL OIL PRESSURE
MANIFOLD, AND INTERNAL SCAVENGE TUBE -
LEAK CHECK.**

(See figures 4, 12, and 14, and
Figure 16.)

- a. If PWA 50047 test set is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 025 00.
- b. Install tooling for leak check per figure 16.
- c. Perform air flow and leak check using PWA 50047 test set or Habco 1093005 checker as follows:
 - (1) Refer to T.O. 2J-F100-53-1, WP 025 00 for PWA 50047 test set operating instructions or SWP 025 01 for Habco 1093005 checker operating instructions.

- (2) Apply 10 psig air to pressurize tubes.
- (3) Apply MIL-L-25567C leak check fluid at all fittings on No. 4 bearing internal pressure tube (figure 4), internal scavenge tube (figure 12), and internal oil pressure manifold (figure 14). No leakage allowed.

- (4) Air flow shall not exceed 0.25 pounds per hour.

- d. Remove PWA 53370 fixture.
- e. Air flow No. 4 bearing oil nozzles per WP 615 00.
- f. Remove PWA 52614 adapter, MS9015-12 plug and MS9021-21 packing.

Figure 15. Deleted.

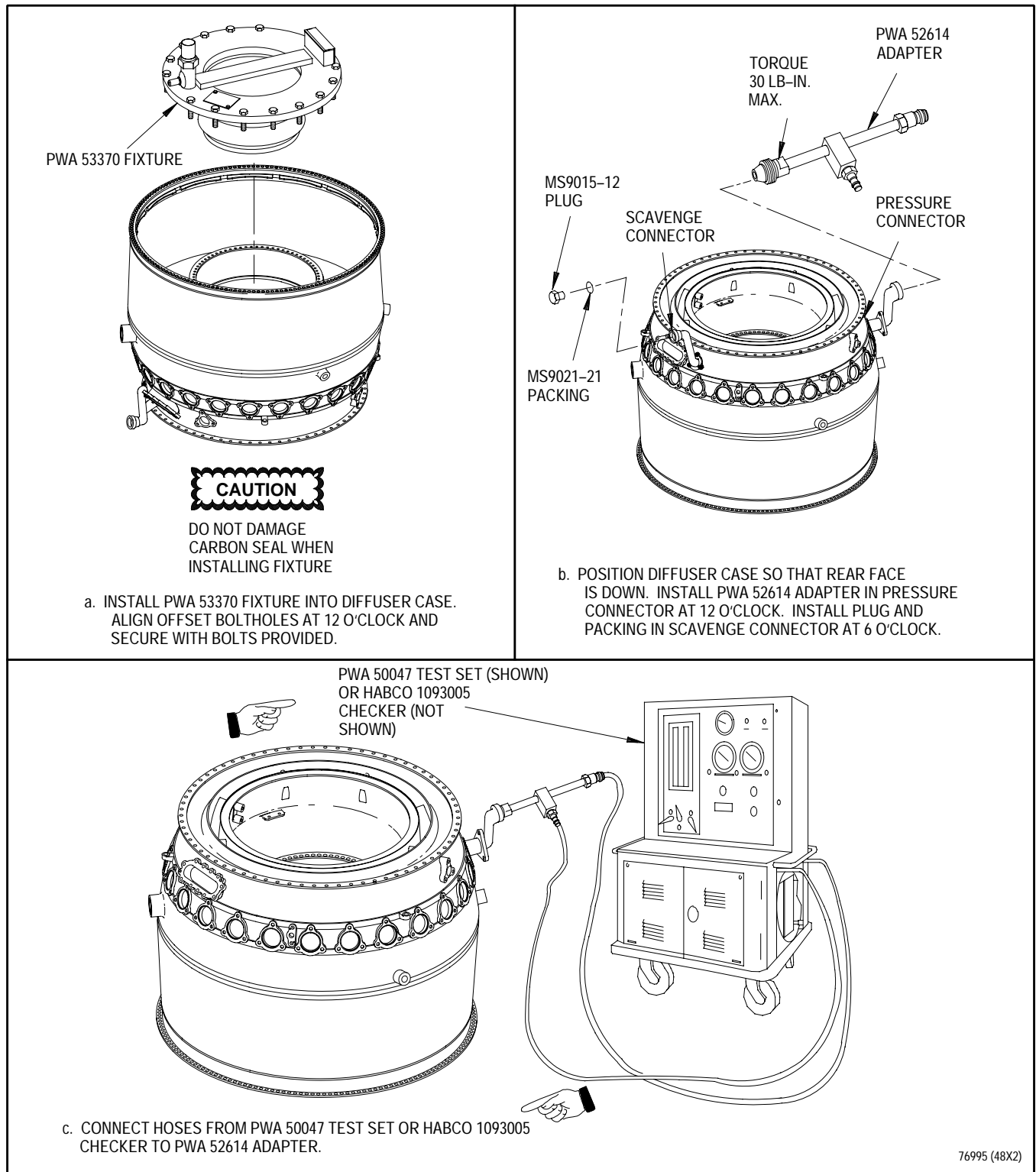


Figure 16. No. 4 Bearing Internal Pressure Tube Assembly, Internal Oil Pressure Manifold, and Internal Scavenge Tube - Leak Check Tool Installation

Figure 17. Deleted.

13. NO. 4 BEARING FRONT AIR SEALING RING - INSTALLATION.

(See Figures 18 and 19.)

- a. Position diffuser case rear flange down.

- b. Chill No. 4 bearing front air sealing ring in freezer for 20 minutes or liquid nitrogen for four minutes. (See figure 18.)

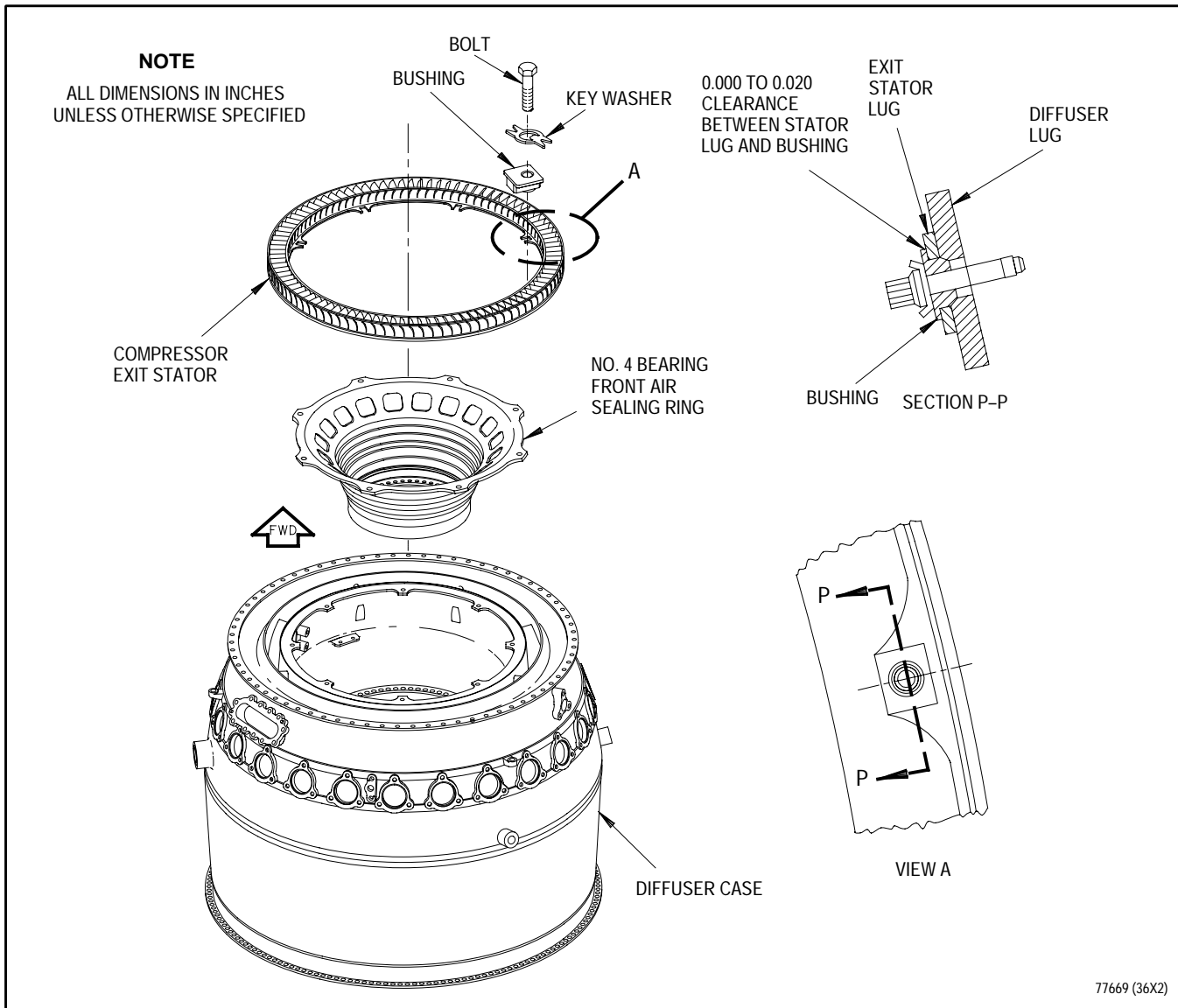


Figure 18. No. 4 Bearing Front Air Sealing Ring and Compressor Exit Stator Assembly - Installation

CAUTION

Use of incorrect nut may cause bolt failure.

- c. If nut on bolt at disassembly was ST2590-10 (nut option: ST2591-10, ST2592-10, ST2593-10, ST2594-10, or ST2595-10), bolt may be reused only if in good condition. Replace bolt if previously used nut PN cannot be verified.
- d. Use only silver plated nuts. Verify by PN ST2590-10 (nut option: ST2591-10, ST2592-10, ST2593-10, ST2594-10, or ST2595-10). Replace nut if PN cannot be verified.

CAUTION

Use of incorrect lubricant may cause bolt failure.

- e. Use only MIL-L-7808 lubricating oil or equivalent. Do not use anti-seize or anti-gallant.

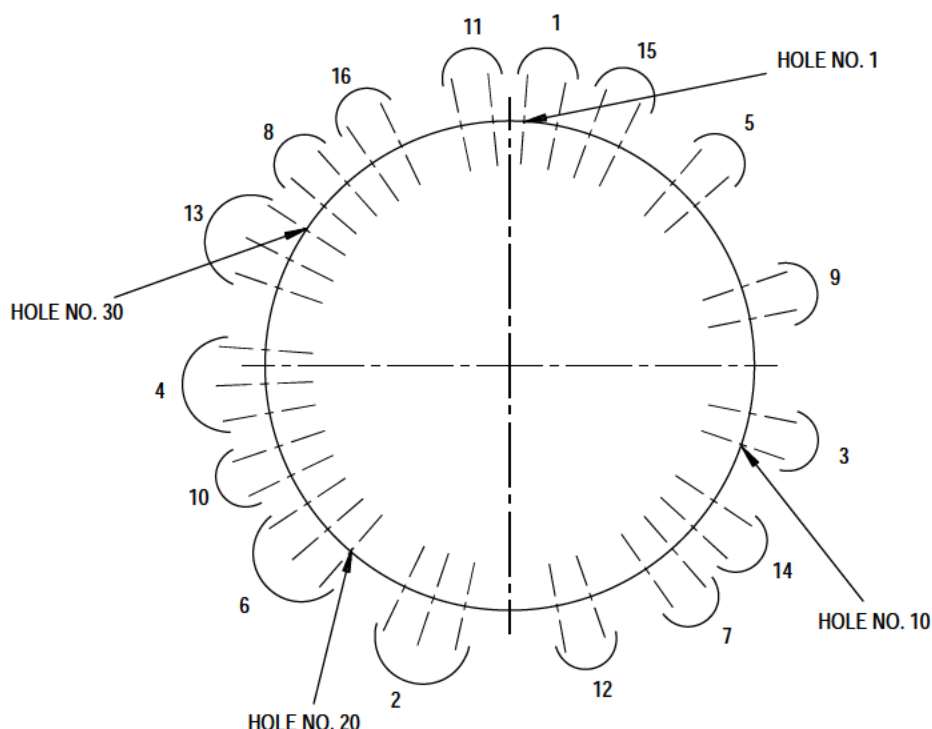
- f. Apply MIL-L-7808 lubricating oil to threads of front air sealing ring mounting bolts.

- g. Install No. 4 bearing front air sealing ring and seat by lightly tapping ring with mallet.

CAUTION

Be careful not to damage honeycomb seals in No. 4 bearing front air sealing ring when installing mounting bolts and nuts.

- h. Install mounting bolts and nuts with bolt heads rearward in front air sealing ring rear flange.
- i. Torque nuts 85 to 95 pound-inches in sequence shown in figure 19.



96507 (24X2)

Figure 19. No. 4 Bearing Front Air Sealing Ring and Compressor Exit Stator Assembly - Installation

14. COMPRESSOR EXIT STATOR ASSEMBLY - INSTALLATION.

(See figure 18 and Figure 20.)

- a. Position diffuser case rear flange down.
- b. Install compressor exit stator assembly so offset lug aligns with offset hole in diffuser case. (See figure 18.)
- c. Install bushings in compressor stator slots.
- d. Lubricate eight bolts with PWA 36545 antigalling compound. Install one key washer and bolt at each of eight locations.
- e. Torque eight bolts at bushing locations 65 to 85 pound-inches in sequence shown in figure 20.
- f. Check clearance between each bushing and stator lug. (See figure 18.) Gap shall be 0.020 inch or less. If gap is greater than 0.020 inch, check bushings to ensure they are seated.
- g. If gap is within limits on all bushings, bend tabs of key washers to lock bolts.

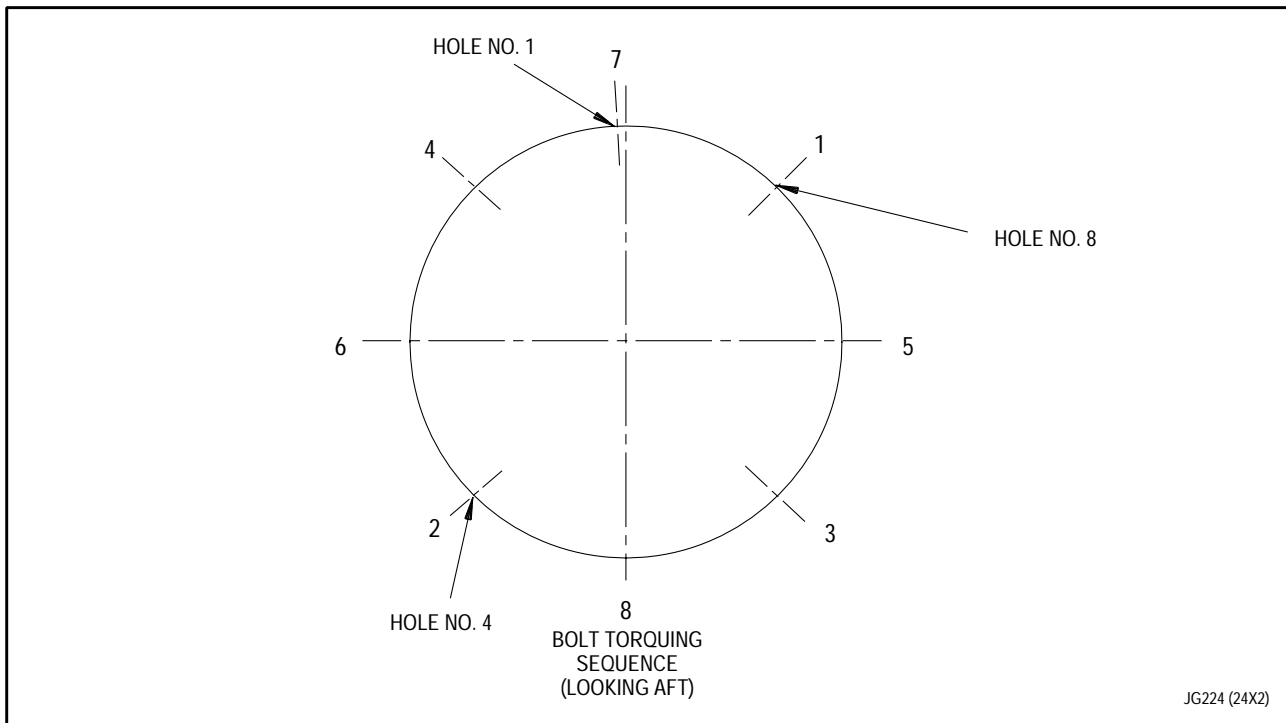


Figure 20. Compressor Exit Stator Assembly - Bolt Torque Sequence

Pages 39 through 49/(50 blank) deleted.

WORK PACKAGE

TECHNICAL PROCEDURES

OIL NOZZLES, NO. 4 BEARING -

AIR FLOW CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	18	6 Blank	18		

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Air Flow Check Using PWA 50047 Pneumatic Test Set - General Procedures - - - - -	WP 025 00
Air Flow Check Using Habco 1093005 Portable Air Flow Checker - General Procedures - - - - -	SWP 025 01

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

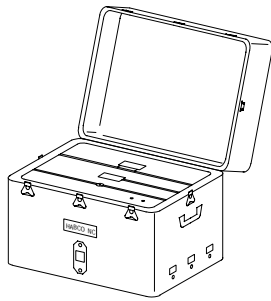
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

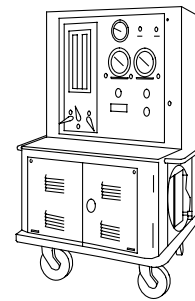
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 4 BEARING OIL NOZZLES - AIR FLOW CHECK	
	TEST SET, PNEUMATIC - - - - -	PWA 50047
		OR
	CHECKER, PORTABLE AIR FLOW - - - - -	HABCO 1093005
	ADAPTER, NO. 4 BEARING OIL NOZZLE AIR FLOW - - - - -	PWA 52614

ILLUSTRATED SUPPORT EQUIPMENT



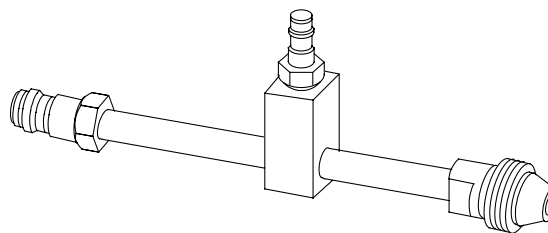
HABCO 1093005 -C

Figure T1. HABCO 1093005 CHECKER



PWA 50047 -C

Figure T2. PWA 50047 TEST SET



PWA 52614 -C

Figure T3. PWA 52614 ADAPTER

1. INTRODUCTION.

- a. This work package contains instructions for air flow check of No. 4 bearing oil nozzles.

2. NO. 4 BEARING OIL NOZZLES - AIR FLOW CHECK.

(See Figure 1.)

- a. If PWA 50047 test set is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 025 00.
- b. Perform air flow check using PWA 50047 test set or Habco 1093005 checker as follows:
 - (1) Install air flow check tooling per figure 1.
 - (2) Refer to T.O. 2J-F100-53-1, WP 025 00 for PWA 50047 test set operating instructions or SWP 025 01 for Habco 1093005 checker operating instructions.
 - (3) Apply 10 psig air to pressurize tubes.
 - (4) Air flow shall be 26 to 35 pounds per hour.
 - (5) Remove air flow check tooling.

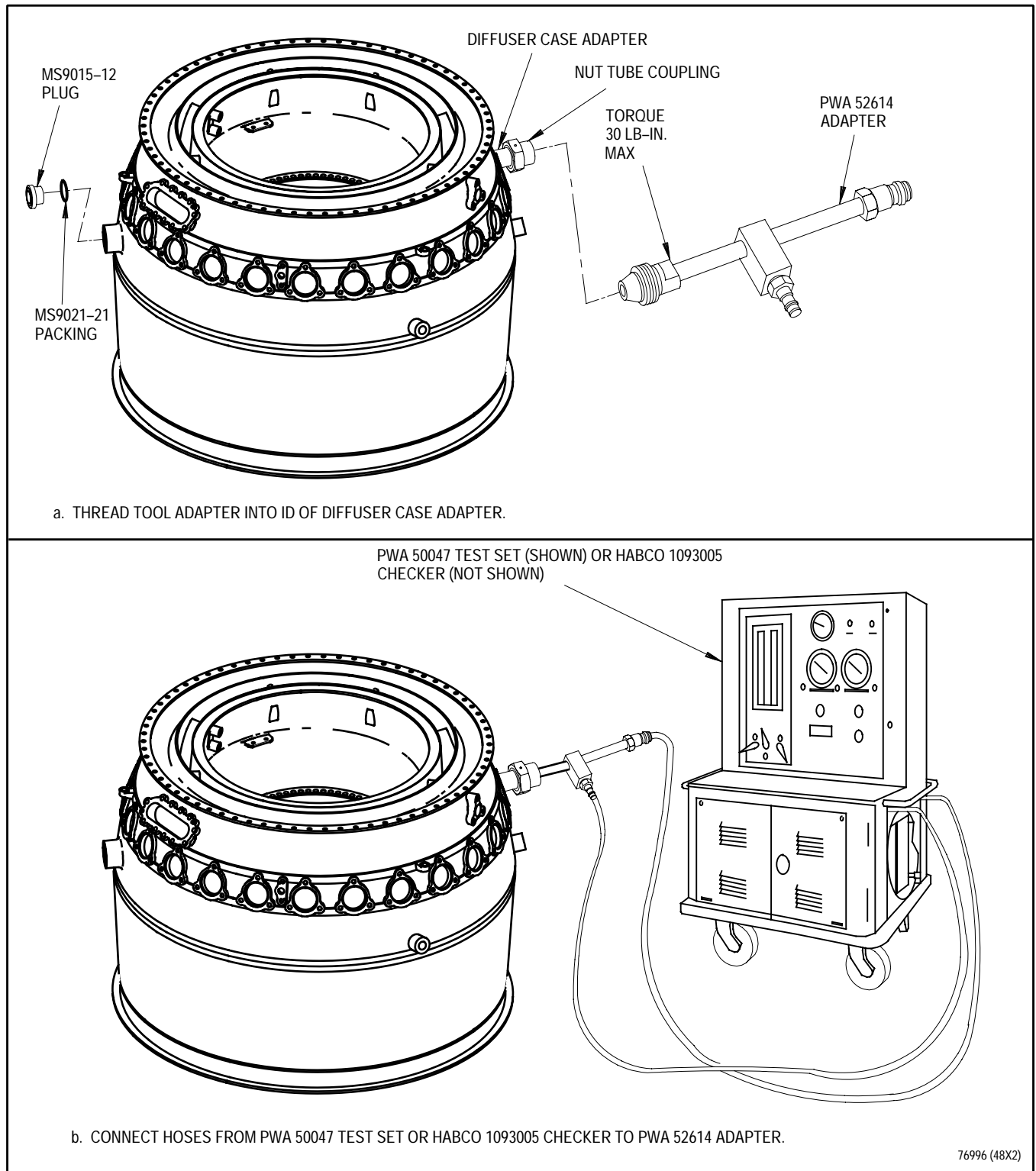


Figure 1. No. 4 Bearing Oil Nozzles - Air Flow Check Tool Installation

WORK PACKAGE

TECHNICAL PROCEDURES

HOUSING, NO. 4 BEARING AND RACE, OUTER -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 8	26	9 Added	26	10 Blank Added	26

REFERENCE MATERIAL REQUIRED

Title	Number
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
GLOVES, LINT-FREE	-
OIL, LUBRICATING	MIL-L-7808

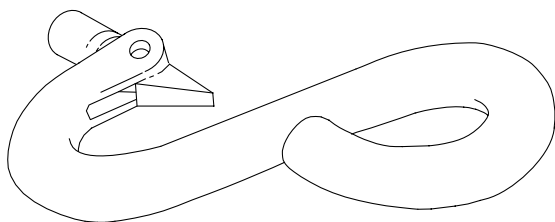
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
RIVET, TUBULAR	4007054	1

APPLICABLE SUPPORT EQUIPMENT

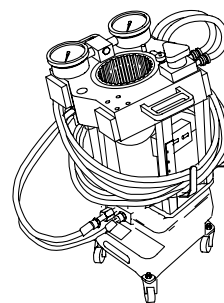
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 4 BEARING HOUSING AND OUTER RACE - ASSEMBLY	
	BASE, NO. 4 BEARING OUTER RACE - - - - -	PWA 52451
	DRIFT, NO. 4 BEARING OUTER RACE - - - - -	PWA 50968
	WRENCH, NO. 4 BEARING OUTER RACE, RETAINING NUT - - -	PWA 50971
	ADAPTER, NO. 4 BEARING OUTER RACE RETAINING NUT - - -	PWA 52453
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
		OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
	RIVETER, NO. 4 BEARING OUTER RACE RETAINING NUT - - -	PWA 50310

ILLUSTRATED SUPPORT EQUIPMENT



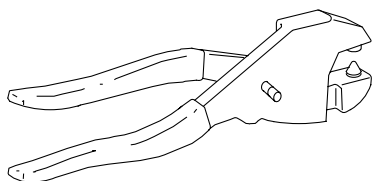
PWA 2388 -C

Figure T1. PWA 2388 HOOK



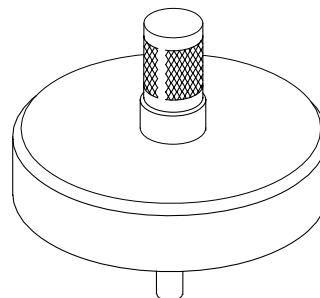
PWA 50308 -C

Figure T2. PWA 50308 WRENCH



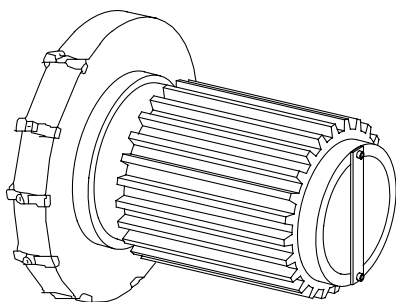
PWA 50310 -C

Figure T3. PWA 50310 RIVETER



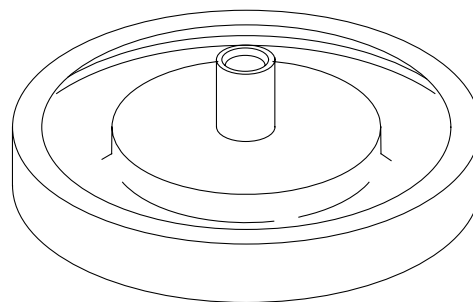
PWA 50968 -C

Figure T4. PWA 50968 DRIFT



PWA 50971 -C

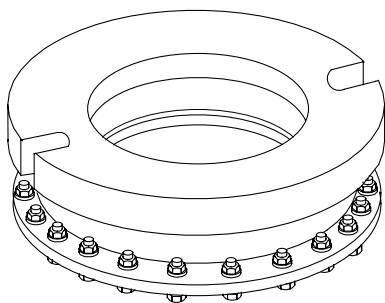
Figure T5. PWA 50971 WRENCH



PWA 52451 -C

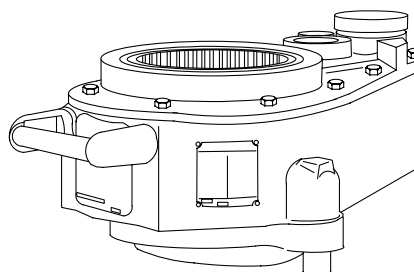
Figure T6. PWA 52451 BASE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



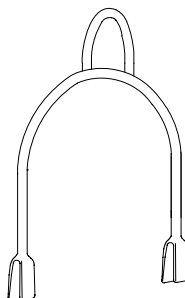
PWA 52453 -C

Figure T7. PWA 52453 ADAPTER



SWE 8200 -C

Figure T8. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T9. SWE 81001/81002 SLING

1. INTRODUCTION.

- a. This work package contains instructions for installing No. 4 bearing outer race into No. 4 bearing housing.

2. NO. 4 BEARING HOUSING AND OUTER RACE - ASSEMBLY.

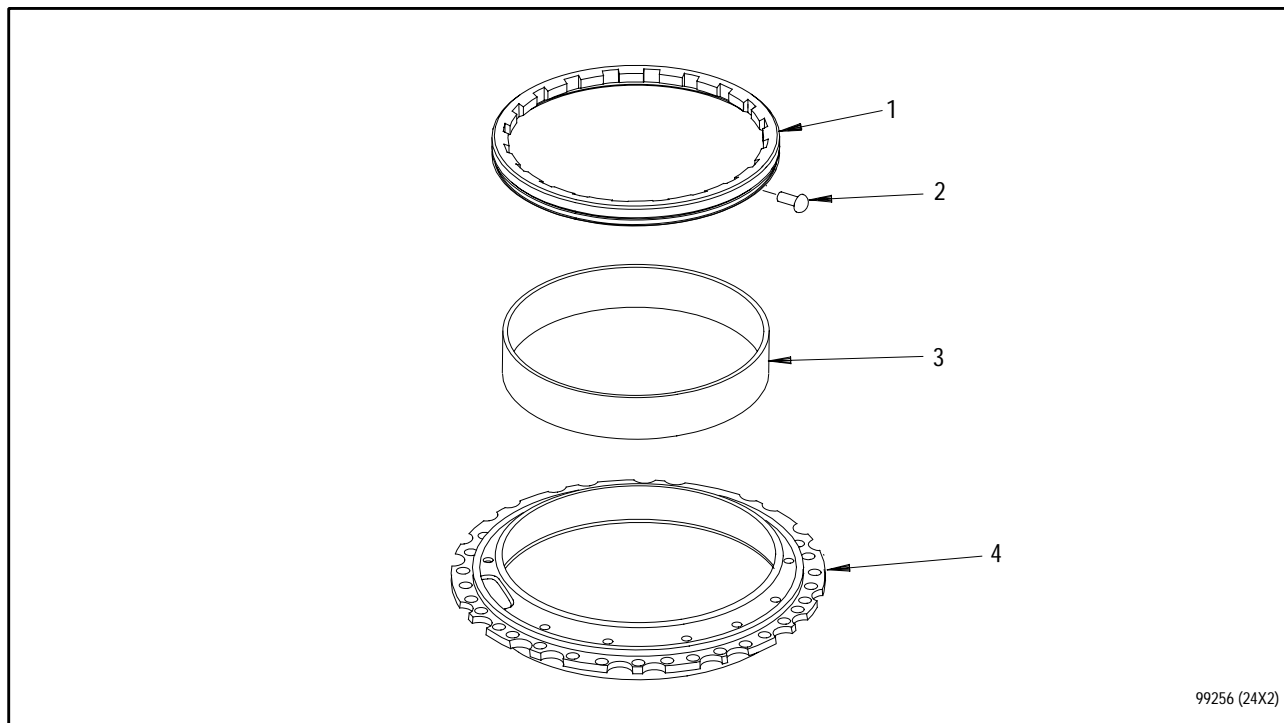
(See Figures 1, 2, and 3.)

- a. Place No. 4 bearing housing(4, figure 1) in hot oil tank. Heat housing 225° to 275°F (107° to 135°C) for 10 minutes.
- b. Install No. 4 bearing housing in PWA 52451 base, threaded end of housing up.
- c. Find X-mark on one side of No. 4 bearing outer race(3).
- d. Install outer race in bearing housing so X-mark is up and 180 degrees from center of elongated hole in housing. See figure 1.
- e. Install PWA 50968 drift and seat outer race with standard arbor press.

NOTE

Outer race retaining nut is silver plated. Shearing of plating at assembly is permissible provided all visible excess plating is removed.

- f. Install and torque bearing retaining nut(1) as follows:
 - (1) Lightly coat threads of nut with MIL-L-7808 lubricating oil.



1. Bearing retaining nut
2. Rivet, PN 4007054
3. No. 4 bearing outer race
4. No. 4 bearing housing

Figure 1. No. 4 Bearing Housing and Outer Race - Assembly

NOTE

Retaining nut has left-hand threads. Turn nut counterclockwise (left-hand) to tighten it.

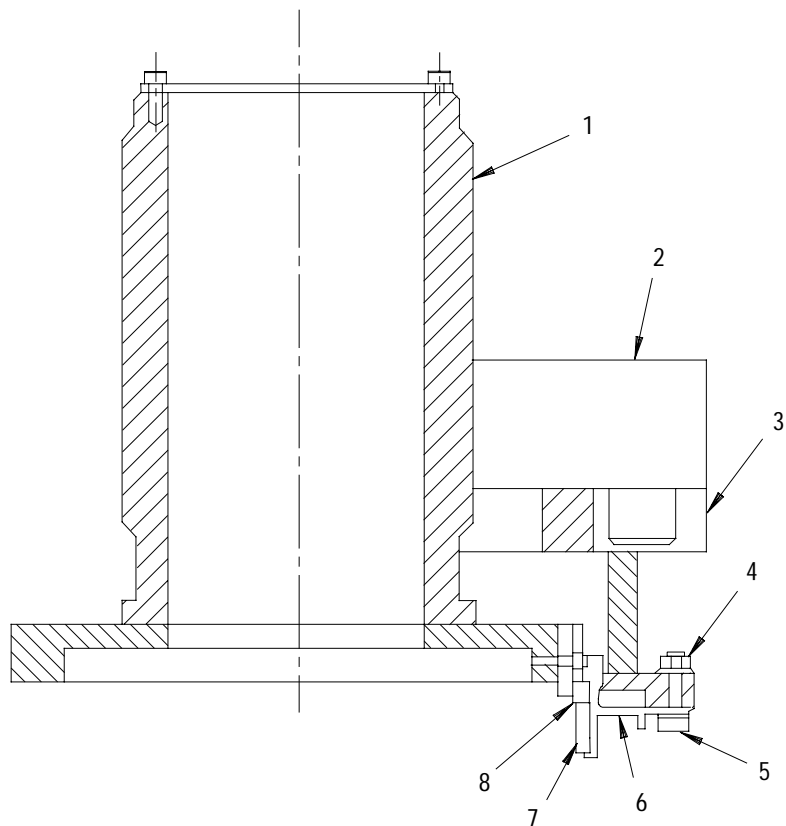
- (2) Install outer race retaining nut(8, figure 2) into No. 4 bearing housing(6) by turning counterclockwise.
- (3) Install PWA 50971 wrench(1) so teeth engage slots of nut.
- (4) Install PWA 52453 adapter(3) over wrench and onto front face of No. 4 bearing housing. Secure with bolts(5) and nuts(4).
- (4a) If SWE 8100/8200 torque multiplier(2, figure 3) is used, install SWE 81001/81002 sling(5) onto torque multiplier.
- (4b) Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 wrench(1) or connect PWA 2388 hook to SWE 81001/81002 sling(5).
- (5) Install PWA 50308 hydraulic wrench(2, figure 2) or SWE 8100/8200 torque multiplier(2) so dowels of wrench or torque multiplier engage holes in PWA 52453 adapter. Set hydraulic wrench to actuate center splines in counterclockwise direction per figure 3 or attach ratchet adapter(3) and work handle(4) to torque multiplier(2).

- (6) Actuate PWA 50308 wrench or SWE 8100/8200 torque multiplier to torque nut 12,400 to 12,600 pound-inches. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.



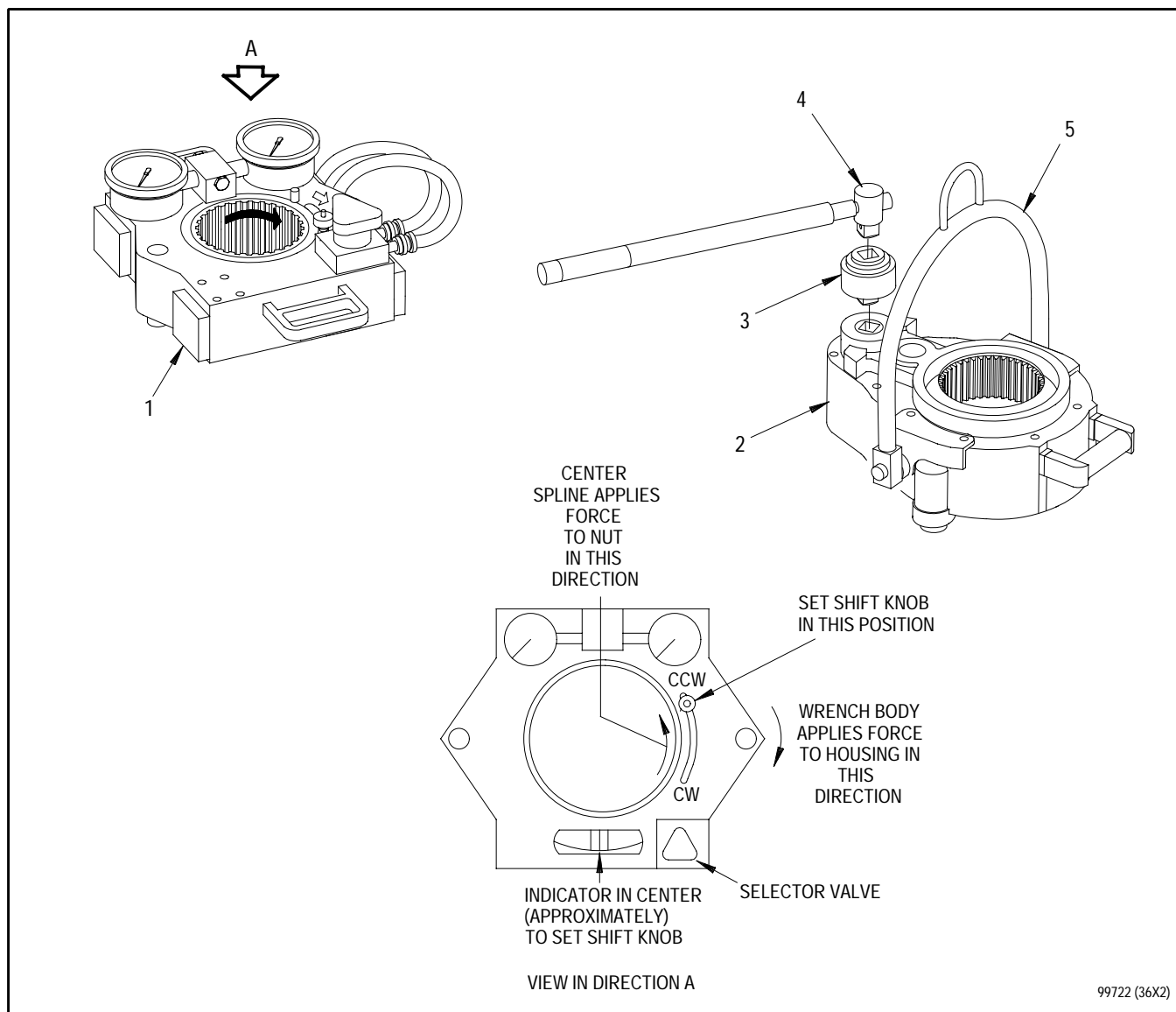
Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.

- (7) Loosen nut to zero torque.
- (8) Torque nut 12,400 to 12,600 pound-inches.
- (9) Remove tools using hoist and check to see if rivet hole in retaining nut(8, figure 2) and No. 4 bearing housing(6) are lined up.
- (10) If rivet hole is lined up go to step g. If rivet hole is not lined up, install tools using hoist and torque up to 2 degrees maximum to align rivet hole.
- g. Install rivet(2, figure 1) with head against No. 4 bearing housing(4).
- h. Flare rivet(2) with PWA 50310 riveter. Inspect for cracks and ragged edges on rivet flare. No cracks or ragged edges allowed.



- | | |
|---|-----------------------------|
| 1. PWA 50971 wrench | 5. Bolt |
| 2. PWA 50308 hydraulic wrench or
SWE 8100/8200 torque multiplier | 6. No. 4 bearing housing |
| 3. PWA 52453 adapter | 7. No. 4 bearing outer race |
| 4. Nut | 8. Outer race retaining nut |

Figure 2. No. 4 Bearing Outer Race Retaining Nut - Installation



1. PWA 50308 hydraulic wrench
2. SWE 8100/8200 torque multiplier
3. Ratchet adapter
4. Work handle
5. SWE 81001/81002 sling

Figure 3. PWA 50308 Hydraulic Wrench and SWE 8100/8200 Torque Multiplier

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 4 BEARING REAR -

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 8

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	5
2	-	3	.	.	0
4	5
5	-	8	.	.	0

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Seal Assembly, No. 4 Bearing Rear - - - - -	WP 618 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Pin, cotter	MS9245-23	3

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for assembling the No. 4 bearing rear seal assembly.

**2. NO. 4 BEARING REAR SEAL ASSEMBLY -
ASSEMBLY.**

(See Figure 1.)

- a. Place No. 4 bearing rear seal support (figure 1) on bench so that flanged end is up.
- b. Select standard or oversize seal ring as follows:
 - (1) Check No. 4 bearing rear support for a P10, P15, P20, or P25 marking in area of part number.
 - (2) Select standard or indicated oversize metal seal ring.

NOTE

Pressure side is side next to part number on ID of ring.

- c. Install standard or appropriate oversize metal seal ring into groove of seal ring holder, pressure side up, and metal seal ring gap at 12 o'clock position.
- d. Install the 12 helical springs into the recesses on rear seal support.
- e. Place the face seal assembly on bench so that carbon seal end is facing up.
- f. Install the three bushings into slots on face seal.
- g. Install face seal and bushings so that bushings fit over the three pins.
- h. Carefully push the face seal down enough to compress the springs, then install cotter pins at the three bushing locations.

NOTE

Cotter pins will be bent after air leak check.

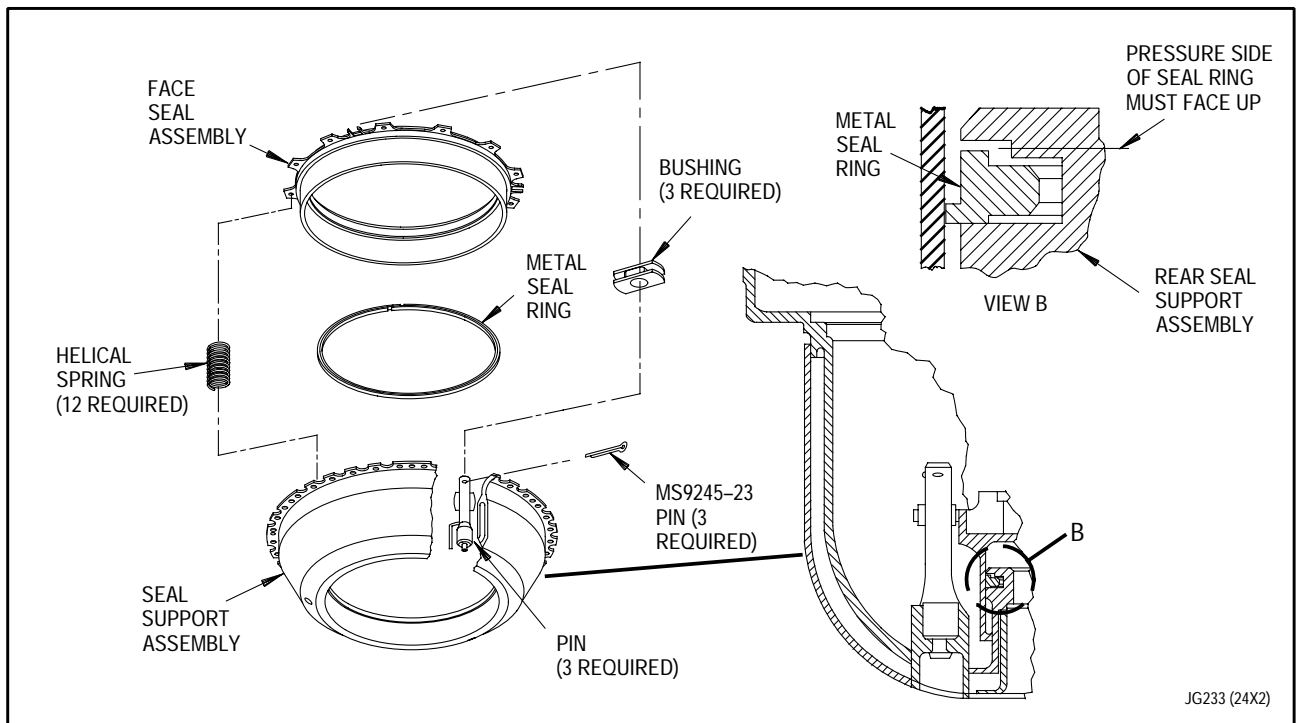


Figure 1. No. 4 Bearing Rear Seal Assembly - Assembly

**3. No. 4 BEARING REAR SEAL ASSEMBLY
-ASSEMBLY CLEARANCE CHECKS.**

(See Figures 2 and 3.)

- a. Check clearance between face seal and seal support as follows:

NOTE

- Do not compress face seal downward while checking gap.
- Use feeler gage 0.002 inch thick with a maximum end width of 0.125 inch.
 - (1) Apply a light outward hand pressure to ID of face seal assembly. (See figure 2.)
 - (2) Check clearance between ID of face seal and OD of seal support opposite from point where outward pressure is applied. This gap shall be 0.002 inch minimum.
 - (3) Check all the way around assembly, always checking gap opposite from point where hand pressure is applied. Gap shall be 0.002 inch minimum.
 - (4) If gap is within limits proceed to step c. If gap is not within limits go to step b.

- b. If clearance check in step a. was not acceptable, proceed as follows:

- (1) Remove face seal assembly from seal support.
- (2) Reposition face seal 120 degrees clockwise and install it per paragraph 2.
- (3) Repeat clearance check per step a. If necessary disassemble face seal; reposition it another 120 degrees and repeat clearance check.
- (4) If clearance check is still unacceptable replace face seal assembly and repeat clearance check. If necessary, reposition face seal 120 degrees at a time.
- (5) If clearance check is still unacceptable replace seal support assembly and repeat clearance check. If necessary, reposition face seal 120 degrees at a time.
- (6) After acceptable clearance between ID of face seal and OD of seal support is attained go to step c.

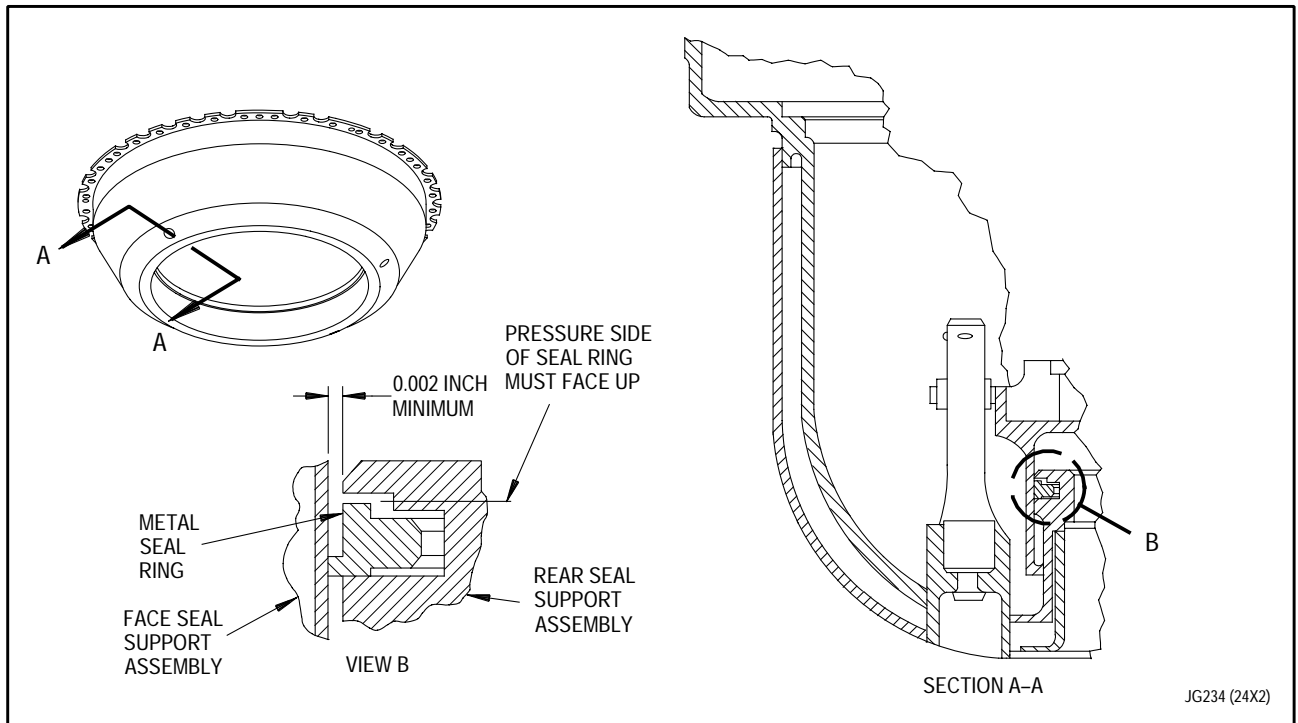


Figure 2. Clearance Between Face Seal and Seal Support

- c. Check clearance between inner edge of bushings and outer edge of slots on face seal as follows:
 - (1) Apply a light outward hand pressure at bushing location being checked. (See figure 3.)
 - (2) Check clearance as shown with 0.005 inch feeler gage. Clearance shall be 0.005 inch minimum.
 - (3) Check clearance at the other two locations. Be sure to apply outward hand pressure as each bushing is being checked.
 - (4) If clearance is less than 0.005 inch at any of the three locations, replace front seal support assembly.
- d. Perform No. 4 bearing rear seal assembly air leak check per WP 618 00.
- e. Bend three cotter pins at bushing locations after acceptable leak check.

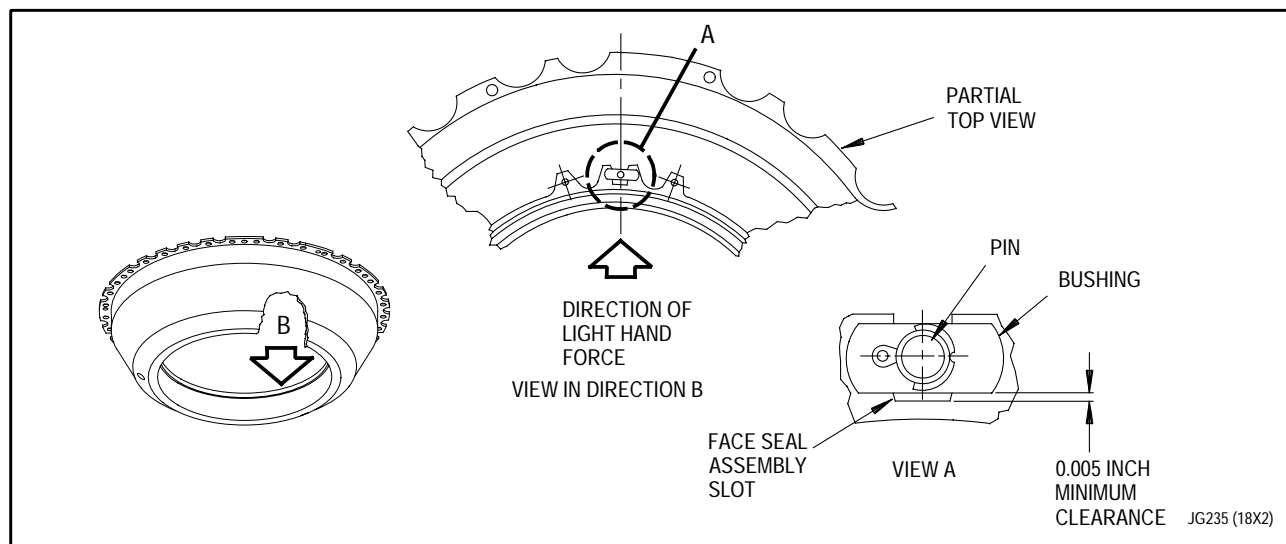


Figure 3. Clearance Between Bushings and Slots

WORK PACKAGE

TECHNICAL PROCEDURES

SEAL ASSEMBLY, NO. 4 BEARING REAR -

AIR LEAK CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	0				
6 Blank	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Oil, lubricating	MIL-L-7808

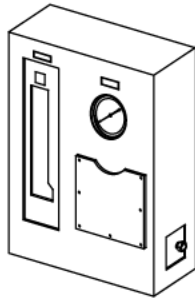
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

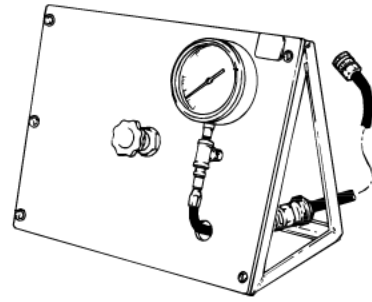
Paragraph	Function - Tool Nomenclature	Tool Number
2	No. 4 Bearing Rear Seal Assembly - Air Leak Check	
	Flowmeter, Air seal assembly airflow check - - - - -	PWA 6507
	Regulator - - - - -	PWA 21875
	Fixture, Air Leak Check - No. 4 bearing rear seal - - - - -	PWA 52426

ILLUSTRATED SUPPORT EQUIPMENT



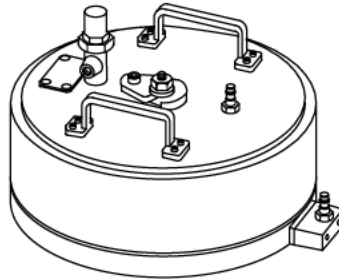
PWA 6507-C

Figure T1. PWA 6507 Flowmeter



PWA 21875 -C

Figure T2. PWA 21875 Regulator



PWA 52426 -C

Figure T3. PWA 52426 Fixture

1. INTRODUCTION.

- a. This work package contains instructions for performing air leak check on No. 4 bearing rear seal assembly.

2. NO. 4 BEARING REAR SEAL ASSEMBLY - AIR LEAK CHECK.

- a. Limit for air leakage past carbon seal or past seal ring is same as total cumulative leakage past carbon seal and seal ring, 1.0 cfm. Check total leakage as follows:

- (1) Loosen collar nut on top of cover of PWA 52426 fixture; swing C-washer out of way and remove cover.
- (2) Protect against false seal assembly leakage indications, ensure fixture packings and seal seat are in satisfactory condition.

NOTE

Engine seal seat shall not be used in fixture for total leakage indications.

- (3) Position fixture spacer (seal seat) in PWA 52426 fixture.
- (4) Apply light coat MIL-L-7808 to position fixture spacer and carbon seal.
- (5) Position No. 4 bearing rear seal assembly aligning dowel pin, on fixture with carbon seal against fixture seal seat.

- (6) Position cover over seal assembly aligning dowel pin on fixture base with hole in cover.
- (7) Position C-washer and tighten collar nut to secure.
- (8) Ensure regulator valve is open and gage on PWA 21875 is reading zero.
- (9) Connect shop air to PWA 21875 regulator. Connect regulator hose to fixture inlet fitting and connect air outlet hose from PWA 52426 fixture to PWA 6507 flowmeter.



Introduce air slowly. If carbon seal is not seated properly, large flow of air may damage flowmeter.

- (10) Regulate air pressure to fixture at 30 psi and read total leakage in cubic feet per minute (cfm) from flowmeter. Leakage shall not exceed 1.0 cfm. If leakage is not more than 1.0 cfm, seal assembly is acceptable. If leakage exceeds 1.0 cfm, tap fixture with mallet to ensure proper seating of seal.

- (11) Open valve on PWA 21875 regulator to relieve air pressure.
 - (12) Disconnect air hoses from PWA 52426 fixture.
 - (13) Remove seal assembly from fixture.
- b. Carbon seal leakage may be reduced as follows:
- (1) Compress and release seal against its springs to be sure it was not cocked or sticking.
 - (2) Clean seal assembly. Refer to T.O. 2-1-111.
- (3) Glass lap carbon seal. Refer to T.O. 2-1-111.
- c. Seal ring leakage may be reduced as follows:
- (1) Check ring gap clearance. Replace if necessary. Ensure pressure side of ring faces proper direction. Refer to T.O. 2J-F100-53-7, WP 617 00.
 - (2) Check seal face condition.

WORK PACKAGE**TECHNICAL PROCEDURES****CHAMBER - COMBUSTION, VANES AND SUPPORT,
FIRST STAGE TURBINE STATOR -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 22

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	6	18	10	10
2A Added	29	6A	8	11	29
2B Blank Added	29	6B	9	12	16
3	29	7	29	13 - 15	0
4	0	8 Blank	9	16 - 17	2
5	16	9	29	18 Blank	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100(II)-603	28 FEB 92	O/I	Retrofit of Combustion Chamber No. 2 ID Liner Segments to Improve Combustion Exit Temperature Profile, F-100-PW-229 Engines, F-15/F-16 Aircraft (ECP 90QA280)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BEESWAX	C-B-191
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
PENCIL, (CRAYON), SILVER, METAL	COLORBRITE NO. 2101, OR ANADEL
MARKING (HARD) (PMC 4059-7)	NO. 1936
PENCIL, (CRAYON), SILVER, METAL	COLOR-TEX NO. 1843
MARKING (HARD)	

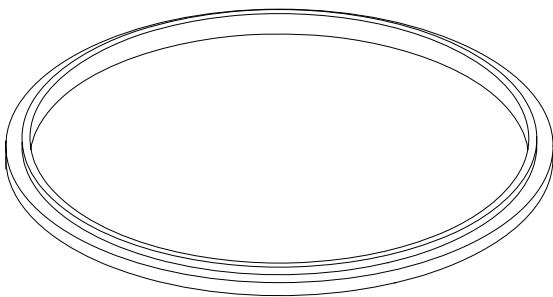
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
COLLAR - PIN, RIVET	4061774	8
OR	OR	
NUT - SELF-LOCKING, HEX	4082753-01	8
PIN - RIVET - THREADED	4069895	8
RETAINER, COMBUSTION CHAMBER	4077276	AS REQUIRED
LINER		
SEAL - TURBINE STATOR, 1ST STAGE	4060982	23
SEAL - TURBINE STATOR, 1ST STAGE,	4076201	23
ASSEMBLY OF		

APPLICABLE SUPPORT EQUIPMENT

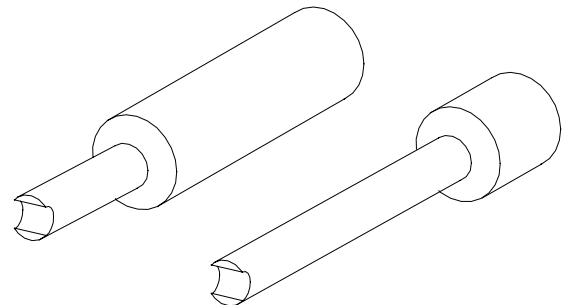
Paragraph	Function - Tool Nomenclature	Tool Number
3	COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE SUPPORT - ASSEMBLY	
	ADAPTER, INSTALLATION TOOL - - - - -	PWA 57781 OR
	INSTALLATION TOOL SET - - - - -	LM 1014
	PUSHER PLATE - - - - -	LM 1001
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
	STAND, ASSY/DISASSY, HIGH PRESSURE TURBINE - - - - -	PWA 57830 OR
	STAND, ASSY/DISASSY, HPT - - - - -	PWA 57765 OR
	STAND, ASSEMBLY AND DISASSEMBLY, HPT - - - - -	PWA 57503
	FIXTURE, GUIDE INSTALLATION AND REMOVAL, FIRST STAGE TURBINE STATOR SUPPORT COMBUSTOR AND FIRST STAGE TURBINE STATOR VANE - - - - -	PWA 57506

ILLUSTRATED SUPPORT EQUIPMENT



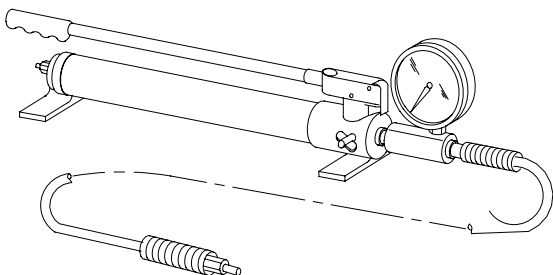
LM 1001 -C

Figure T1. LM 1001 PUSHER PLATE



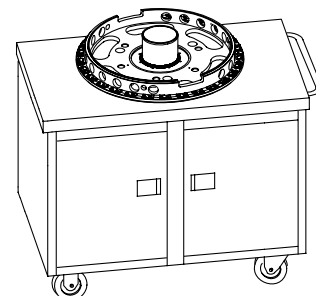
LM 1014 -C

Figure T2. LM 1014 INSTALLATION TOOL SET



PWA 55380 -C

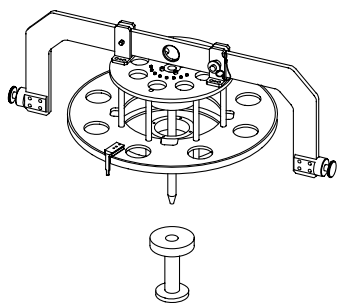
Figure T3. PWA 55380 PUMP



PWA 57503 -C

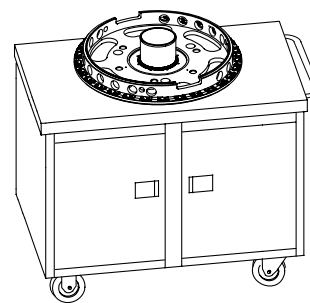
Figure T4. PWA 57503 STAND

ILLUSTRATED SUPPORT EQUIPMENT (continued)



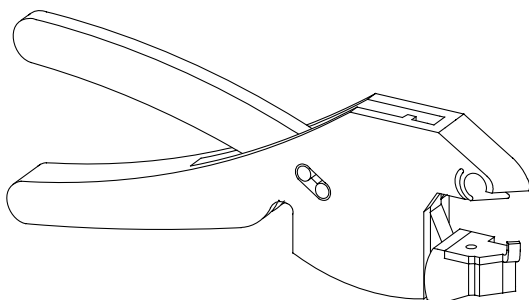
PWA 57506 -C

Figure T5. PWA 57506 FIXTURE



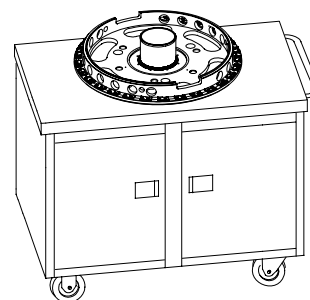
PWA 57765 -C

Figure T6. PWA 57765 STAND



PWA 57781 -C

Figure T7. PWA 57781 ADAPTER



PWA 57830 -C

Figure T8. PWA 57830 STAND

1. INTRODUCTION.

- a. This work package contains instructions for assembling combustion chamber, first stage turbine stator vanes and support.

2. PRELIMINARY INSTRUCTIONS.

(See Figure 1.)

- a. Figure 1 shows an overall view of assembly. Look at this figure to become familiar with it.

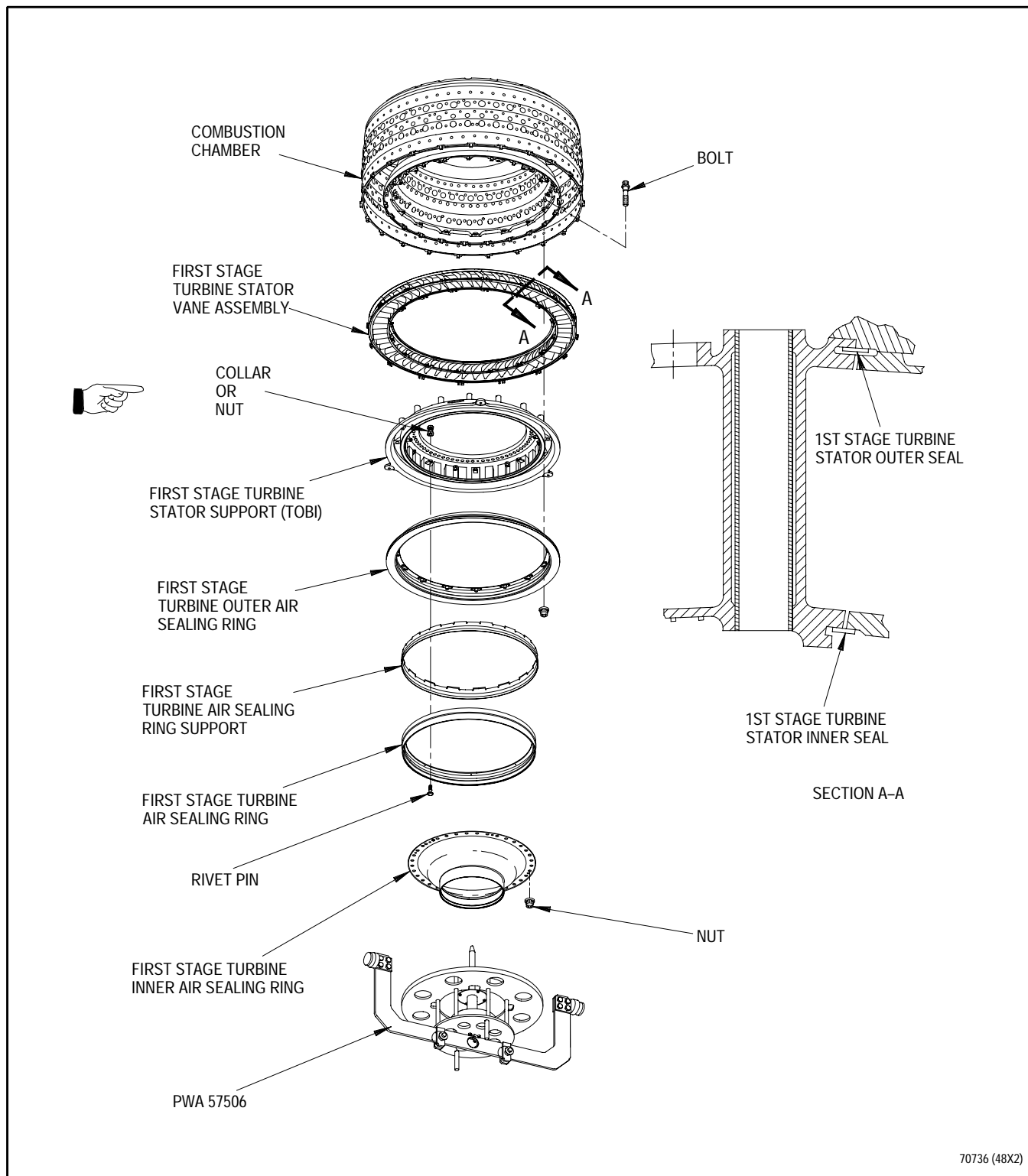


Figure 1. Combustion Chamber, First Stage Stator Vane and Support - Installation

**3. COMBUSTION CHAMBER, FIRST STAGE
TURBINE STATOR VANES, FIRST STAGE
TURBINE SUPPORT - ASSEMBLY.**

(See Figures 2 through 2B and 4 through 9.)

- a. If any combustion chamber liner segments(1, figure 2) were removed during disassembly, reinstall with retainers(2) as follows:

NOTE

Some combustion chamber assemblies use reoperated 2nd row ID liner segments. These reoperated liner segments have two of four combustion holes with larger diameters.

- (1) Install liner segment(1) into position in combustion chamber assembly. For 2nd row ID, install liner segments so that arrows on liner segments align with corresponding arrows on inner liner subassembly. (See figure 2A.) For inspection of 2nd row ID liner segments for clearance envelope requirements, refer to step (5). (See figure 2B.) Inspect 2nd row ID liner segments for clearance envelope requirements. (See figure 2B.)



Using excessive force when installing retainers may deform retainers and result in retainer loss during engine operation.

- (1a) Install retainers behind inner combustion chamber assembly mount lugs using PWA 57781 adapter. Retainers shall not be installed any further than necessary to engage retainer slot over combustion chamber liner segment post.
- (2) Ensure that retainers installed radially around circumference of the combustor are installed in same direction. Retainers installed axially are installed from front to rear.
- (3) Install new retainer(2, figure 2) just enough to engage retainer slot over post of liner segment(1) using PWA 57781 adapter.
- (4) Inspect newly installed retainers(2, figure 2) to ensure that retainer legs engage slot in post and are not bent or spread apart.
- (5) Inspect 2nd row ID liner segments for clearance envelope requirements. (See figure 2B.)

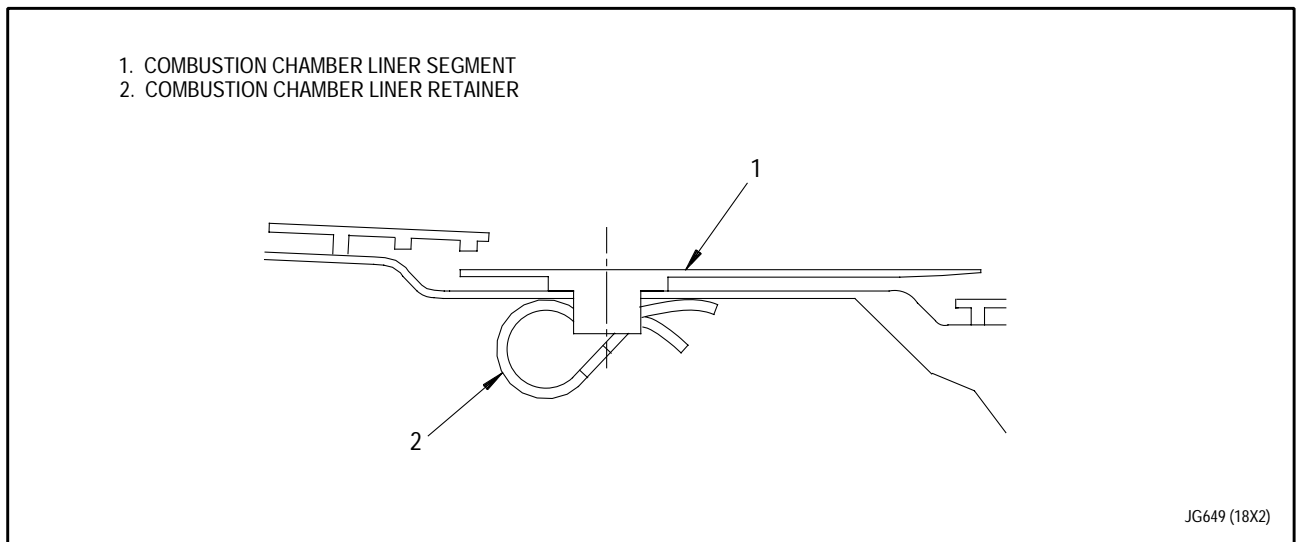


Figure 2. Combustion Chamber Liner Segments - Installation

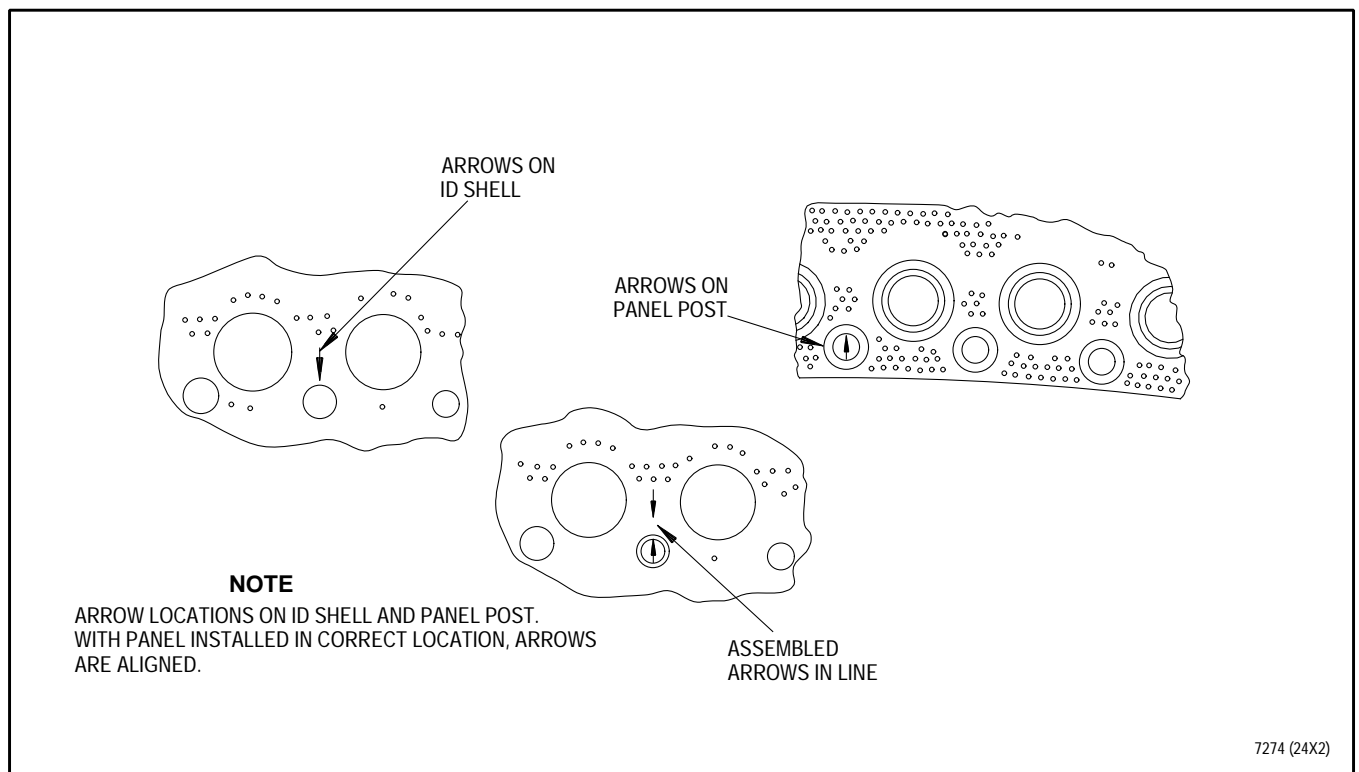


Figure 2A. Combustor Chamber Liner Segment Showing Arrow Alignment

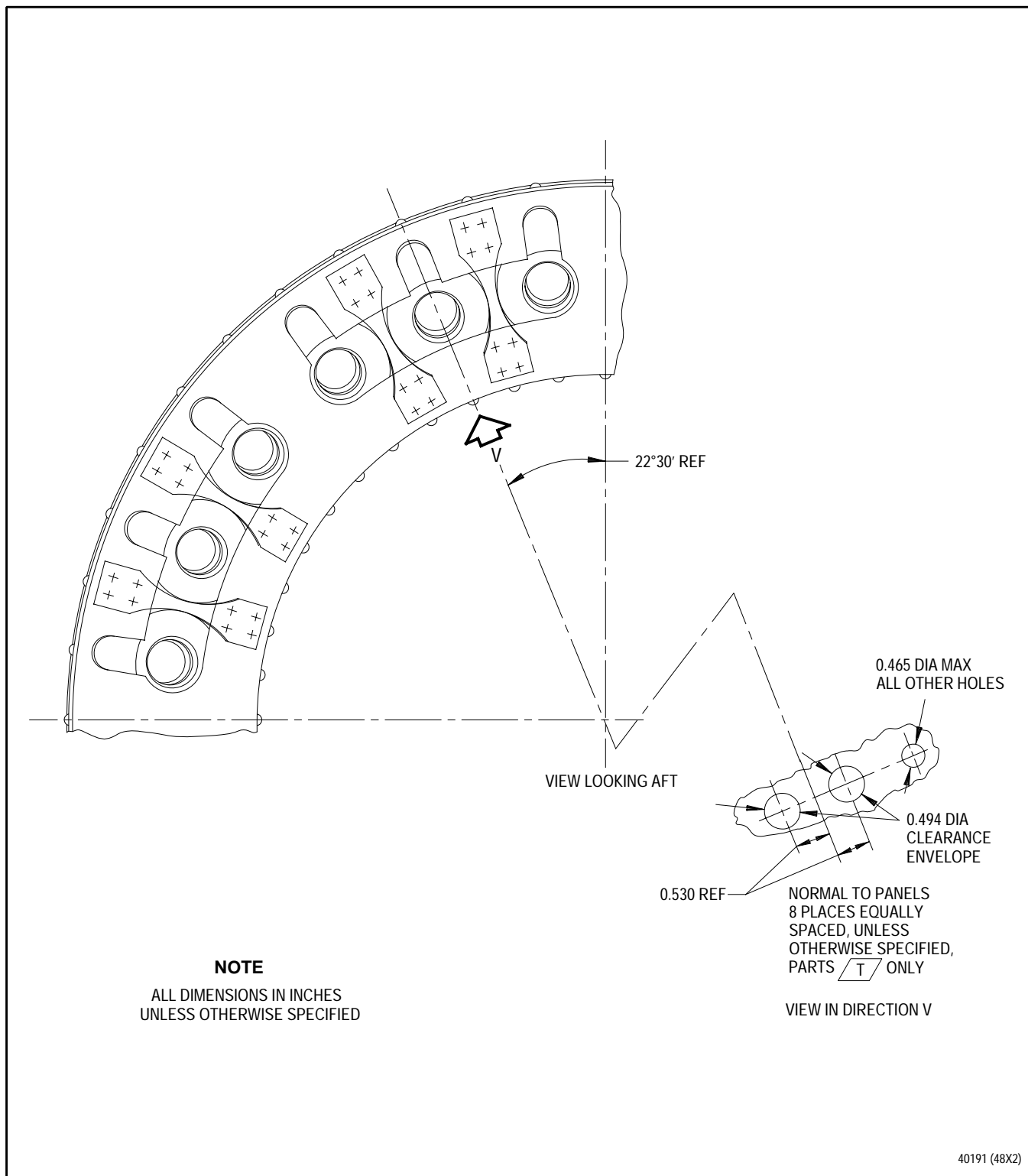


Figure 2B. Combustion Chamber Liner Segment - Clearance Envelope Requirement for Second Row Inner Diameter Liner Segments

Figure 3. Deleted.

- b. Install first stage turbine air sealing ring support in first stage turbine stator support as follows:
- (1) Place PWA 57830 stand, detail-23 ring(9, figure 4) on detail-69 base assembly(11).
 - (2) Install first stage turbine stator support (TOBI) (8), front end down on detail-23 ring(9).
 - (3) Install air sealing ring support(7) aligning cut outs with lugs on first stage turbine stator support(8).
 - (4) Install LM 1001 pusher plate on air sealing ring support(7).
 - (5) Install detail-40 ring assembly center on LM 1001 pusher plate.
 - (6) Install detail-103 threaded shaft(10), detail-102 ring(3), detail-74 hydraulic cylinder(2) and detail-9 nut(1).
 - (7) Connect PWA 55380 hydraulic hand pump to hydraulic cylinder(2).
 - (8) Visually check seating of sealing ring support(7) as pressure is increased. Tap detail-28 ring assembly(4) with mallet to level first stage turbine air sealing ring support(7) during installation.
 - (9) Actuate PWA 55380 pump to seat sealing ring support(7). Do not exceed 2,500 psig to seat support.
 - (10) Verify seating of first stage air sealing ring support(1, figure 5) at four locations by ensuring aft end of support is flush with first stage turbine stator support(2) or within -0.060 to +0.020 inch. See figure 5.
 - (11) Release hydraulic pressure and remove pump.
 - (12) Remove PWA 57830 stand, detail-9 nut(1, figure 4), detail-74 hydraulic cylinder(2), and detail-102 ring(3).

- (13) Lift detail-40 ring assembly from stand.

NOTE

First stage turbine stator may have to be separated from detail-23 ring(9) with jackscrews.

- (14) Remove stator support(8) from PWA 57830 stand.

- c. Install first stage turbine air sealing ring(6, figure 6) in first stage turbine stator support(5) as follows:

- (1) Position first stage turbine stator support(5) on bench front end down.
- (2) Position first stage turbine air sealing ring(6) on first stage turbine stator support(5) with holes aligned.
- (3) Tap with mallet to seat.
- (4) Verify seating of first stage turbine air sealing ring(1, figure 7) at four locations by ensuring gap between first stage turbine air sealing ring(1) and first stage turbine stator support(3) is flush within 0.010 inch. (See figure 7.)
- (5) If gap is beyond allowable limits, air sealing ring(1) is not fully seated. Remove air sealing ring(1) and verify air sealing ring support(2) is seated per step b(12).

NOTE

Rivet pins(7, figure 6) may be secured using either pre-sheared collars(4) or self-locking nuts(4A).

- d. Secure first stage turbine air sealing ring(6) and stator support(5) with rivet pins(7) and collars(4) or self-locking nuts(4A) as follows:

- (1) If using collars, pre-shear heads from collars using standard wrenches on two collar wrench flats.

NOTE

Only rivet pins with two wrenching flats on pin head shall be installed.

- (2) Install rivet pins, heads up, to secure first stage turbine air sealing ring(6) and stator support(5).

NOTE

Crowfoot wrench NSN 5120-01-348-7323 (Snap On 5/16 inch Flank Drive crowfoot PN TMRX10) can be used without alteration for installation of rivet pins and nuts.

- (3) Install pre-sheared collars or self-locking nuts on pins. Tighten collars or nuts using 1/4 inch open end wrench on pin and torque wrench with a maximum scale of 2.0 pound-inches increments on collar or nut.
- (4) Verify run-on torque between 1.5 and 7.0 pound-inches.
- (5) If run-on torque is not between 1.5 and 7.0 pound-inches discard collar or nut and install new one per steps (1) through (5).



Exceeding torque limits can cause rivet pin fracture and severe engine damage.

- (6) Apply final torque 23 to 27 pound-inches to collars or nuts.

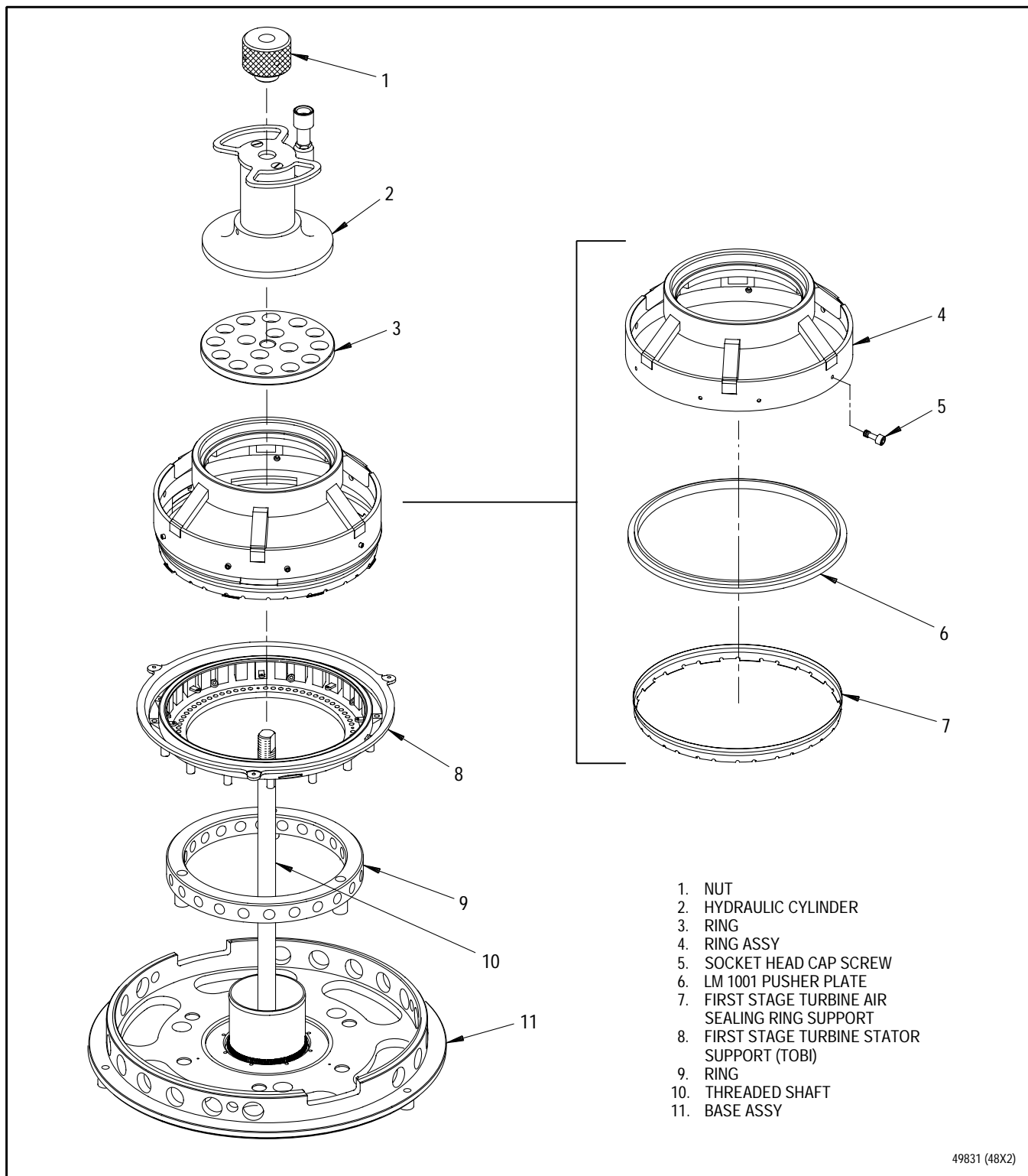
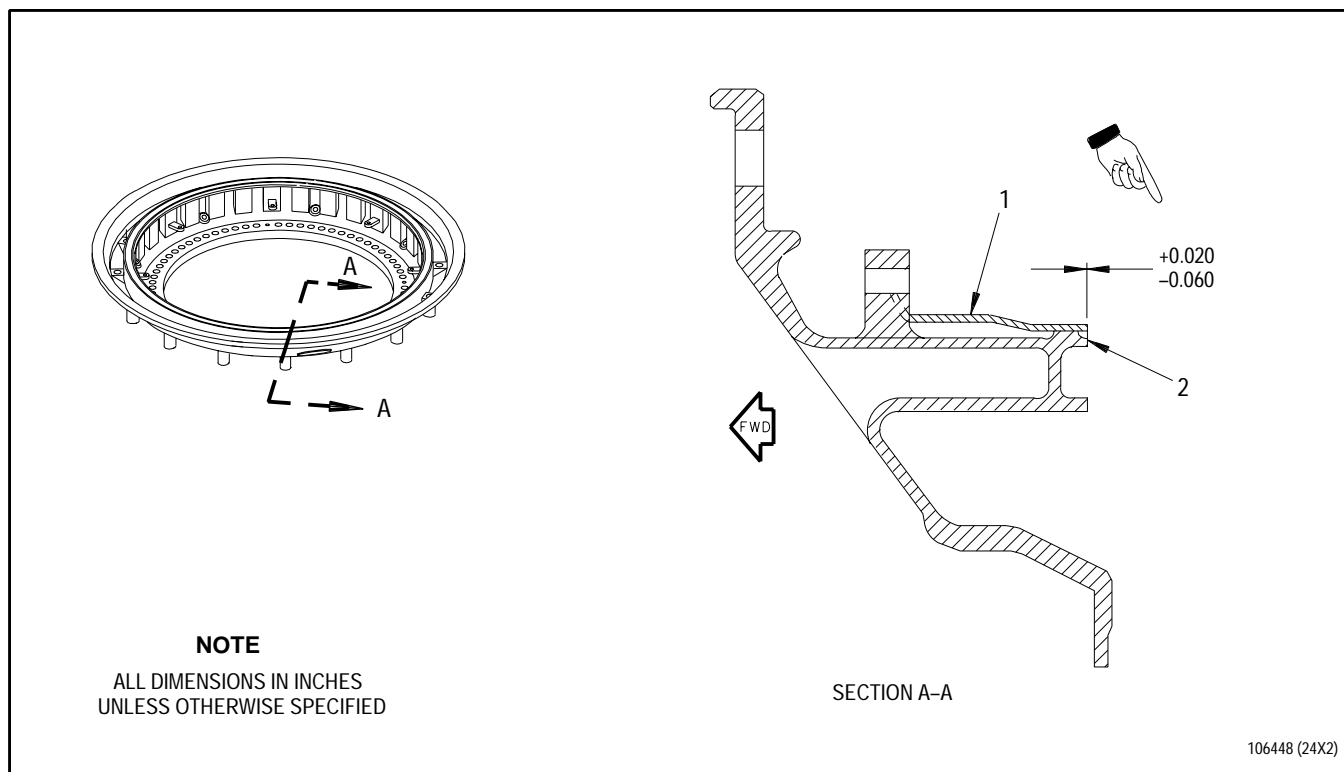


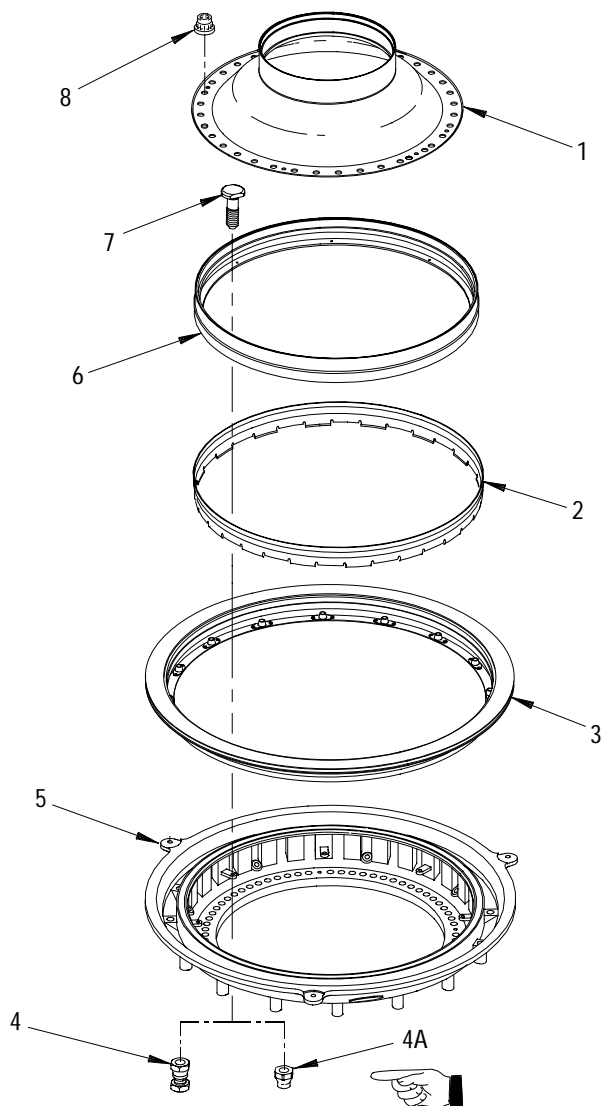
Figure 4. First Stage Turbine Air Sealing Ring Support - Installation



1. First stage turbine air sealing ring support
2. First stage turbine stator support

Figure 5. First Stage Turbine Air Sealing Ring Support - Seating Check

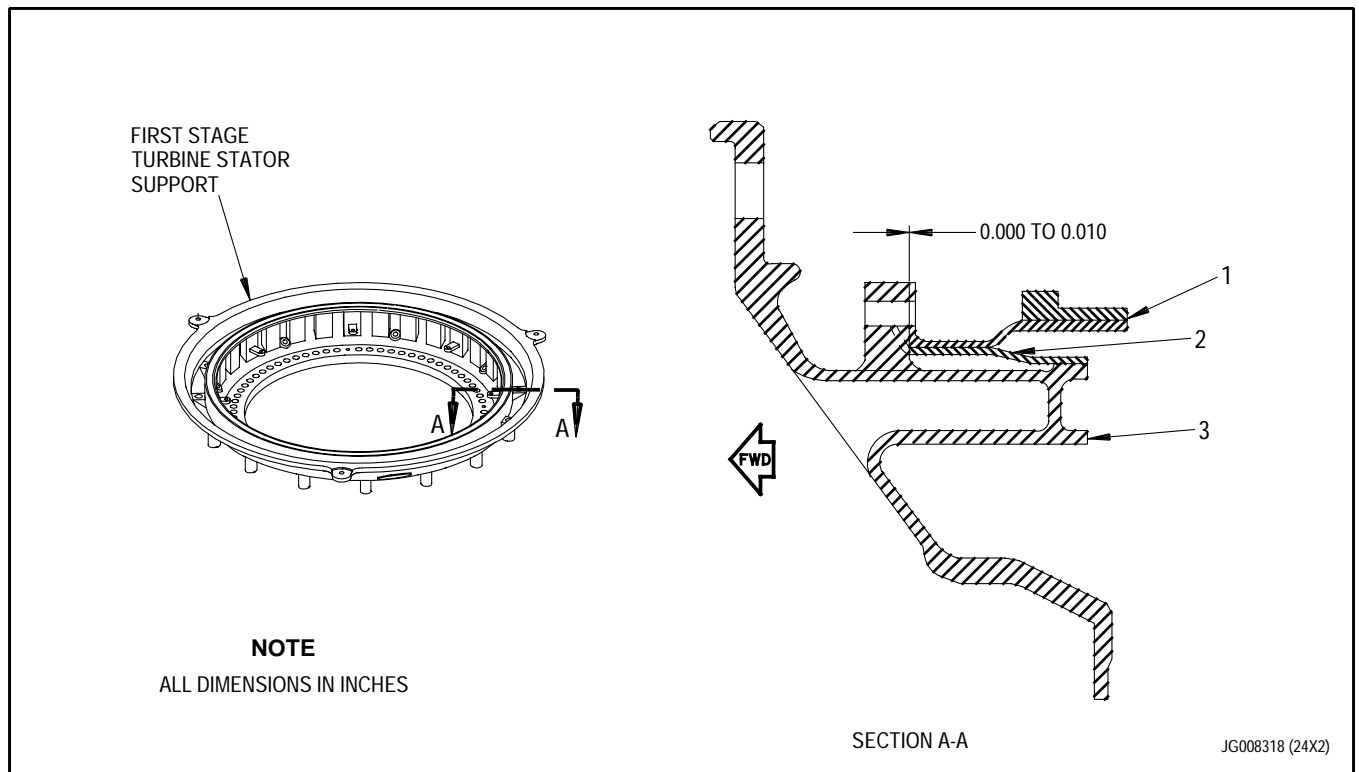
- e. Install first stage turbine outer air sealing ring(3, figure 6) as follows:
 - (1) Mark offset hole with silver marking pencil.
 - (2) Chill outer air sealing ring(3) in freezer for 30 minutes.
 - (3) Position outer air sealing ring(3) on first stage turbine stator support(5) with offset holes aligned. Tap with mallet to seat.
 - (4) Allow time for part to return to normal temperature.
 - (5) Secure with four work bolts equally spaced.



68442 (36X2)

1. First stage turbine inner air sealing ring
2. First stage turbine air sealing ring support
3. First stage turbine outer air sealing ring
4. Collar
- 4A. Nut
5. First stage turbine stator support
6. First stage turbine air sealing ring
7. Rivet pin
8. Nut

Figure 6. First Stage Turbine Stator Support - Assembly



1. First stage turbine air sealing ring
2. First stage turbine air sealing ring support
3. First stage turbine stator support

Figure 7. First Stage Turbine Air Sealing Ring - Seat Check

- f. Install first stage turbine inner air sealing ring assembly(1, figure 6) as follows:
 - (1) Align offset hole in inner air sealing ring(1) and mark with silver pencil prior to chilling.
 - (2) Chill inner air sealing ring(1) in freezer for 30 minutes.
 - (3) Position inner air sealing ring(1) on first stage turbine stator support(5) with offset hole aligned.
 - (4) Seat inner air sealing ring(1) with four work bolts, nuts and washers.
 - (5) Remove work bolts, nuts and washers.
- g. Place PWA 57506 guide fixture(6, figure 8) on bench with center post pointing up and ensure No. 1 vane locating detail(5) is secured to fixture and pointing up.
- h. Install first stage turbine stator support(4) on center ring of guide fixture, aligning offset lug of stator support with offset stamped on OD of fixture.
- i. Secure stator support(4) to fixture with four short detail capscrews from bottom.
- j. Align No. 1 vane with locating detail(5) of PWA 57506 guide fixture.

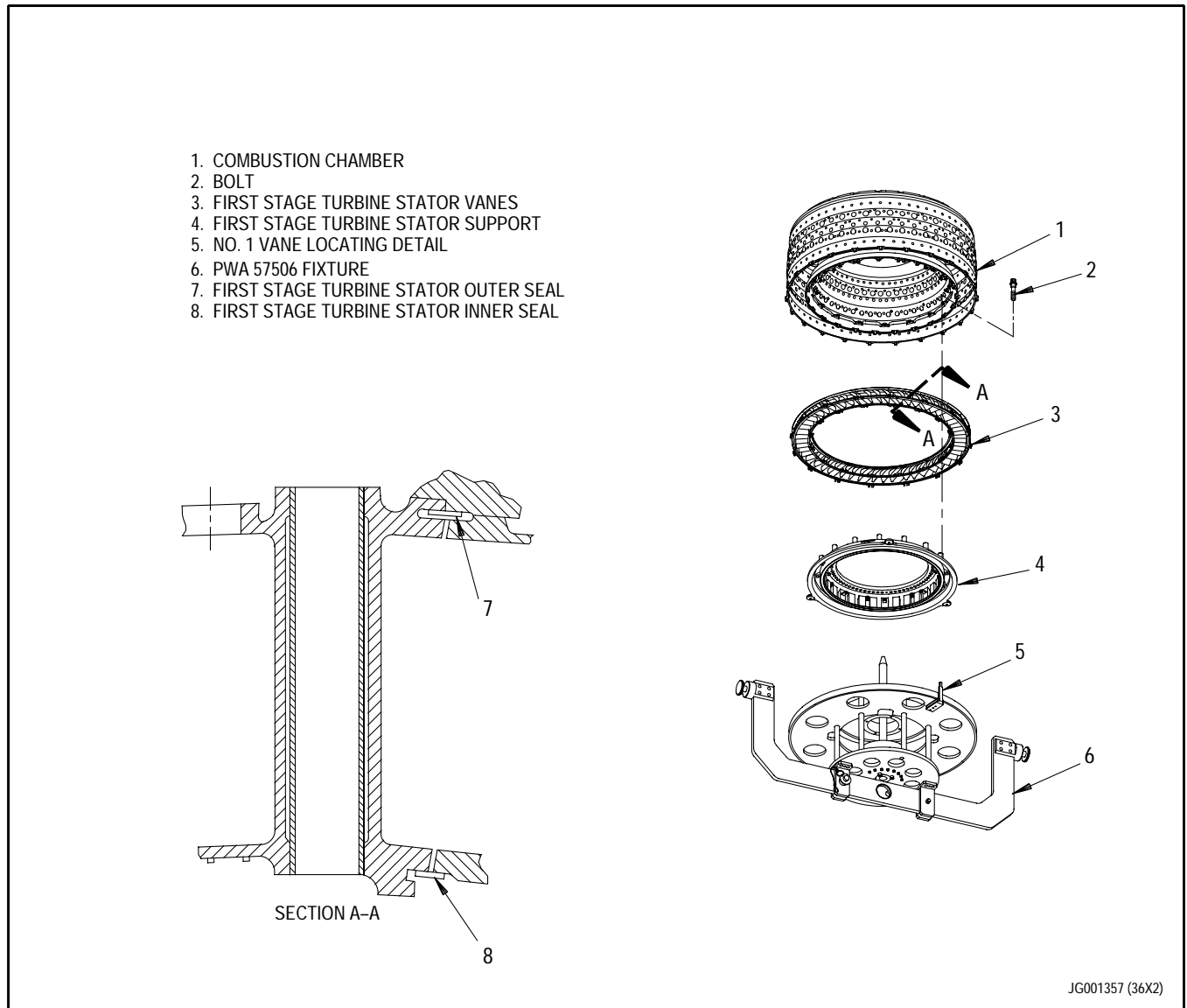


Figure 8. Combustion Chamber First Stage Turbine Stator Vanes and Support - Assembly

- k. Install first stage turbine stator inner seals(8) and hold in place with beeswax.
- l. Install No. 1 vane onto stator support(4), aligning OD lug of vane with locating detail of fixture.
- m. Install remaining vanes onto stator support(4) in a counterclockwise direction. Ensure all inner seals(8) remain in place during installation.

- n. Install first stage turbine stator outer seals(7) on each vane and hold in place with beeswax.
- o. Remove PWA 57506 locating detail(5) and install pointing down.
- p. Remove workbolts from first stage turbine stator support(4).
- q. Install combustion chamber(1) onto stator support(4), aligning offset lug of combustion chamber with offset lug of stator support.
- r. Ensure that ID and OD lugs on combustion chamber(1) engage slots in vanes.

NOTE

- No intermixing of silver plated and nonsilver plated nutplates within a set allowed. New silver plated fasteners can be identified by silver colored threads. Used parts will require PN verification.
- Do not apply antigallant or lubricant to silver plated nutplates or bolts used with them.
- s. If stator support OD honeycomb air seal contains PN ST2596-04 (typical) silver plated nutplates, install as follows:
 - (1) Secure combustion chamber(1) to stator support(4) using bolts(2). Do not apply antigallant or lubricant to PN 4080005 (typical) bolts.
 - (2) Torque bolts 120 to 130 pound-inches per sequence shown in figure 9.

t. If stator support OD honeycomb air seal contains PN 4070347 (typical) nutplate, install as follows:

- (1) Lightly coat threads of PN 4068912 (typical) bolts(2) with PWA 36545 antigalling compound.

- (2) Secure combustion chamber(1) to stator support(4) using bolts(2).

- (3) Torque bolts 62 to 72 pound-inches per sequence shown in figure 9.

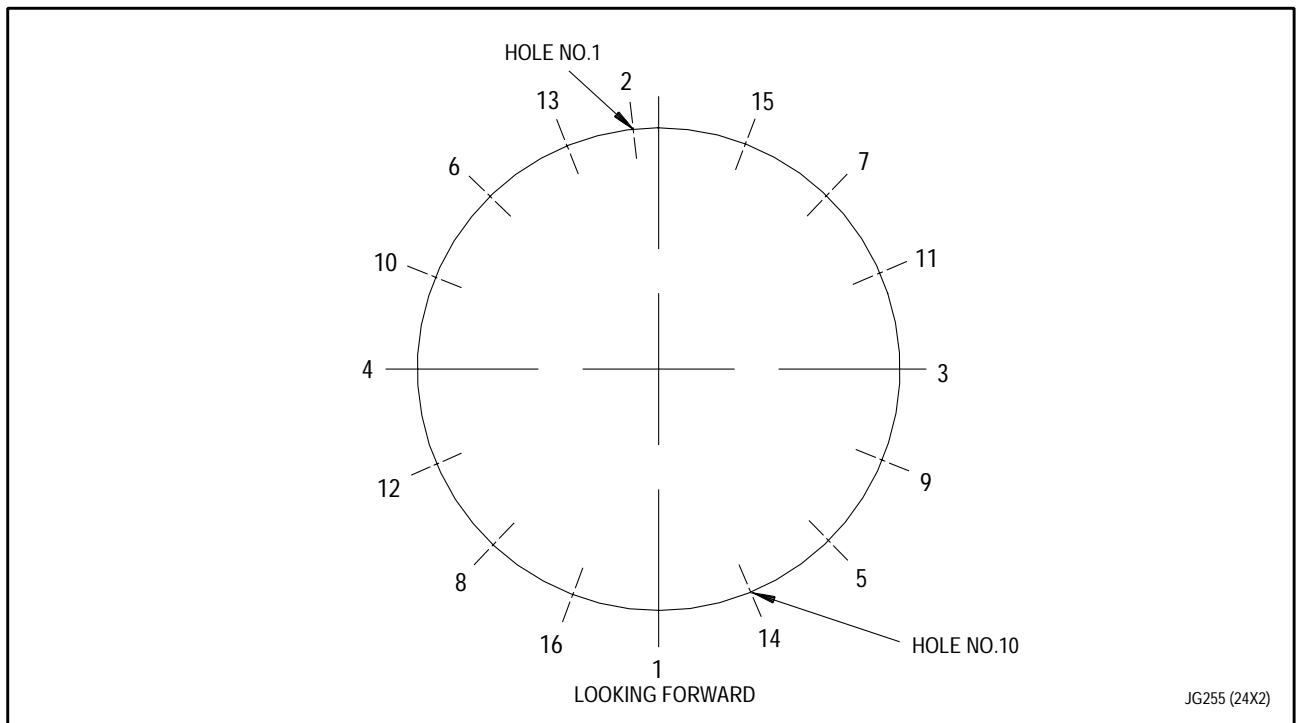


Figure 9. TOBI Assembly Bolt Torque Sequence

SUBORDINATE WORK PACKAGE**TECHNICAL PROCEDURES**

**CHAMBER - COMBUSTION;
VANES AND SUPPORT, FIRST STAGE TURBINE STATOR;
AND FRONT TURBINE CASE -**

ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE SWP PAGES

Total Number of Pages in this SWP is 22

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	5	29	12 - 13	23
2	25	6 - 10	23	14	29
3	29	11	29	15 - 22	23
4	23				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100(II)-503	28 FEB 92	O/I	Retrofit of Combustion Chamber No. 2 ID Liner Segments to Improve Combustion Exit Temperature Profile, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 90QA280)
2J-F100229(II)-552	31 OCT 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ADHESIVE, PWA 36003-1	RTV-159
ADHESIVE, PWA 36454-2	PERMABOND 910
BEESWAX	C-B-191
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
OIL, LUBRICATING	MIL-L-7808
PENCIL, (CRAYON), SILVER, METAL	COLORBRITE NO. 2101
MARKING (HARD) (PMC 4059-7)	

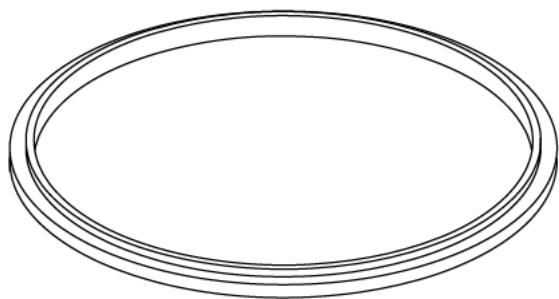
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BOLT-SHOULDER, DOUBLE HEX	4068912	16
BOLT-SHOULDER, DOUBLE HEX	4080005	16
BOLT	4084102	8
NUT	4083241	8
RETAINER, COMBUSTION CHAMBER LINER	4081406	AR
SEAL - TURBINE STATOR, 1ST STAGE, ASSEMBLY OF	4084008	23
SEAL - TURBINE STATOR, 1ST STAGE, ASSEMBLY OF	4084007	23

APPLICABLE SUPPORT EQUIPMENT

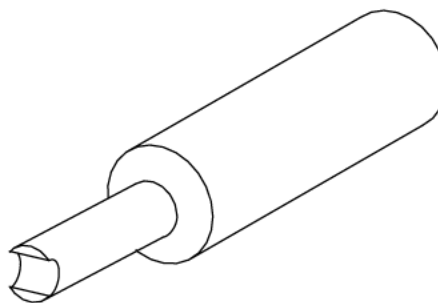
Paragraph	Function - Tool Nomenclature	Tool Number
3	COMBUSTION CHAMBER ASSEMBLY - LINER SEGMENTS INSTALLATION	
	ADAPTER, INSTALLATION TOOL - - - - -	PWA 57781
		OR
	INSTALLATION TOOL SET - - - - -	LM 1014
4	FIRST STAGE TURBINE STATOR SUPPORT, AIR SEALING RING SUPPORT, OUTER AIR SEALING RING, AND INNER AIR SEALING RING - ASSEMBLY	
	STAND, ASSY/DISASSY, HIGH PRESSURE TURBINE - - - - -	PWA 57830
		OR
	STAND, ASSY/DISASSY, HPT - - - - -	PWA 57765
		OR
	STAND, ASSEMBLY AND DISASSEMBLY, HPT - - - - -	PWA 57503
	SPACER - - - - -	LM 1001
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
5	COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT, AND FRONT TURBINE CASE - ASSEMBLY	
	FIXTURE, ASSEMBLY - - - - -	PWA 57918
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	FIXTURE, GUIDE, INSTALLATION AND REMOVAL, TOBI, COMBUSTOR AND 1ST VANE - - - - -	PWA 57506
	SLING, ADJUSTABLE MODULE HANDLING, 2000 LB CAPACITY (LONG AND SHORT CABLES) - - - - -	PWA 56336
	HOOK, SAFETY - - - - -	PWA 2388

ILLUSTRATED SUPPORT EQUIPMENT



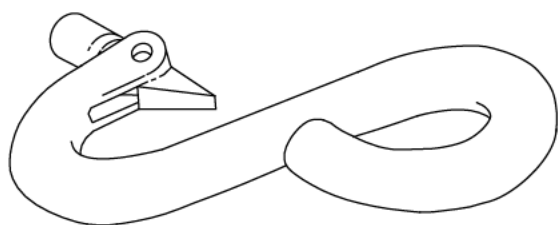
LM 1001 -C

Figure T1. LM 1001 SPACER



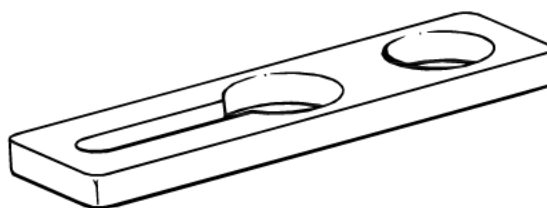
LM 1014 -C

Figure T2. LM 1014 INSTALLATION TOOL SET



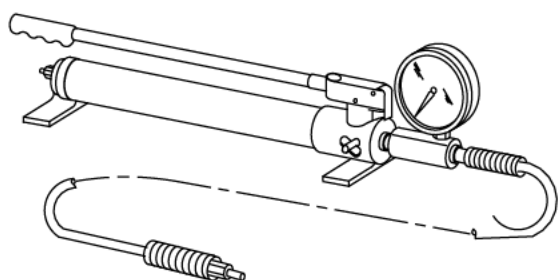
PWA 2388 -C

Figure T3. PWA 2388 HOOK



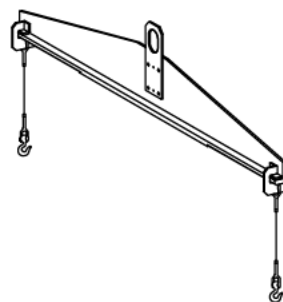
PWA 26147 -C

Figure T4. PWA 26147 ADAPTER



PWA 55380 -C

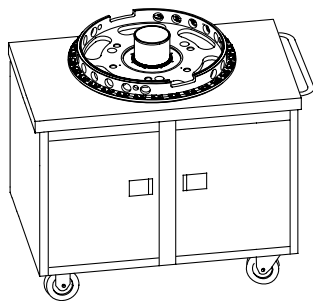
Figure T5. PWA 55380 PUMP



PWA 56336 -C

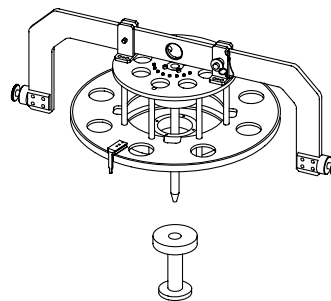
Figure T6. PWA 56336 SLING

ILLUSTRATED SUPPORT EQUIPMENT (continued)



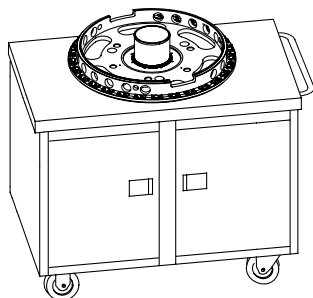
PWA 57503 -C

Figure T7. PWA 57503 STAND



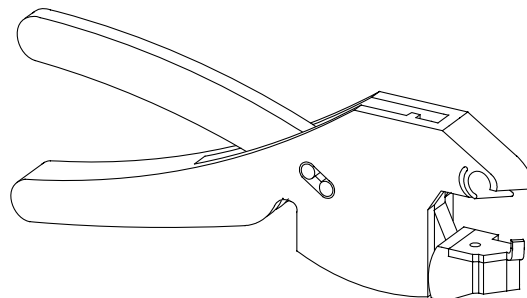
PWA 57506 -C

Figure T8. PWA 57506 FIXTURE



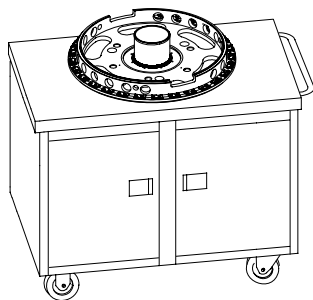
PWA 57765 -C

Figure T9. PWA 57765 STAND



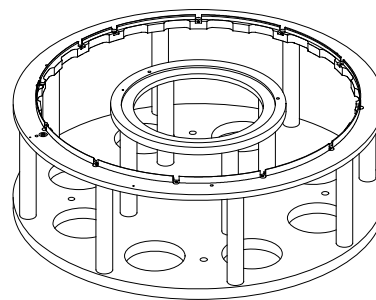
PWA 57781 -C

Figure T10. PWA 57781 ADAPTER



PWA 57830 -C

Figure T11. PWA 57830 STAND



PWA 57918 -C

Figure T12. PWA 57918 FIXTURE

1. INTRODUCTION.

- a. This subordinate work package contains instructions for assembling combustion chamber, 1st stage turbine stator vanes, 1st stage turbine stator support and front turbine case.

2. PRELIMINARY INSTRUCTIONS.

(See Figure 1.)

- a. Figure 1 shows an overall view of assembly. Look at this figure to become familiar with it.

Legend for figure 1

- 1. 1st stage turbine inner air sealing ring
- 2. Nut
- 3. 1st stage turbine air sealing ring
- 4. 1st stage turbine air sealing ring support
- 5. 1st stage turbine outer air sealing ring
- 6. 1st stage turbine stator support (TOBI)
- 7. Bolt
- 8. Front turbine case
- 9. 1st stage turbine stator vanes
- 10. Combustion chamber assembly
- 11. Bolt
- 12. Nut
- 13. Eccentric sleeve
- 14. Split sleeve
- 15. Bolt
- 16. 1st stage turbine stator outer seal
- 17. 1st stage turbine stator inner seal

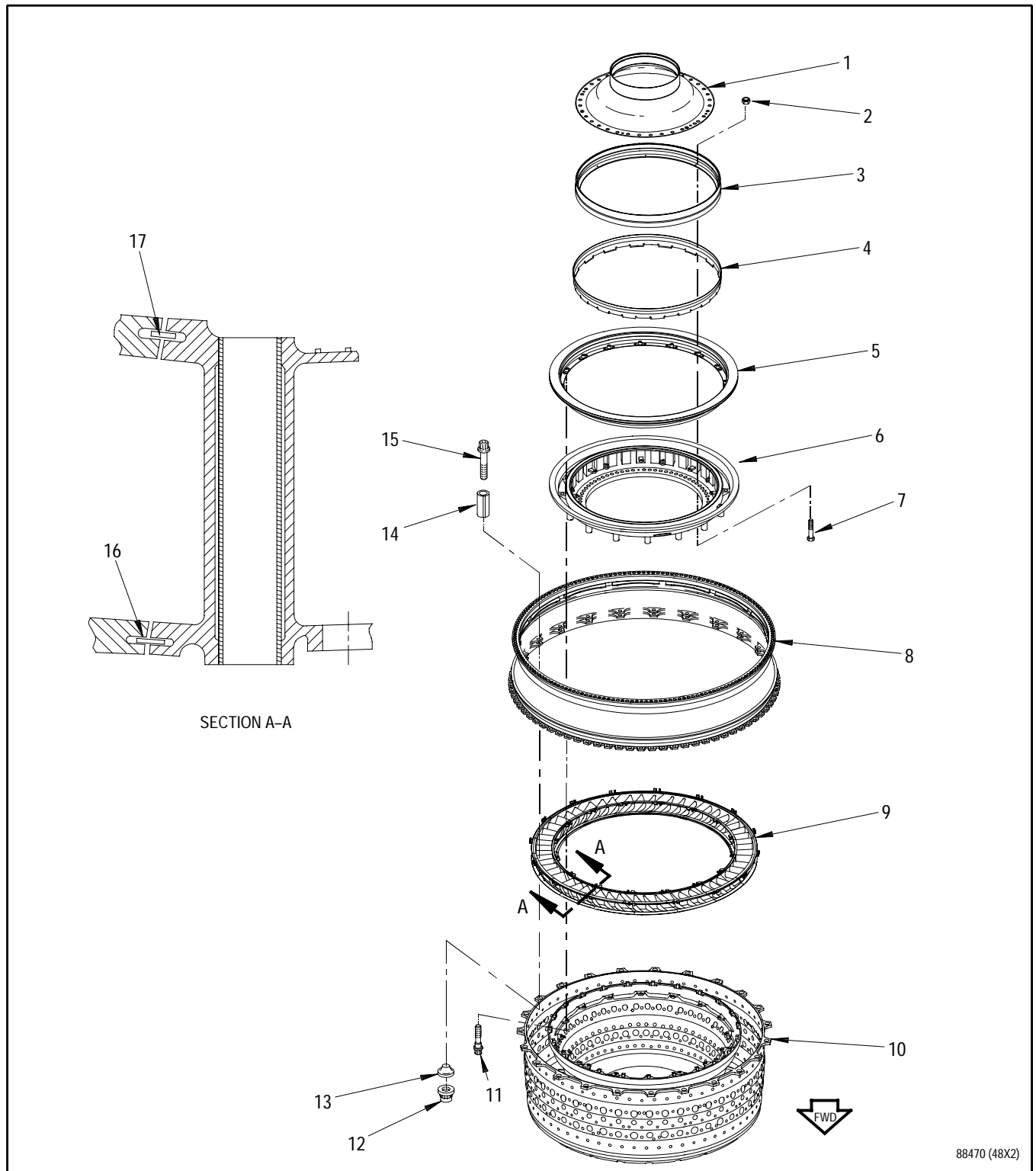


Figure 1. Combustion Chamber, First Stage Stator Vanes and Support, and Front Turbine Case - Installation

3. COMBUSTION CHAMBER ASSEMBLY - LINER SEGMENTS INSTALLATION.

(See Figures 2 through 4.)

- a. If any combustion chamber liner segments(1, figure 2) were removed during disassembly, reinstall with retainers(2) as follows:

NOTE

Some combustion chamber assemblies use reoperated 2nd row ID liner segments. These reoperated liner segments have two of four combustion holes with larger diameters.

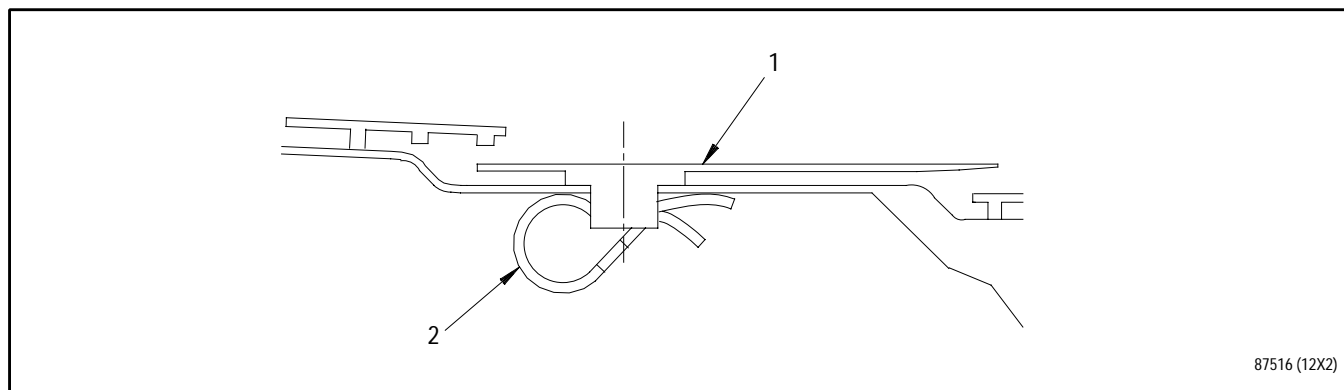
- (1) Install liner segment(1) into position in combustion chamber assembly. For 2nd row ID, install liner segments so that arrows on liner segments align with corresponding arrows on inner liner subassembly. (See figure 3.) Inspect 2nd row ID liner segments for clearance envelope requirements per step (5).



Using excessive force when installing retainers may deform retainers and result in retainer loss during engine operation.

- (2) Install new retainers(2, figure 2) behind inner combustion chamber assembly mount lugs using PWA 57781 adapter. Retainers shall not be installed any further than necessary to engage retainer slot over combustion chamber liner segment post.

- (3) Ensure that retainers installed radially around circumference of combustion chamber are installed in same direction. Retainers installed axially are installed from front to rear.
- (4) Inspect newly installed retainers to ensure that retainer legs engage slot in post and are not bent or spread apart.
- (5) Inspect 2nd row ID liner segments for clearance envelope requirements per figure 4.



1. Combustion chamber liner segment
2. Combustion chamber liner segment retainer

Figure 2. Combustion Chamber Liner Segments - Installation

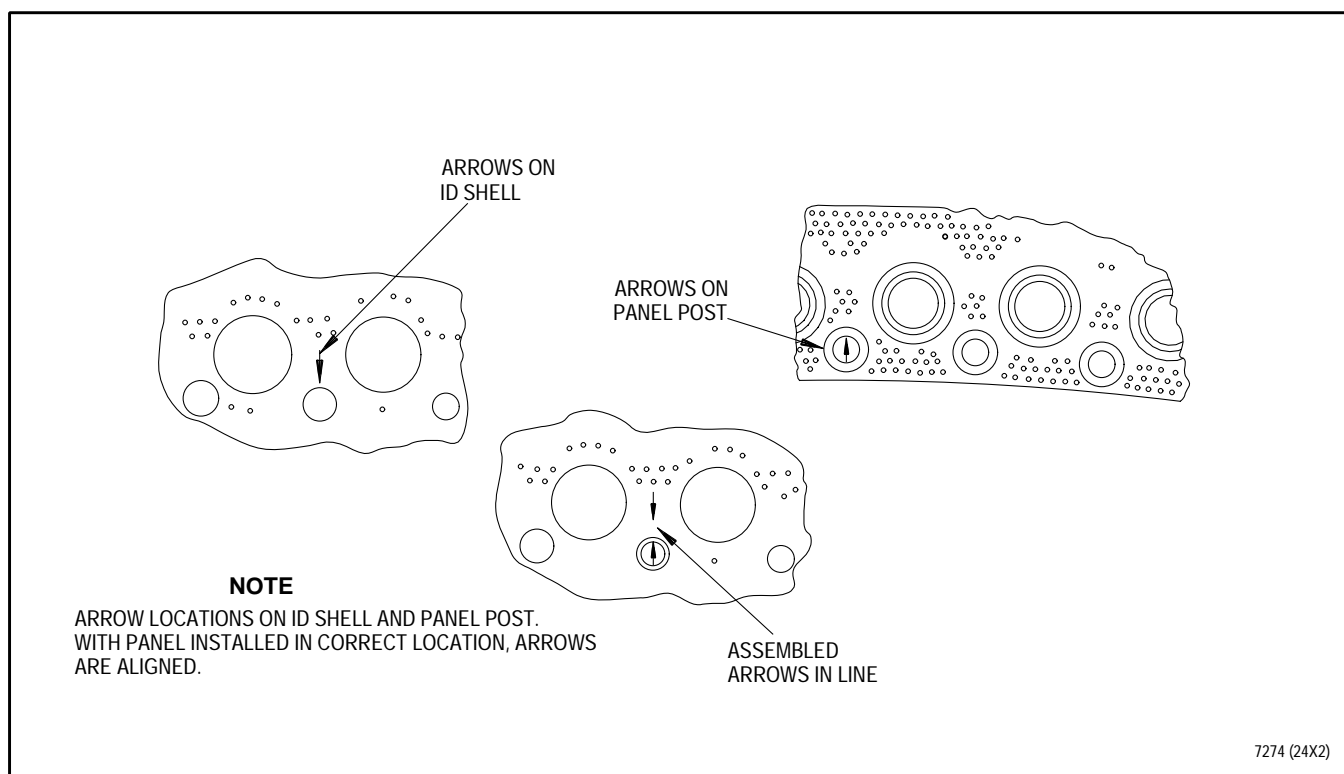


Figure 3. Combustor Chamber Liner Segment Showing Arrow Alignment

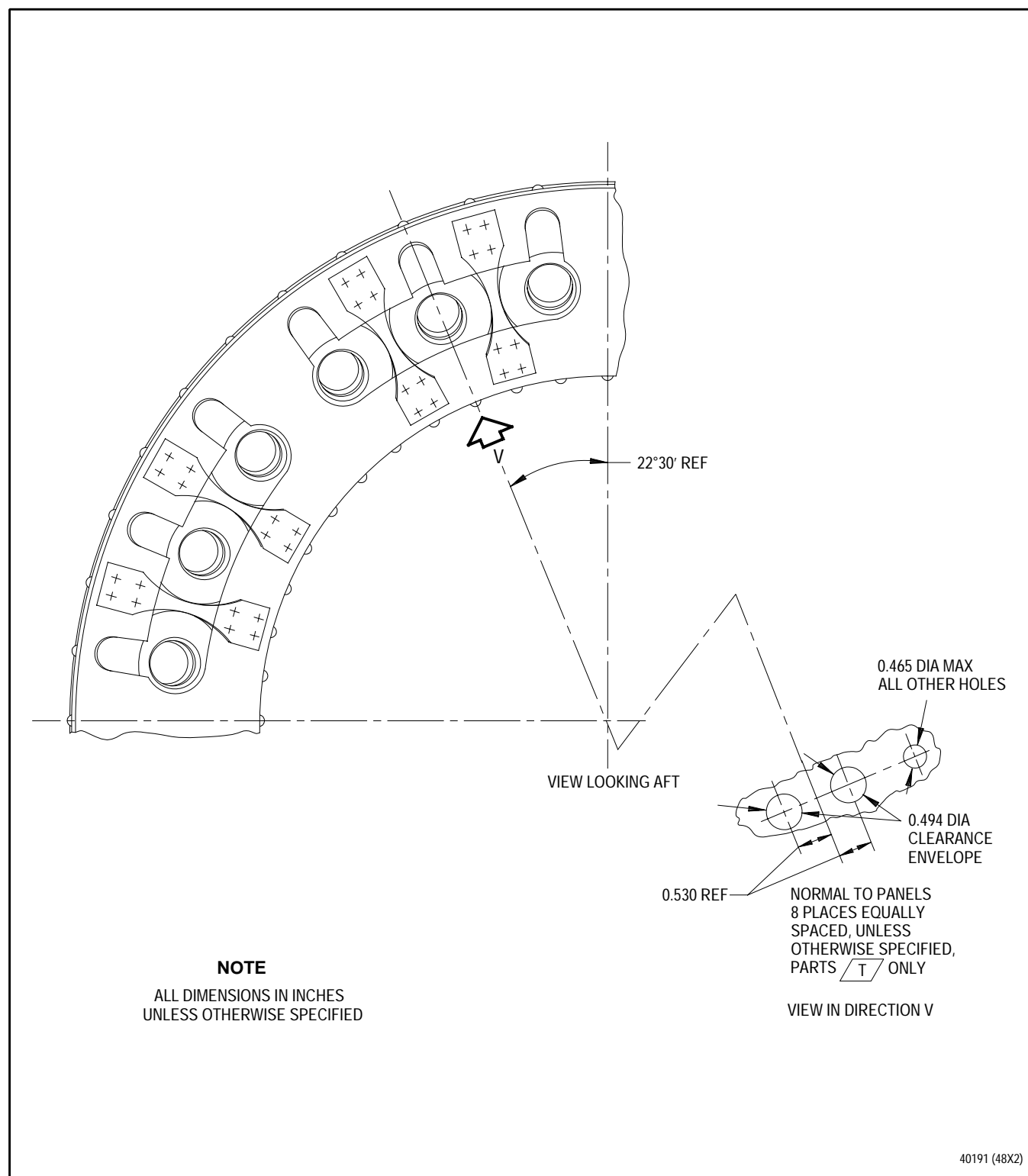


Figure 4. Combustion Chamber Liner Segment - Clearance Envelope Requirement for Second Row Inner Diameter Liner Segments

4. FIRST STAGE TURBINE STATOR SUPPORT, AIR SEALING RING SUPPORT, OUTER AIR SEALING RING, AND INNER AIR SEALING RING - ASSEMBLY

(See Figures 5 through 8.)

a. Install 1st stage turbine air sealing ring support(6, figure 5) in 1st stage turbine stator support(7) using PWA 57830 stand as follows:

- (1) Place stand detail-23 ring(8) on stand base assembly(10).
- (2) Install 1st stage turbine stator support(7), front end down on ring(8).
- (3) Install air sealing ring support(6) aligning cut outs with lugs on 1st stage turbine stator support(7).
- (4) Install LM 1001 spacer(5) on air sealing ring support(6).
- (5) Install detail-96 clamp assembly(4) centered on LM 1001 spacer(5).
- (6) Install detail-118 threaded shaft(9), detail-102 plate(3), stand hydraulic cylinder assembly(2) and detail-9 nut(1).
- (7) Connect PWA 55380 hydraulic hand pump to hydraulic cylinder assembly(2).
- (8) Visually check seating of sealing ring support(6) as pressure is increased. Tap clamp assembly(4) with mallet to level 1st stage turbine air sealing ring support(6) during installation.

(9) Actuate PWA 55380 pump to seat sealing ring support(6). Do not exceed 2,500 psig.

(10) Verify seating of 1st stage air sealing ring support(1, figure 6) at four locations by ensuring aft end of support is flush with 1st stage turbine stator support(2) or within -0.060 to +0.020 inch. See figure 6.

(11) Release hydraulic pressure and remove hydraulic pump.

(12) Remove nut(1, figure 5), hydraulic cylinder assembly(2), plate(3), and threaded shaft(9).

(13) Remove clamp assembly(4) and LM 1001 spacer(5).

NOTE

First stage turbine stator support(7) may have to be separated from ring(8) with jackscrews.

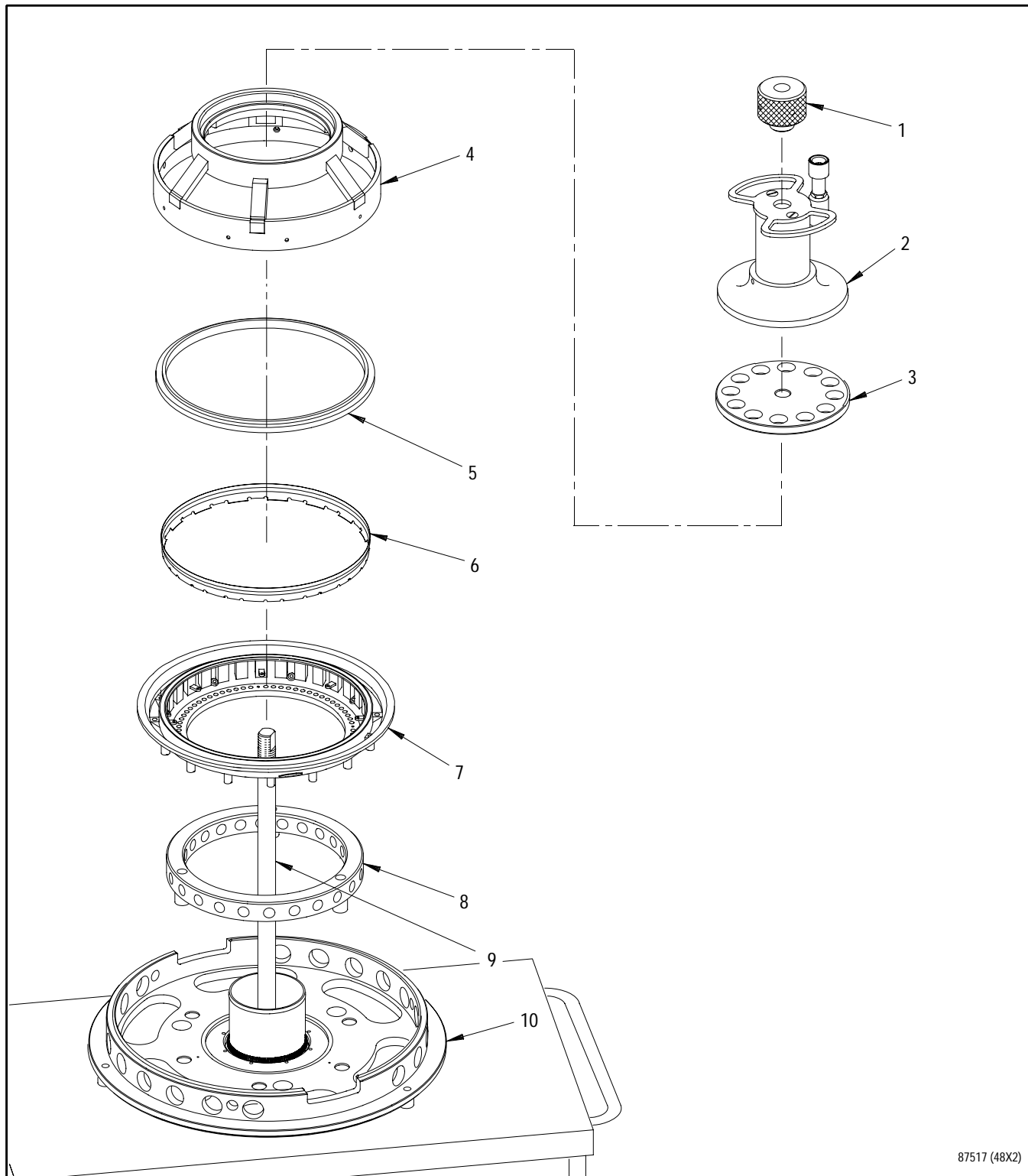
(14) Remove stator support(7) from stand.

b. Install 1st stage turbine air sealing ring(2, figure 7) in 1st stage turbine stator support(5) as follows:

(1) Position 1st stage turbine stator support(5) on bench front end down.

(2) Position 1st stage turbine air sealing ring(2) on 1st stage turbine stator support(5) with holes aligned.

(3) Tap with mallet to seat.



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Figure 5. First Stage Turbine Air Sealing Ring Support - Installation

Legend for figure 5

1. Nut
2. Hydraulic cylinder assembly
3. Plate
4. Clamp assembly
5. LM 1001 spacer
6. 1st stage turbine air sealing ring support
7. 1st stage turbine stator support (TOBI)
8. Ring
9. Threaded shaft
10. Base assembly

- (4) Verify seating of 1st stage turbine air sealing ring(1, figure 8) at four locations by ensuring gap between 1st stage turbine air sealing ring(1) and 1st stage turbine stator support(3) is flush within 0.010 inch. (See figure 8.)
- (5) If gap is beyond allowable limits, air sealing ring(1) is not fully seated. Remove air sealing ring(1) and verify air sealing ring support(2) is seated per step a(10).
- c. Secure 1st stage turbine air sealing ring(2, figure 7) to stator support(5) with eight bolts(6) and self-locking nuts(8) as follows:
 - (1) Install bolts, heads down (forward), through mating flanges of stator support and air sealing ring.
- d. Install 1st stage turbine outer air sealing ring(4) as follows:
 - (1) Mark offset hole using Colorbrite No. 2101 silver pencil or equivalent.
 - (2) Chill outer air sealing ring(4) in freezer for 30 minutes.
 - (3) Position outer air sealing ring(4) on 1st stage turbine stator support(5) with offset holes aligned. Tap with mallet to seat.
 - (4) Allow time for part to return to normal temperature.
 - (5) Secure with four work bolts equally spaced.



Exceeding torque limits can cause bolt cracking or overstress, resulting in bolt fracture and severe engine damage during engine operation.

- (2) Install self-locking nuts on bolts. Torque nuts 48 to 50 pound-inches.

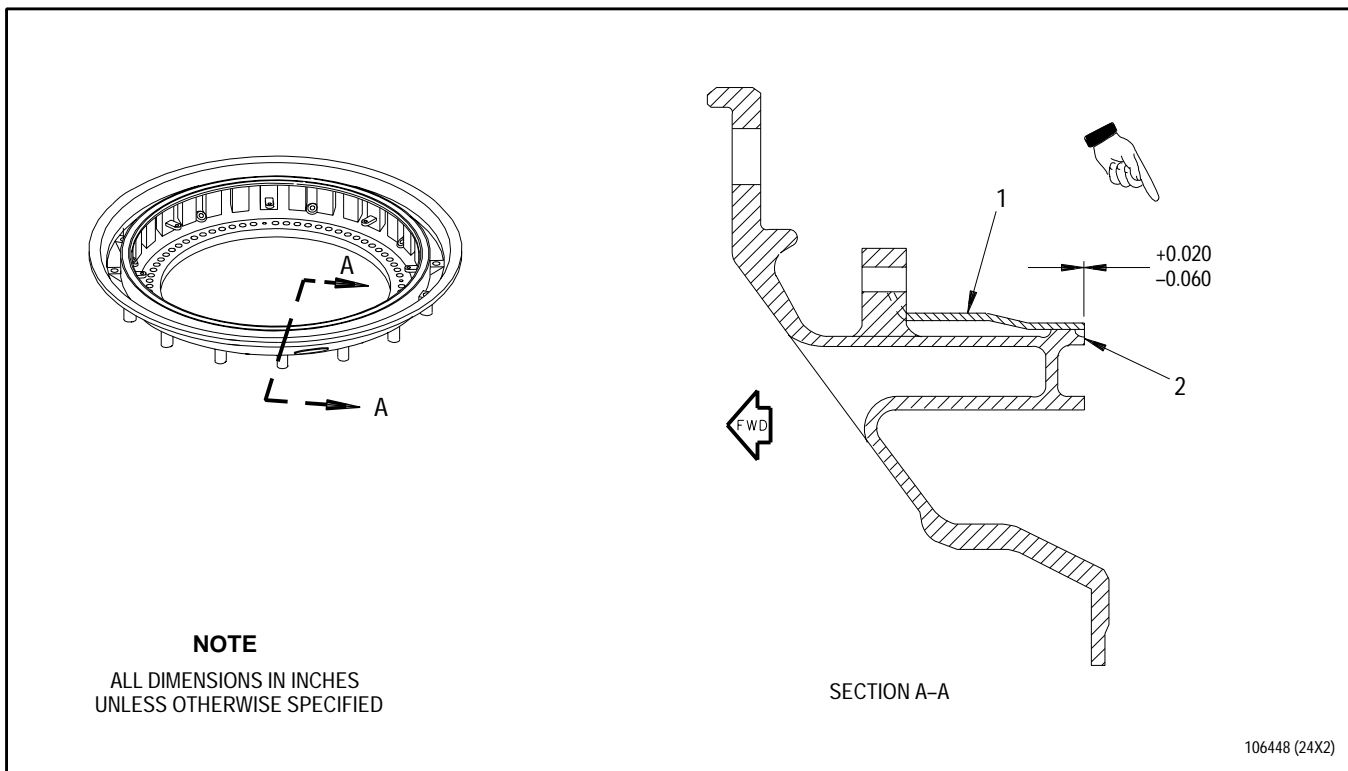
e. Install 1st stage turbine inner air sealing ring(1) as follows:

- (1) Align offset hole in inner air sealing ring(1) and mark with silver pencil prior to chilling.
- (2) Chill inner air sealing ring(1) in freezer for 30 minutes.
- (3) Position inner air sealing ring(1) on 1st stage turbine stator support(5) with offset hole aligned.

(4) Seat inner air sealing ring(1) with four work bolts(7), nuts(9) and washers.

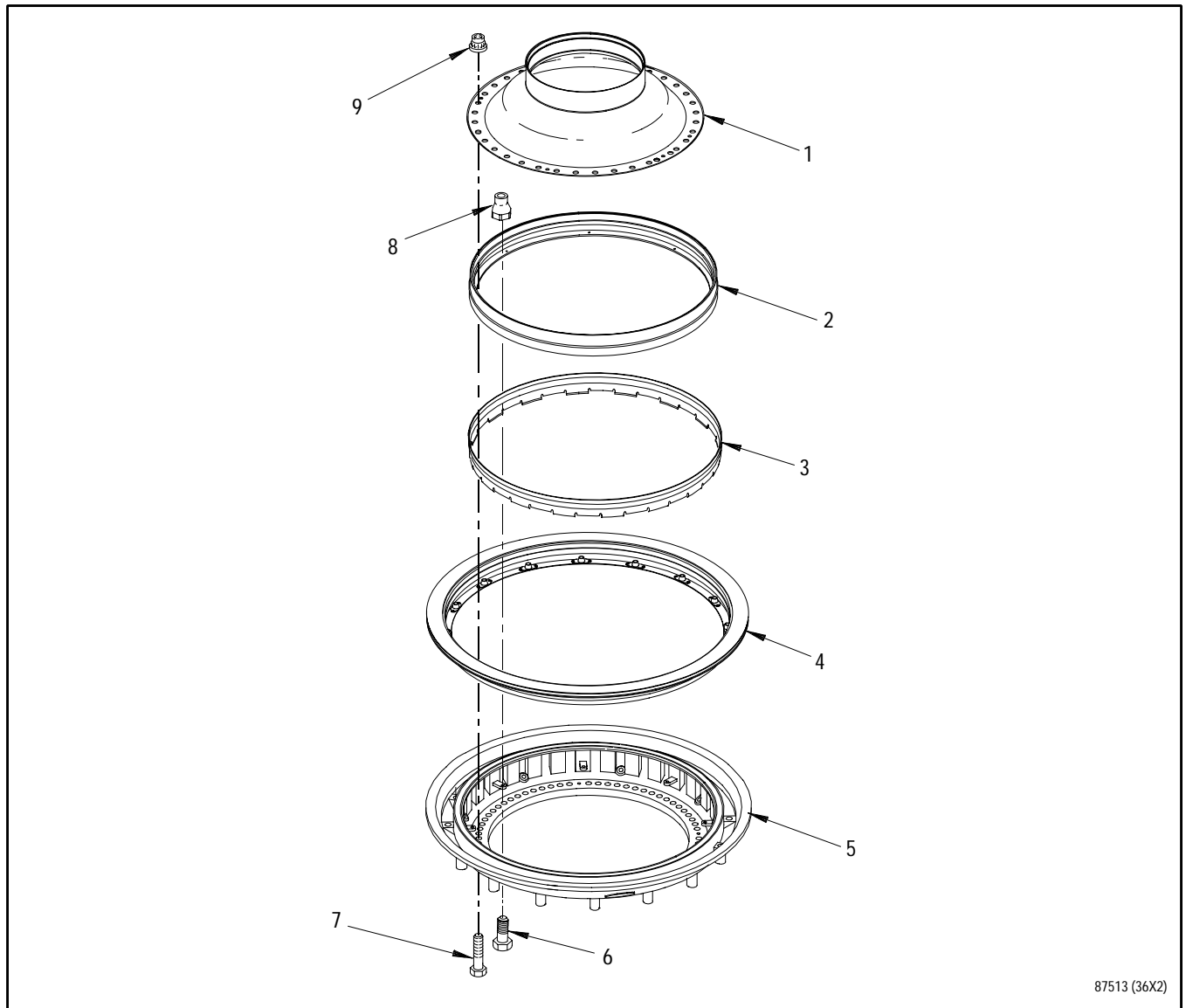
(5) Allow temperatures to normalize.

(6) Remove work bolts, nuts and washers.



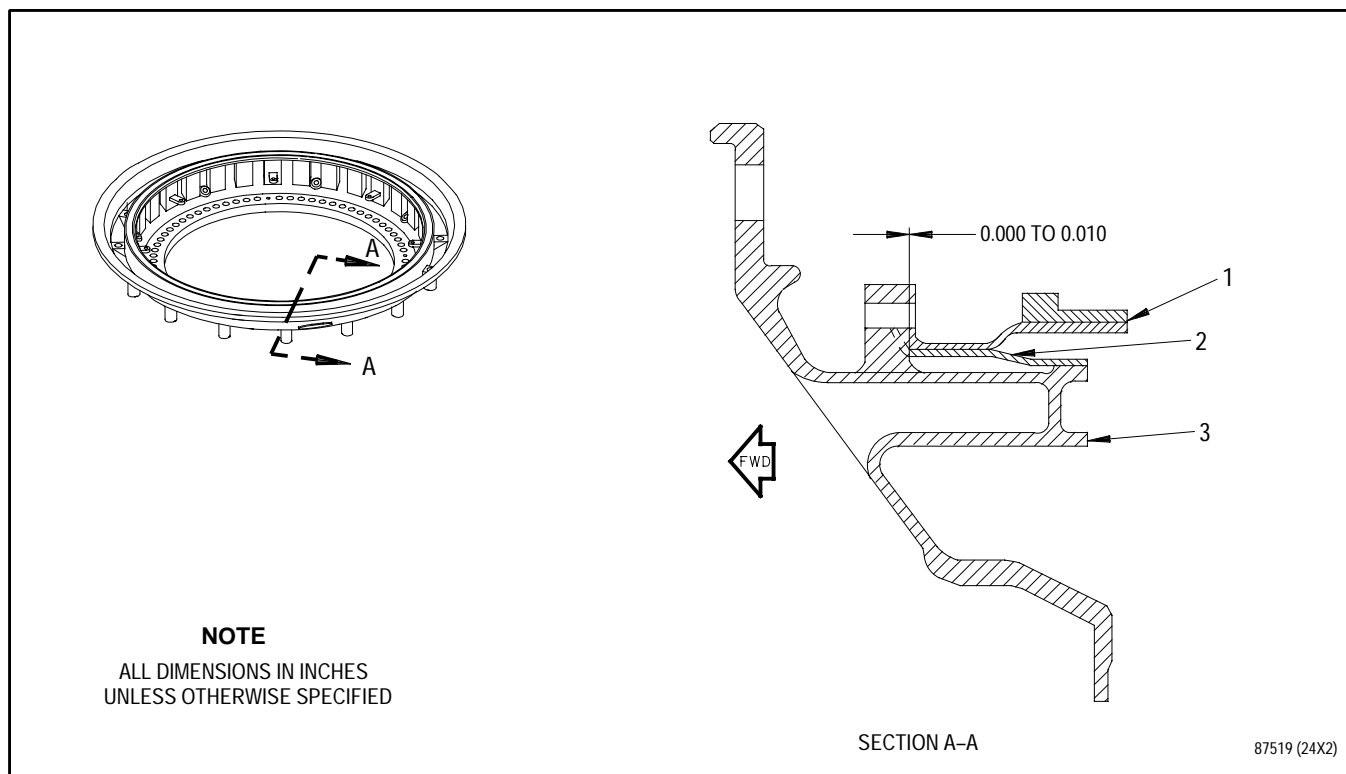
1. 1st stage turbine air sealing ring support
2. 1st stage turbine stator support

Figure 6. First Stage Turbine Air Sealing Ring Support - Seating Check



1. 1st stage turbine inner air sealing ring
2. 1st stage turbine air sealing ring
3. 1st stage turbine air sealing ring support
4. 1st stage turbine outer air sealing ring
5. 1st stage turbine stator support
6. Bolt
7. Work bolt
8. Nut
9. Work nut

Figure 7. First Stage Turbine Stator Support - Assembly



1. 1st stage turbine air sealing ring
2. 1st stage turbine air sealing ring support
3. 1st stage turbine stator support

Figure 8. First Stage Turbine Air Sealing Ring - Seating Check

5. COMBUSTION CHAMBER, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT, AND FRONT TURBINE CASE - ASSEMBLY.

(See figure 7 and Figures 9
through 11.)

- a. Arrange 1st stage turbine stator vanes(5, figure 9) in order on workbench with mount lugs down and smaller (inner) platform toward assembler.

NOTE

First stage turbine stator outer(4) and inner(3) seals are three piece bonded assemblies. Details may separate during handling.

- b. Ensure 1st stage turbine stator outer and inner seals are intact. If any are separated, bond details with PWA 36003-1 adhesive using intact seals as models.
- c. Install 1st stage turbine stator outer seal(4) in left side of outer platform of each stator vane. Secure in place with soft beeswax.



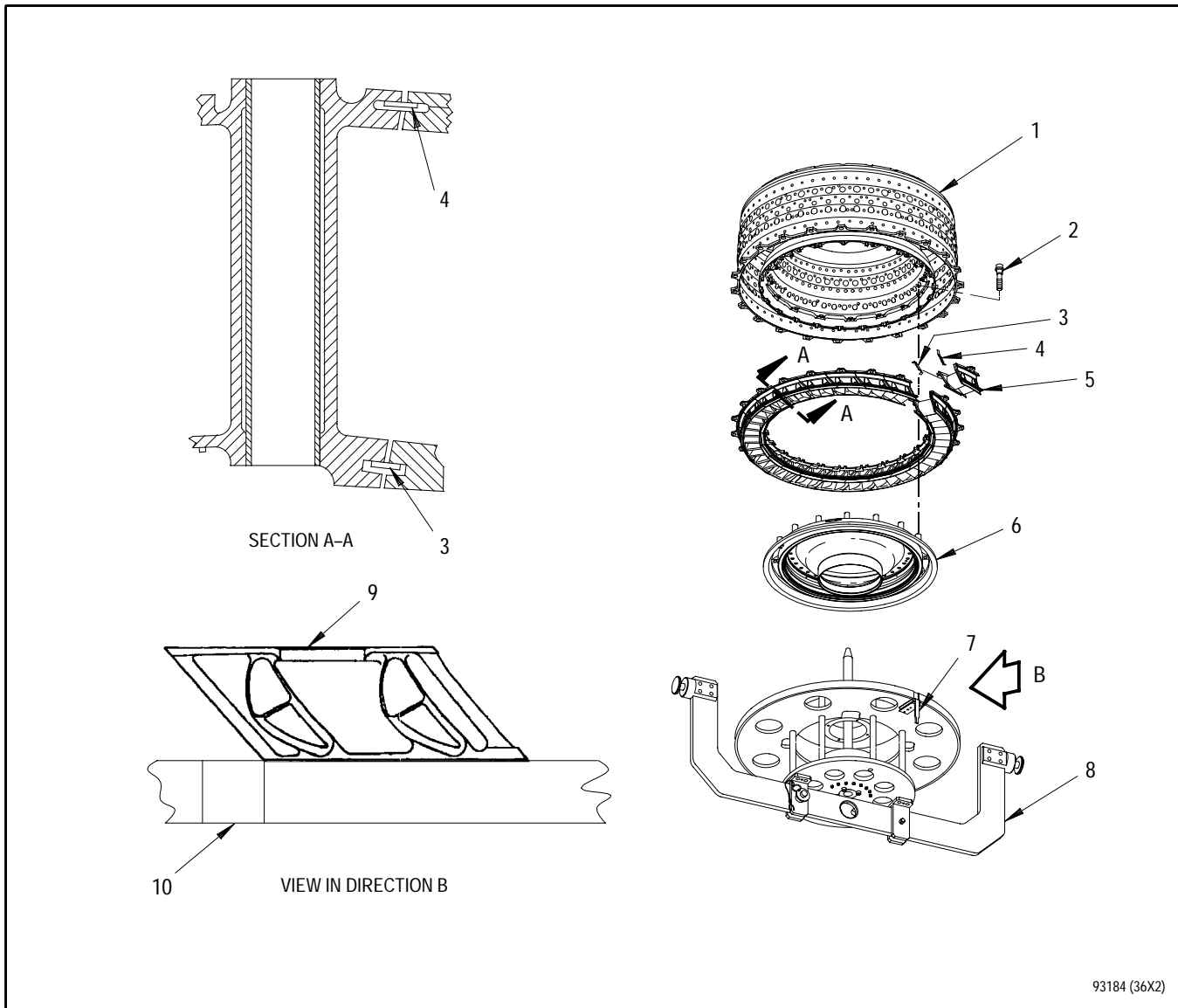
Failure to properly install 1st stage turbine stator inner seal can result in cooling air leakage, resulting in engine damage.

- d. Install 1st stage turbine stator inner seal(3) in left side of inner platform of each stator vane with hole in one end of seal downward toward vane leading edge. Secure in place with soft beeswax.

NOTE

PWA 57506 vane locating detail(7) is not required for this assembly.

- e. Place PWA 57506 guide fixture(8) on bench with center post pointing up. Remove vane locating detail(7) or install on fixture pointing down.
- f. Install 1st stage turbine stator support and air sealing ring assembly(6) on center ring of guide fixture, aligning offset lug of stator support with offset stamped on OD of fixture.
- g. Secure stator support to fixture with four short detail cap screws from bottom.
- h. Install No. 1 1st stage turbine stator vane(5) on OD of turbine stator support and PWA 57506 guide fixture with vane mounting lugs(9) up. Align left edge of vane with right edge of slot(10) where locating detail(7) was removed.
- i. Install remaining vanes in order in counterclockwise direction. Carefully engage inner and outer seals of each vane with slots in platforms of previously installed vane.
- j. Remove work bolts from 1st stage turbine stator support(6).
- k. Install combustion chamber assembly(1) onto stator support(6), aligning offset lug of combustion chamber with offset lug of stator support. Engage ID lugs of combustion chamber exit flange with slots in vane ID mounting lugs. Ensure holes in OD lugs of combustion chamber exit flange align with holes in vane OD mounting lugs.



1. Combustion chamber assembly
2. Bolt
3. 1st stage turbine stator inner seal
4. 1st stage turbine stator outer seal
5. 1st stage turbine stator vanes
6. 1st stage turbine stator support and air sealing ring assembly
7. Vane locating detail
8. PWA 57506 guide fixture
9. Vane mounting lug
10. Vane locating detail slot

Figure 9. Combustion Chamber, First Stage Turbine Stator Vanes and Support - Assembly

- l. Ensure inner(3) and outer(4) seals remain in place between vanes(5).

NOTE

Silver plated and non-silver plated nutplates shall not be intermixed within a set.

- m. Determine type of nutplates installed on 1st stage turbine outer air sealing ring(4, figure 7) as follows:

- (1) New silver plated nutplates can be identified by silver colored threads. Used parts will require part number verification.

- (2) If nutplates are PN ST2596-04, threads are silver plated and shall be used only with PN 4080005 bolts(2, figure 9). Do not apply antigallant or lubricant to bolts.

- (3) If nutplates are PN 4070347, threads are not silver plated and shall be used only with PN 4068912 bolts(2). Lightly coat threads of bolts with PWA 36545 antigalling compound.

- n. Secure combustion chamber(1) to stator support(6) using bolts(2) as follows:

- (1) If nutplates are silver plated, do not use antigallant or lubricant. If nutplates are not silver plated, lightly coat threads of bolts with PWA 36545 antigalling compound.

- (2) Install bolts(2) through combustion chamber lugs into nutplates of stator support and air seal assembly(6).

- (3) Torque bolts per sequence shown in figure 10 as follows:

- (a) If silver plated nutplates and PN 4080005 bolts are used, torque bolts 120 to 130 pound-inches.

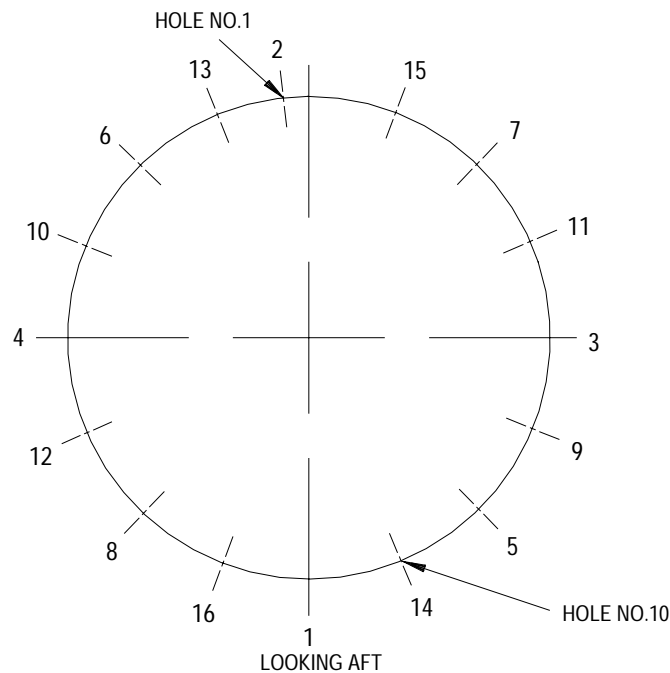
- (b) If non-silver plated nutplates and PN 4068912 bolts are used, torque bolts 62 to 72 pound-inches.

- o. Install combustion chamber, vanes and support assembly(2, figure 11) in PWA 57918 assembly fixture(3) using PWA 57506 guide fixture as follows:

- (1) Attach PWA 26147 adapters to trunnions on PWA 57506 guide fixture(8, figure 9).

- (2) Attach PWA 56336 sling to overhead hoist with PWA 2388 hook. Attach sling to PWA 26147 adapters.

- (3) Raise guide fixture and assembled parts and position above PWA 57918 assembly fixture(3, figure 11).



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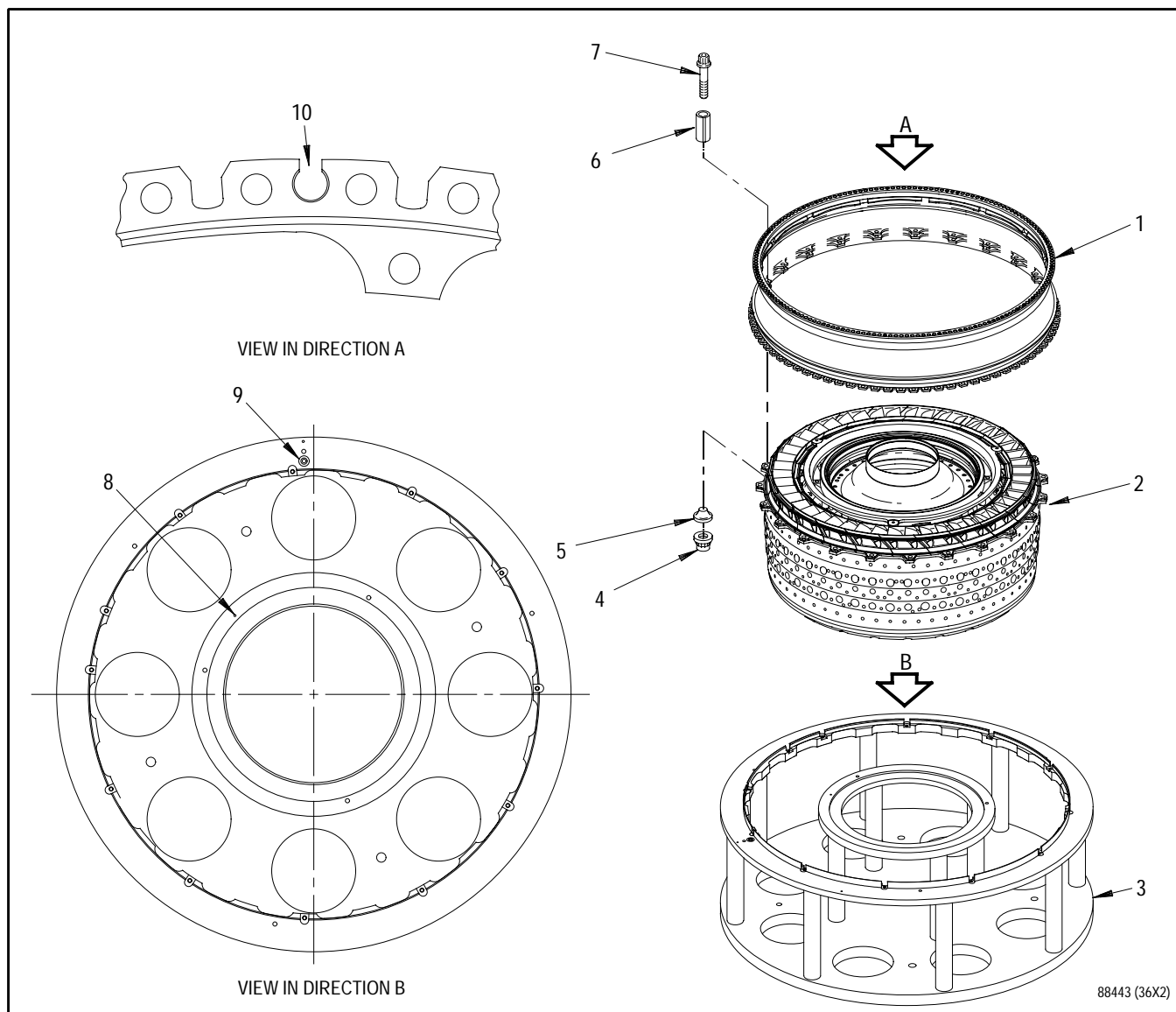
Figure 10. First Stage Turbine Stator Support Assembly - Bolt Torque Sequence

CAUTION

Failure to use care when lowering assembled parts into assembly fixture can result in damage to combustion chamber.

- (4) Lower assembled parts(2) into assembly fixture(3) aligning offset hole in ID flange of turbine stator support with pin(8) on inner flange of fixture at approximately 10 o'clock position.
- (5) Remove four detail cap screws securing guide fixture to turbine stator support. Remove guide fixture.

- p. Locate slotted hole(10) between two boltholes on forward (larger) OD flange of front turbine case(1). Remove pin(9) from OD flange of PWA 57918 fixture at approximately 12 o'clock position.
- q. Carefully lower front turbine case over 1st stage stator vanes with slotted hole(10) on forward flange rotated from pin(9) on PWA 57918 fixture just enough for turbine case ID lugs to clear 1st vane OD lugs. When forward flange of front turbine case contacts fixture flange, rotate front turbine case to align slotted hole on flange with pinhole on fixture. Ensure OD lugs of 1st vanes fit between two lugs on ID of case. Install pin(9) from below flange of fixture to engage slotted hole on front turbine case flange.



1. Front turbine case
2. Combustion chamber, 1st stage turbine stator vanes, and 1st stage turbine stator support
3. PWA 57918 assembly fixture
4. Nut
5. Eccentric sleeve
6. Split sleeve
7. Bolt
8. Alignment pin
9. Alignment pin
10. Slotted hole

Figure 11. Combustion Chamber, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support and Front Turbine Case - Assembly

- r. Install split sleeves(6) on bolts(7). Place one small drop of PWA 36454-2 Permabond 910 adhesive at split line.
- s. Lubricate threads of bolts(7) with MIL-L-7808 lubricating oil.
- t. Install bolts with split sleeves, heads up, through holes of lugs on front turbine case, 1st stage stator vanes, and combustion chamber.
- u. Install eccentric sleeves(5), flat side down, from below on bolts. Rotate sleeve slightly to engage eccentric diameter with slots in OD lugs of combustion chamber. Install nuts(4) fingertight.
- (3) Torque numbers 1, 8 and 16 nuts to 60 pound-inches; then torque all other nuts to 60 pound-inches.
- (4) Torque numbers 1, 8 and 16 nuts to final torque of 85 to 95 pound-inches; then torque all other nuts 85 to 95 pound-inches.
- (5) Recheck torque on all nuts 85 to 95 pound-inches.
- (6) Ensure bolts are not loose and will not rotate. Visually inspect to verify that flanges of eccentric sleeves are seated against flange of combustion chamber lugs.



Failure to ensure eccentric sleeves are properly engaged in slots of combustion chamber prior to torquing nuts can result in hardware damage.

- v. Verify eccentric sleeves are engaged in slots in OD lugs of combustion chamber. Do not use nuts to force them into place.
- w. Torque nuts(4) as follows:
 - (1) If not already numbered from disassembly, number bolt positions one through 23 in clockwise direction from alignment pin(9) location.
 - (2) Torque numbers 1, 8 and 16 nuts to 30 pound-inches; then torque all other nuts to 30 pound-inches.

WP 620 00 Deleted

WORK PACKAGE**TECHNICAL PROCEDURES****CASE AND STATOR ASSEMBLY, REAR
COMPRESSOR FOURTH THROUGH NINTH STAGE -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 60

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	8 - 9	15	20	0
2	25	10	31	21 - 22	29
2A - 2B	31	11 - 12	15	22A	2
3	31	13	31	22B	29
4	28	14	15	22C Added	7
4A	20	14A - 14D	31	22D Blank Added	7
4B	7	15	31	23	7
5	7	16 - 17	15	24	1
6	20	18	31	25	28
6A	28	18A Added	15	26 - 28	29
6B Added	7	18B - 18F	31	29	0
6C	15	18G - 18K Added	31	30 - 32	1
6D	31	19	29	33	0
7	31			34 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
General Repair Procedures - Compound, Antigalling (PWA 36545) Application (SPOP 748) - - - - -	SWP 098 07
General Repair Procedures - Compound, Sealant (PWA 552) Application - - - - -	SWP 098 08
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Blades, Compressor Rotor, Fourth Through Thirteenth Stage and Fourth Through Seventh Stage Blade Locks - Inspection - - - - -	WP 374 00
Blades, Rear Compressor Rotor Assembly, Eighth Through Thirteenth Stage - Replacement - - - - -	WP 630 00
Core Engine Module - Table of Limits and Clearance Charts - - - - -	WP 801 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-509	15 APR 92	O/I	Retrofit of 4th Through 9th Stage Compressor Stator Assembly Featuring Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engines, F15/ F16 Aircraft (ECP 90QA096)
2J-F100229(II)-510	30 AUG 93	O/I	Reoperation of Hardware for Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engines, F15/ F16 Aircraft (ECP 90QA096)
2J-F100229(II)-519	31 DEC 93	O/I	Retrofit of Improved 4th and 5th stage Bushings to Eliminate Back-out, F100-PW-229 Engines, F15/F16 Aircraft (ECP 92QA105)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
ACETONE (PMC 9008)	O-A-51
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
COMPOUND, ANTIGALLING (PWA 550)	HI-T-650 OR LUBRI-BOND HT
COMPOUND, SEALANT (PWA 552)	SERMABOND 481
OIL, LUBRICATING (AERO KROIL)	NSN 9150-00-905-1387
OIL, LUBRICATING	MIL-L-7808
TAPE, MASKING (CLOTH BACKING) (PMC 4001)	F.O.S. 57-2 RED OR TUCK 90-W RED OR 222 OR TB-30-113

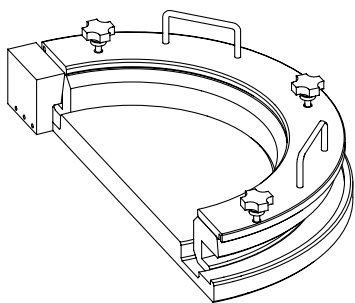
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
BEARING HALF-COMPRESSOR STATOR, 4TH AND 5TH STAGE	4077734	140 (4TH STAGE)
BEARING HALF-COMPRESSOR STATOR, 4TH AND 5TH STAGE	4077734	152 (5TH STAGE)
BEARING OPTION	4075460	33 (4TH STAGE)
BEARING OPTION	4075460	34 (5TH STAGE)
BEARING OPTION	4075460	40 (6TH STAGE)
DAMPING SPRING	4079170	2
DAMPING SPRING	4079171	2
DAMPING SPRING	4079173	2
GASKET	4075429	2
GASKET	4075433	2
KEY WASHER	4075435	4
KEY WASHER	4075436	4
KEY WASHER	4075437	2
KEY WASHER	4075439	20
LOCKING SEAT	4075572	9
LOCKING SEAT	4075574	2
SEAL, COMPRESSOR STATOR, 9TH STAGE	4086310	8
SEAL, COMPRESSOR STATOR	4076385	6
SEAL, COMPRESSOR STATOR	4076386	8
SEAL, COMPRESSOR STATOR	4076387	8
SEAL, COMPRESSOR STATOR	4076388	8
SEAL, COMPRESSOR STATOR	4086309-01	6
SEAL, COMPRESSOR STATOR	4086309-02	8
SEAL, COMPRESSOR STATOR	4086309-03	8

APPLICABLE SUPPORT EQUIPMENT

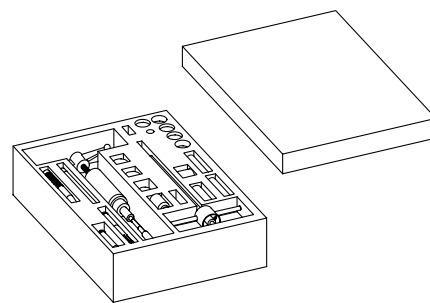
Paragraph	Function - Tool Nomenclature	Tool Number
2	FOURTH, FIFTH, AND SIXTH STAGE VARIABLE VANE OUTER BEARINGS (BUSHINGS) - INSTALLATION USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790	
	PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790
2A	SIXTH STAGE COMPRESSOR STATOR BEARING (BUSHING) - INSTALLATION USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790	
	PUSHER/PULLER, CIVV AND RCVV OUTER BUSHINGS AND AUGMENTOR CONVERGENT SEGMENT BUSHINGS - - - - -	PWA 57790
4	EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING SINGLE DAMPING SPRING AND THREE SHROUDS PER CASE HALF) - ASSEMBLY AND INSTALLATION	
	ASSEMBLY FIXTURE, 9TH STAGE STATORS - - - - -	PWA 57540
5	EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING DAMPING SPRINGS AND SHROUDS OF SAME ARC LENGTH AS SEGMENTS) - ASSEMBLY AND INSTALLATION	
	ASSEMBLY FIXTURE, 9TH STAGE STATORS - - - - -	PWA 57540
5A	SEVENTH, EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING DAMPING SPRINGS AND SHROUDS OF SAME ARC LENGTH AS SEGMENTS) - ASSEMBLY USING PWA 57909 FIXTURE	
	FIXTURE, INSTALLATION, 7TH-9TH STAGE COMPRESSOR STATOR SEGMENT - - - - -	PWA 57909

ILLUSTRATED SUPPORT EQUIPMENT



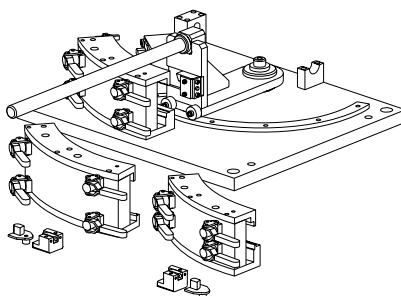
PWA 57540 -C

Figure T1. PWA 57540 ASSEMBLY FIXTURE



PWA 57790 -C

Figure T2. PWA 57790 PUSHER/PULLER



PWA 57909 -C

Figure T3. PWA 57909 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for assembly of upper and lower 4th through 9th stage case and stator assembly.

2. FOURTH, FIFTH, AND SIXTH STAGE VARIABLE VANE OUTER BEARINGS (BUSHINGS) - INSTALLATION USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790.

(See Figures 1, 1A and 1B.)

NOTE

- Use of new bushings(7, 8, or 11, figure 1) is required.
 - The following instructions apply to both upper and lower 4th through 9th stage case.
 - Paragraph 2 applies for 6th stage bearing PN 4074432. Proceed to paragraph 2A for installation of 6th stage bearing PN 4079117.
- a. Position case(10) on table, front flange up.



Do not re-use bushings.

- b. Clean new bushings(7, 8, or 11) and bushing holes in case(10) with acetone.

- c. Install new 4th stage bushings(7), new 5th stage bushings(8) and key washers(9), and new 6th stage bushings(11) and key washers(12) using PWA 57782 pusher/puller(5) as follows:



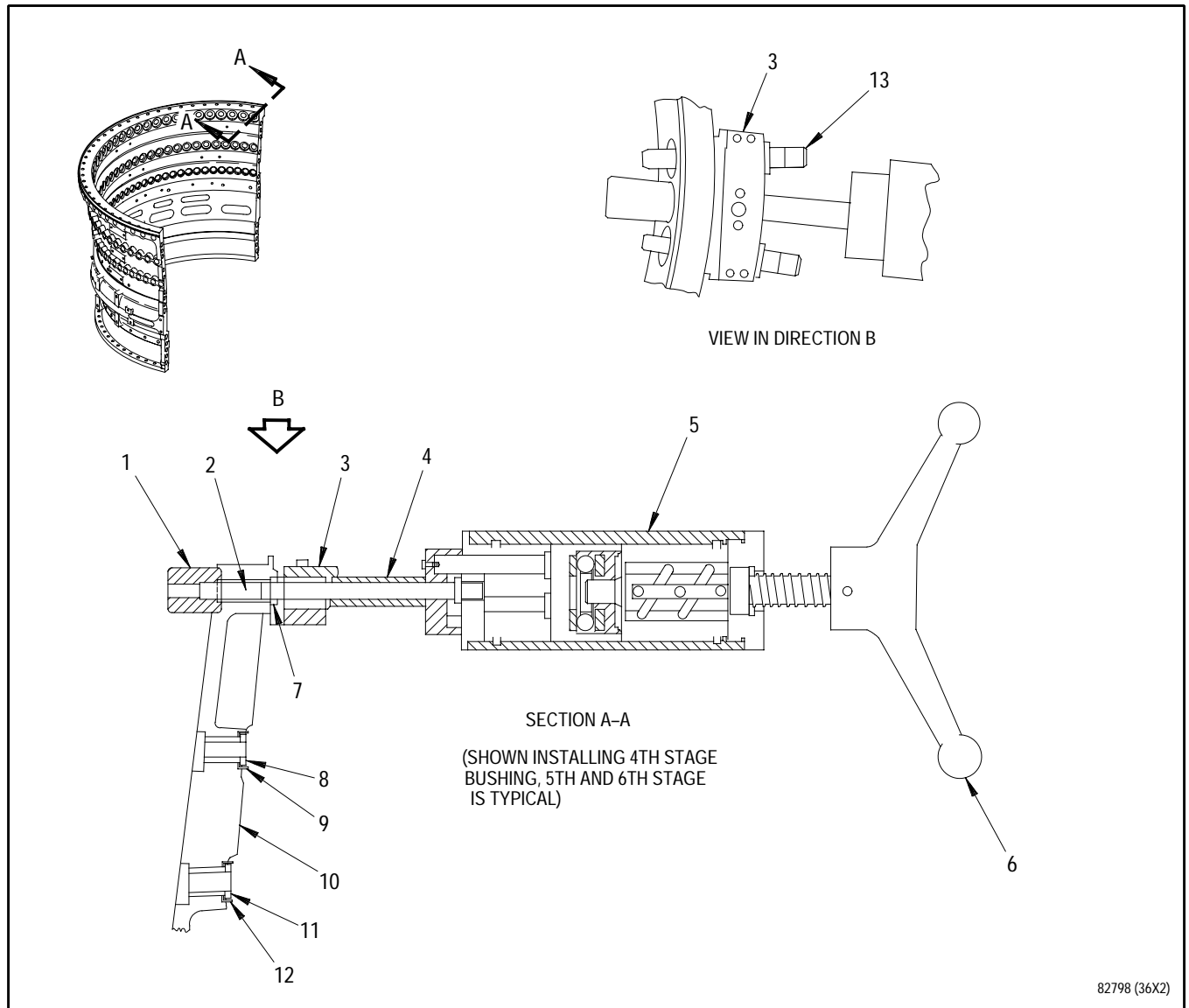
Applying excessive force to extend detail-11 guide post(2) past hard stop will damage tool.

- (1) Rotate detail-19 speed handle(6) counterclockwise to extend detail-11 guide post(2) to full length.

NOTE

Detail-31 guide block is used for 5th stage, detail-33 guide block is used for 6th stage.

- (2) For 5th and 6th stage, attach key washer(9 or 12) to guide block(3) using one detail clip of guide block. Load the opposite detail clip outboard.



1. Locating knob
2. Guide post
3. Guide block
4. Pusher sleeve
5. PWA 57782 pusher/puller
6. Speed handle
7. 4th stage bushing
8. 5th stage bushing
9. Key washer
10. Case
11. 6th stage bushing
12. Key washer
13. Alignment pin

Figure 1. Fourth, Fifth, and Sixth Stage Variable Vane Outer Bearings (Bushings) - Installation Using PWA 57782 Pusher/Puller, Detail of PWA 57790

NOTE

- Detail-27 guide block is used for fourth stage, detail-31 guide block is used for fifth stage, and detail-33 guide block is used for sixth stage.
 - Detail-25 alignment pin is used if a bushing is not in hole in case, detail-30 alignment pin is used if a bushing is in hole in case.
- (3) For PN 4071383, PN 4074428, and PN 4074432 bushings, apply a thin, even coat of PWA 552 sealing compound

(ceramic glue) to ID of bushing hole in case(10) and fill recessed area on OD of bushing(7, 8, or 11). Refer to T.O. 2J-F100-53-1, SWP 098 08.

- (31) Treat PN 4081053-01 4th stage and PN 4081054-01 5th stage bushings with PWA 474 antigalling compound as shown in figure 1B.
- (4) Position guide block(3), marked side up, on case(10) and install alignment pins(13).

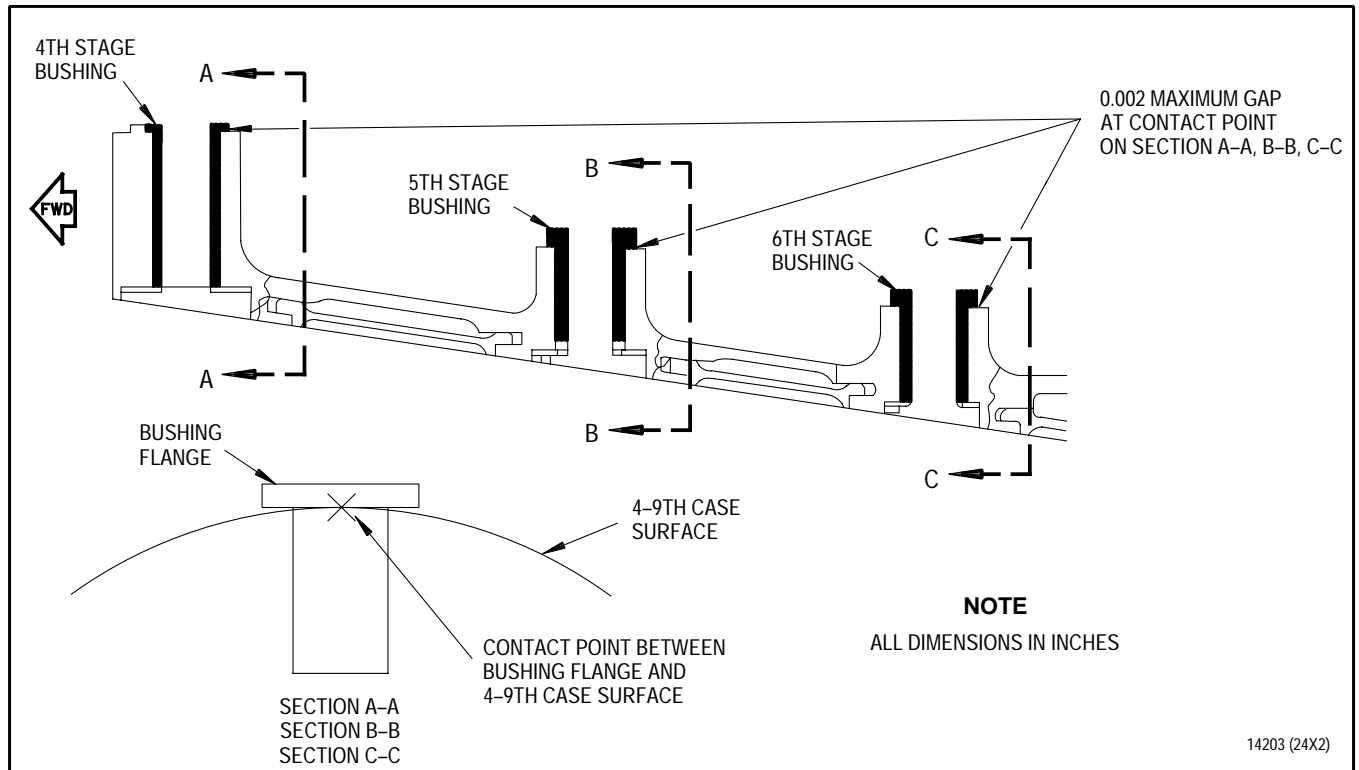


Figure 1A. Variable Vane Outer Bearings (Bushings) - Seating Inspection

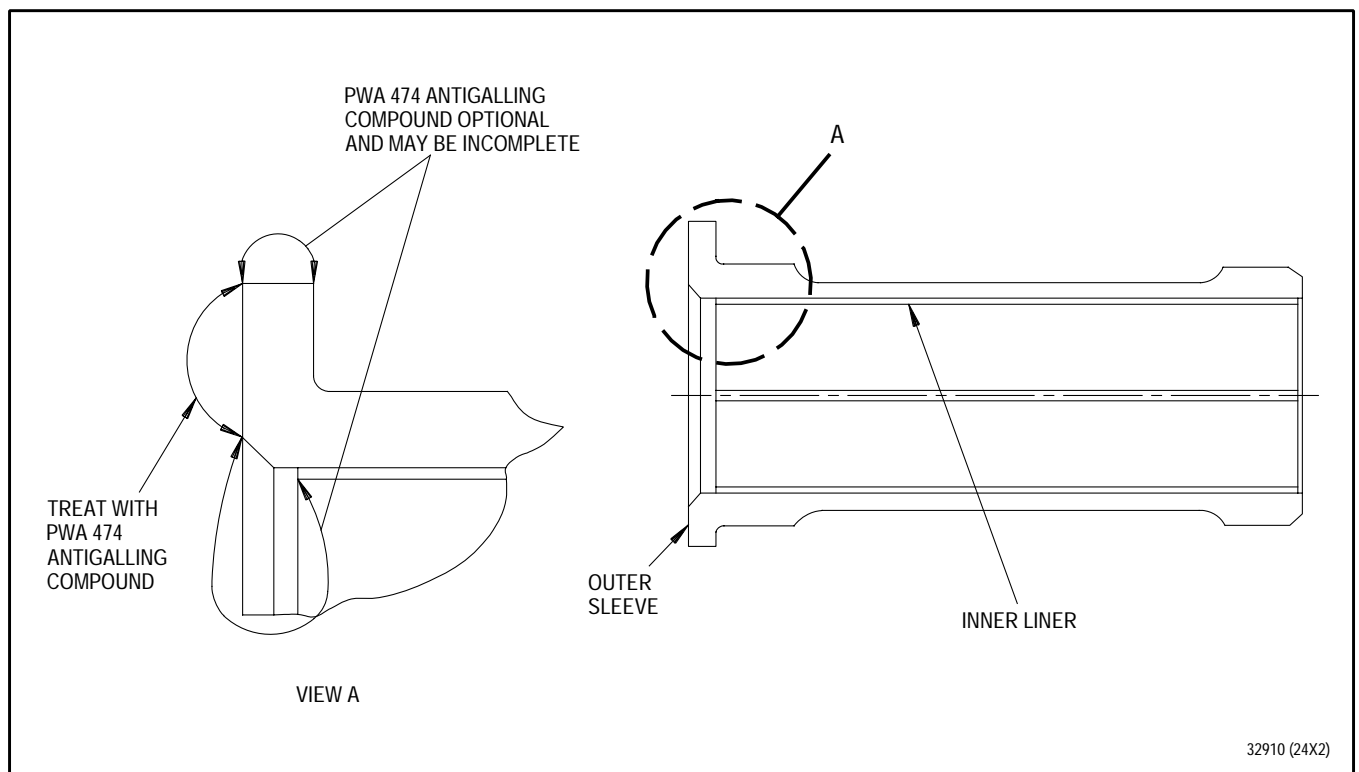


Figure 1B. Fourth Stage (PN 4081053-01) and Fifth Stage Bushings (PN 4081054-01) - Antigalling Compound Application

- (5) Install detail-21 pusher sleeve(4) on detail-11 guide post(2).
- (6) Install 4th stage bushing(7) on detail-11 guide post(2) flat surface up. Install 5th stage bushing(8) or 6th stage bushing(11) in guide block(3), flat surface down.
- (7) Install detail-11 guide post(2) through guide block and hole in case.

NOTE

Detail-22 locating knob is used for 4th stage, detail-23 locating knob is used for 5th stage, and detail-24 locating knob is used for 6th stage.

- (8) Thread locating knob(1) onto detail-11 guide post(2).
- (81) For PN 4081053-01 4th stage bushing and PN 4081054-01 5th stage bushing rotate detail-19 speed handle(6) clockwise to seat bushing.
- (9) For PN 4071383, 4074428 and 4074432 bushings, proceed as follows:
 - (a) Rotate detail-19 speed handle(6) clockwise to push bushing(7, 8 or 11) into case(10). Do not seat bushing in case, push in just past recessed area of bushing.

- (b) For PN 4071383, 4074428 and 4074432 bushings, wipe excess sealing compound from under flange of bushing.

- (c) Rotate detail-19 speed handle(6) to seat bushing.

- (10) Remove tooling.

- (11) Wipe excess sealing compound from under flange of bushing.

- (12) Reinstall tooling. Guide block is not required to seat bushing.

- (13) Rotate detail-19 speed handle(6) to seat bushing.

- d. Remove PWA 57782 pusher/puller(5).
- e. Ensure bushings are seated using 0.002 inch feeler stock. See figure 1A.
- f. For ceramic glued bushings, clean any excess sealing compound from guide block(3, figure 1).
- g. For ceramic glued bushings, cure sealant as follows:
 - (1) Air dry for 2 hours minimum.
 - (2) Heat to 125° to 175°F (52° to 79°C) and hold for 3 hours.
 - (3) Heat to 475° to 525°F (246° to 274°C) and hold for 1 hour.
 - (4) Allow to air cool.

2A. SIXTH STAGE COMPRESSOR STATOR BEARING (BUSHING) - INSTALLATION USING PWA 57782 PUSHER/PULLER, DETAIL OF PWA 57790.

(See Figure 1C and 1D.)

NOTE

- Use of new bushings(8, figure 1C) is required.
- Following instructions apply to both upper and lower 4th through 9th case.
- Fourth through 9th stage compressor case set, PN 4080545-01 does not have 6th stage bumpers.
- Paragraph 2A applies for 6th stage bearing PN 4079117.
 - a. Position case(7) on table, front flange up.



Do not re-use bushings.

- b. Clean new 6th stage bushings(8) with PWA 116-2 and bushing holes in case(7) with acetone.
- c. Install new 6th stage bushings(8) and key washers(9) using PWA 57782 pusher/puller(5) as follows:
 - (1) Rotate detail-19 speed handle(6) counterclockwise to extend detail-11 guide post(2) to full length.

NOTE

Detail-33 guide block is used for 6th stage.

- (2) Attach key washer(9) to guide block(3) using one detail clip of guide block. Load the opposite detail clip inboard.

NOTE

Detail-25 alignment pin is used if a bushing is not in hole in case. Detail-30 alignment pin is used if a bushing is in hole in case.

- (3) Position guide block(3), marked side up, on case(10) and install alignment pins(10).
- (4) Apply PWA 36545-3 antigalling compound to ID of bearing. Refer to T.O. 2J-F100-53-1, SWP 098 07.
- (5) Install new 6th stage bushing(8) in guide block(3), flat surface down. Align cutout in detail-21 with tangs on bushing.
- (6) Install detail-21 pusher sleeve(4) on detail-11 guide post(2).
- (7) Install detail-11 guide post(2) through bushing in guide block and case.

NOTE

Detail-24 locating knob is used for 6th stage.

- (8) Thread locating knob(1) onto detail-11 guide post(2).
- (9) Rotate detail-19 speed handle(6) clockwise to seat bushing(8) into case(7).

(10) Remove PWA 57782 pusher/
puller (5).

(11) Ensure bushings are seated
using 0.002 inch feeler
stock. (See figure 1D.)

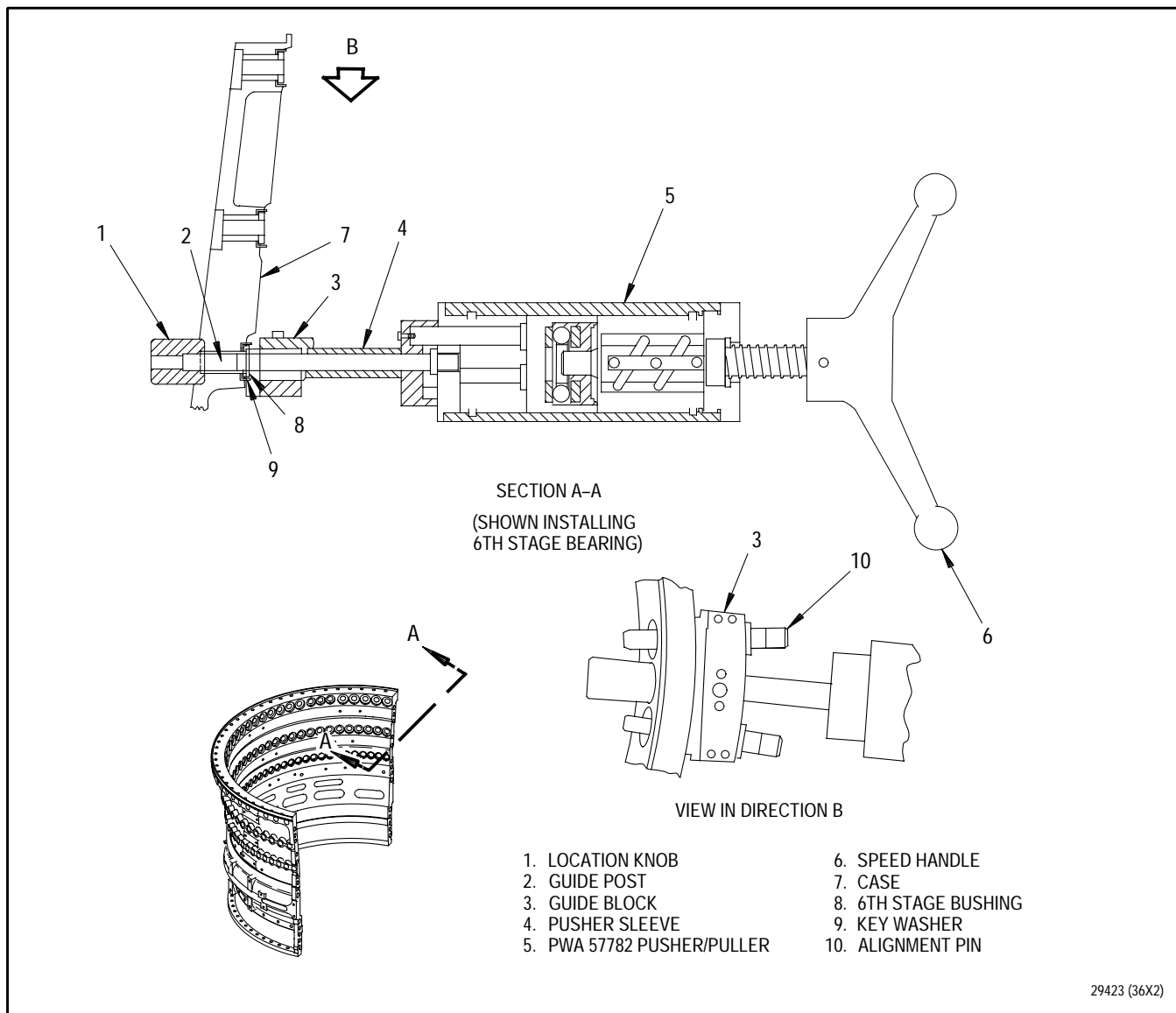
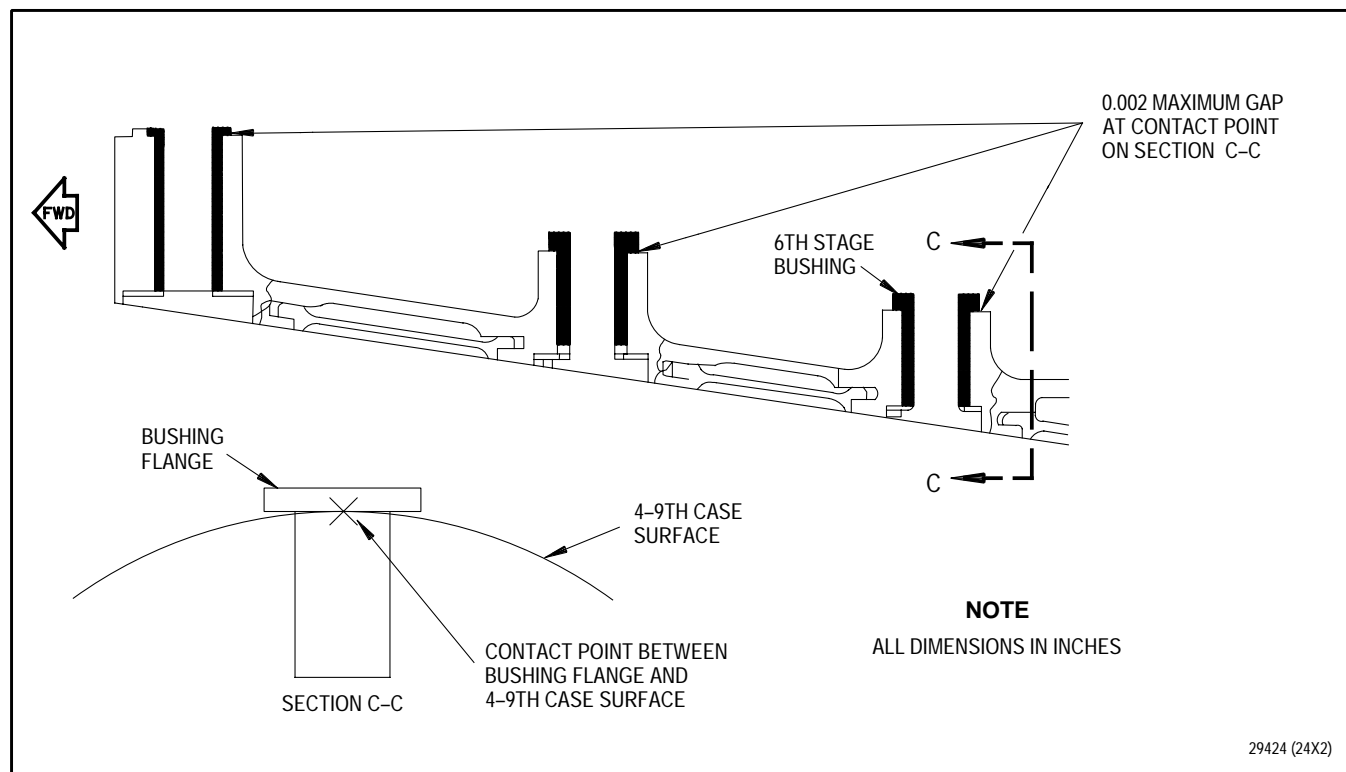


Figure 1C. Sixth Stage Compressor Stator Bearing (Bushing) - Installation Using PWA 57782 Pusher/Puller, Detail of PWA 57790

**Figure 1D. Variable Vane Bushing - Seating Check**

3. SEVENTH STAGE STATOR AND DUCT SEGMENTS - INSTALLATION.

(See Figures 2, 2A, and 3.)

NOTE

Following instructions apply to both upper and lower 4th through 9th stage case and stator assembly.

- a. Place case on bench rear flange down.
- b. Install 7th and 8th stage gaskets(2 and 4, figure 2) into grooves in case with ends of gaskets equally spaced from edges of case.
- c. Apply PWA 36545 antigalling compound to threads and washer face of 12 bolts(12, sheet 3). Refer to T.O. 2J-F100-53-1, SWP 098 07. Burnish antigalling compound on threads with a brass brush.



- Failure to replace segments with like part number and dash number can result in downstream blade damage.
- Reuse of seals may result in leakage.
- Reuse of damper springs is not allowed.

NOTE

- Damper springs between shroud and stator segments must be new.
- There are two seal configurations used between stator segments, formed thin sheet metal type or solid dogbone shape type. Seals must be new.

- There are two configurations 7th stage stator segment assemblies. One incorporates single damping spring and three shrouds per case half installed per step d. The other incorporates damping springs and shrouds of same arc length as segments assembled and installed per step e.
- Seventh stage stator segments require installation in specific locations. See figure 2A.
- d. Install 7th stage stator segments(3, figure 2, sheet 1) incorporating single new damping spring and three shrouds per case half as follows:
 - (1) Install a -01 7th stage stator segment in right side of case by inserting trailing foot of stator segment into groove in case.
 - (2) Loosely install a 7th stage rail(1) in case and secure with key washers(13 and 14, sheet 3) and three bolts(12).

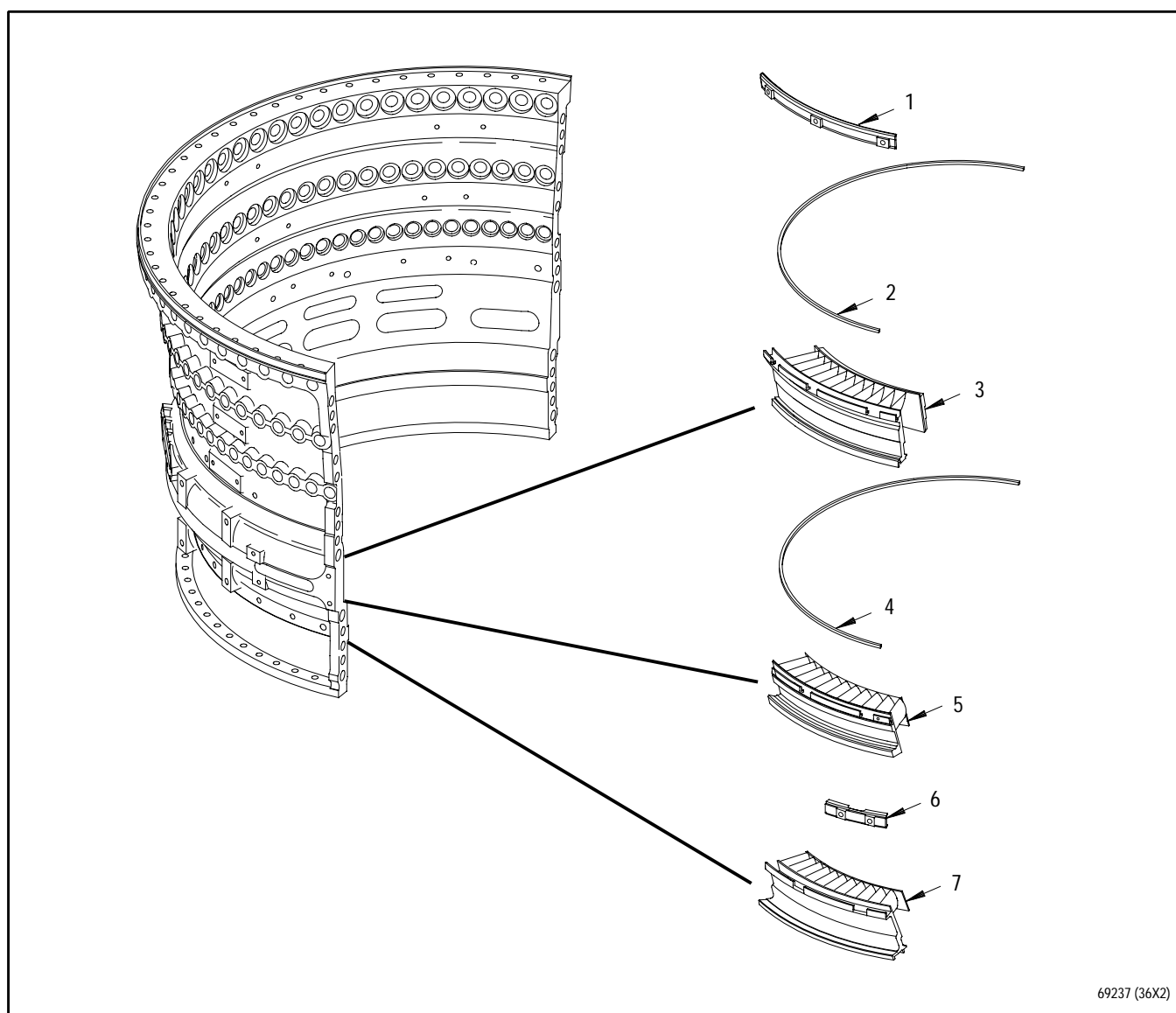
NOTE

- Stator segment -04 in lower case half incorporates borescope port hole.
- Seals are installed between stator segments but not at axial flange where case halves mate.

stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard. Ensure hole in stator segment aligns with borescope port hole in lower case half.

- (3) Install a -02 stator segment(3, sheet 1) (in upper case half) or a -04 stator segment(3) (in lower case half) with a new seal(8, sheet 2) between

- (4) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(17, sheet 3) and three bolts(12).



69237 (36X2)

Figure 2. Seventh, Eighth, And Ninth Stage Stators - Installation (Sheet 1 of 4)

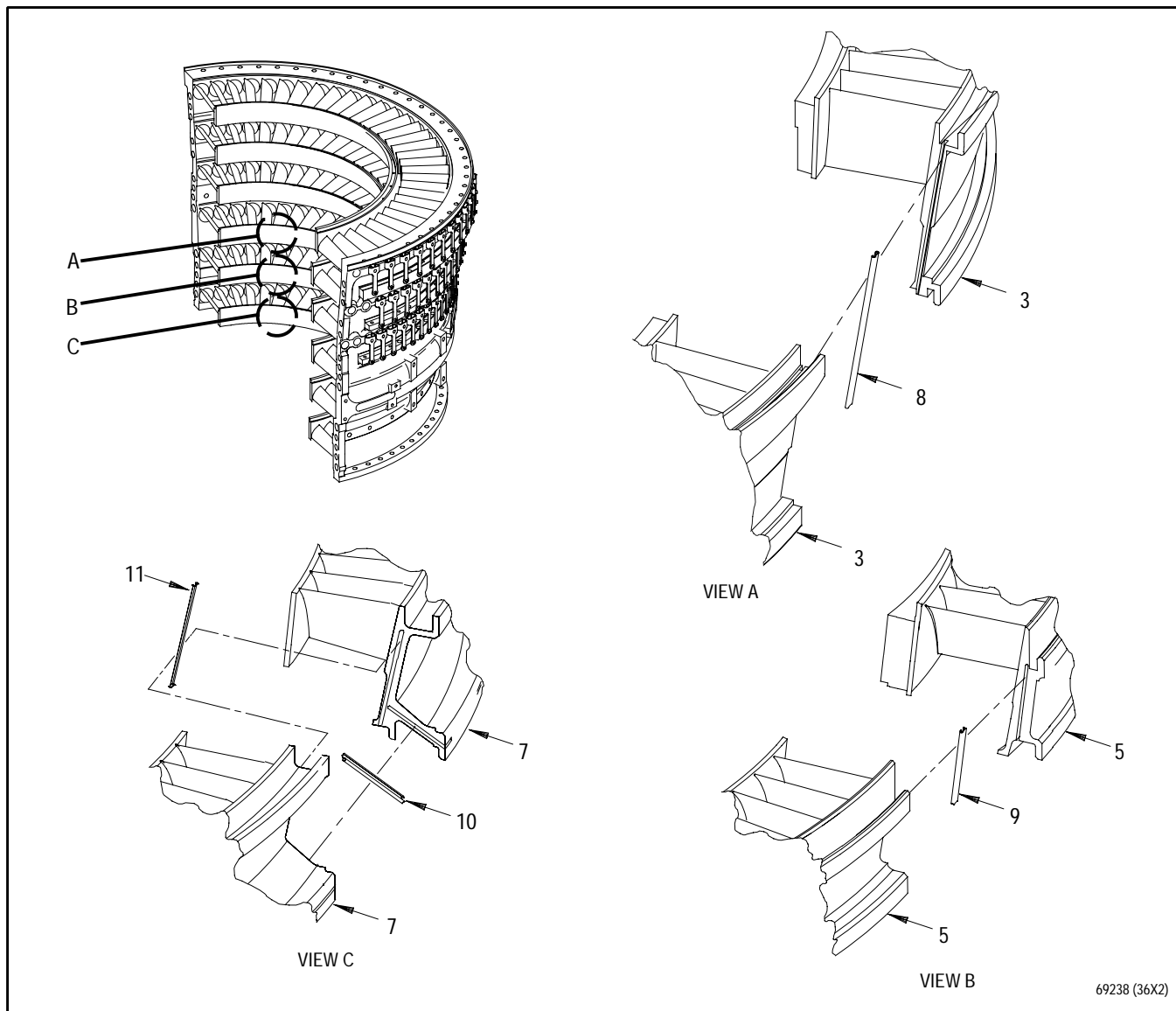
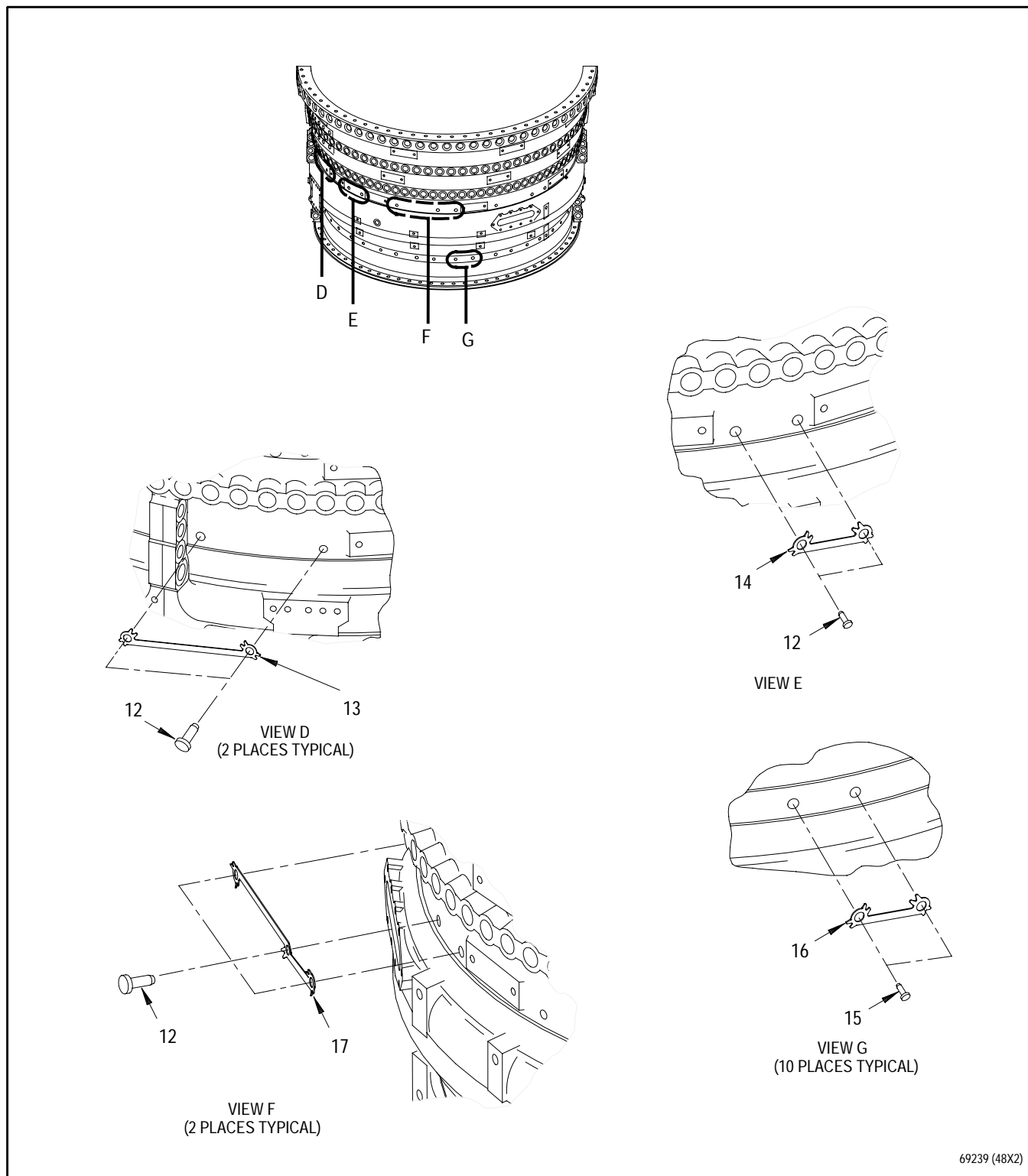
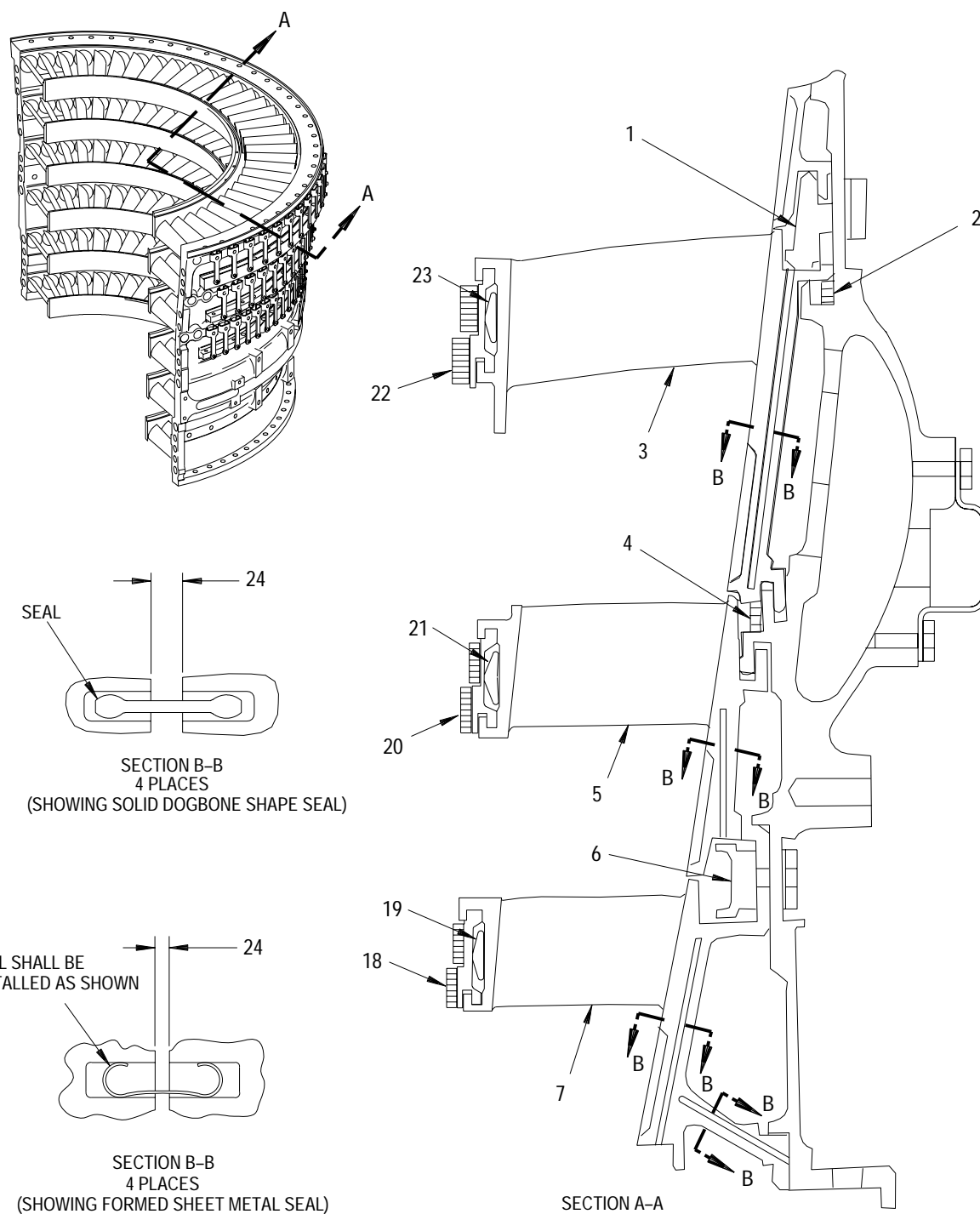


Figure 2. Seventh, Eighth, And Ninth Stage Stators - Installation (Sheet 2 of 4)





110406 (48X2)

Figure 2. Seventh, Eighth, And Ninth Stage Stators - Installation (Sheet 4 of 4)

Legend for figure 2

1. Seventh stage rail
2. Gasket
3. Seventh stage stator segment
4. Gasket
5. Eighth stage stator segment
6. Eighth/ninth stage rail
7. Ninth stage stator segment
8. Seal
9. Seal
10. Seal
11. Seal
12. Bolt
13. Key washer
14. Key washer
15. Bolt
16. Key washer
17. Key washer
18. Ninth stage shroud
19. Ninth stage damping spring
20. Eighth stage shroud
21. Eighth stage damping spring
22. Seventh stage shroud
23. Seventh stage damping spring
24. 0.072 inch maximum
(See WP 801 00, Ref. No. 3366)

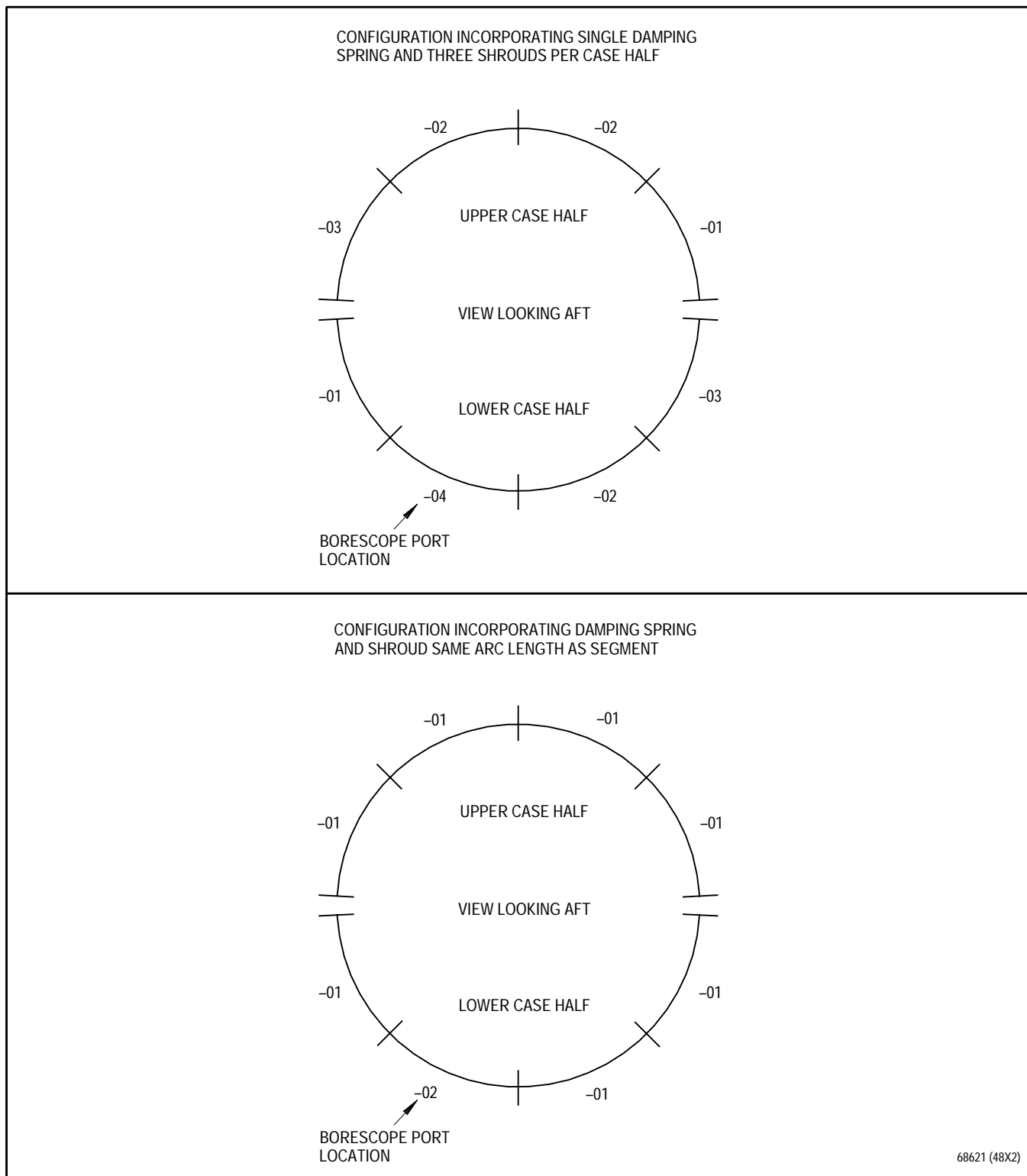


Figure 2A. Seventh Stage Stator Segment - Locations

(5) Apply MIL-L-7808 lubricating oil to mating surfaces of 7th stage shroud(22, sheet 4), 7th stage damping spring(23), and stator segments(3).

(6) Position damping spring(23) in slot in ID of stator segments(3) and using nonmetallic or brass drift and mallet, tap a shroud(22) from left to right into slot in stator segments.

NOTE

If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.

(7) Install a 7th stage duct segment(5, figure 3) by sliding into case from right side.

(8) Install a -02 stator segment(3, figure 2, sheet 2) with a seal(8) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.

(9) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(17, sheet 3) and three bolts(12).

(10) Apply MIL-L-7808 lubricating oil to mating surfaces of shroud(22, sheet 4), damping spring(23) and stator segments(3).

(11) Using nonmetallic or brass drift and mallet, tap a shroud(22) from left to right into slot in stator segments.

(12) Install a 7th stage duct segment(5, figure 3) by sliding into case from left side.

(13) Install a -03 stator segment(3, figure 2, sheet 2) with a seal(8) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.

(14) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(13, sheet 3) and three bolts(12).

(15) Apply MIL-L-7808 lubricating oil to mating surfaces of shroud(22, sheet 4), damping spring(23) and stator segments(3).

(16) Using nonmetallic or brass drift and mallet, tap a shroud(22) from left to right into slot in stator segments.

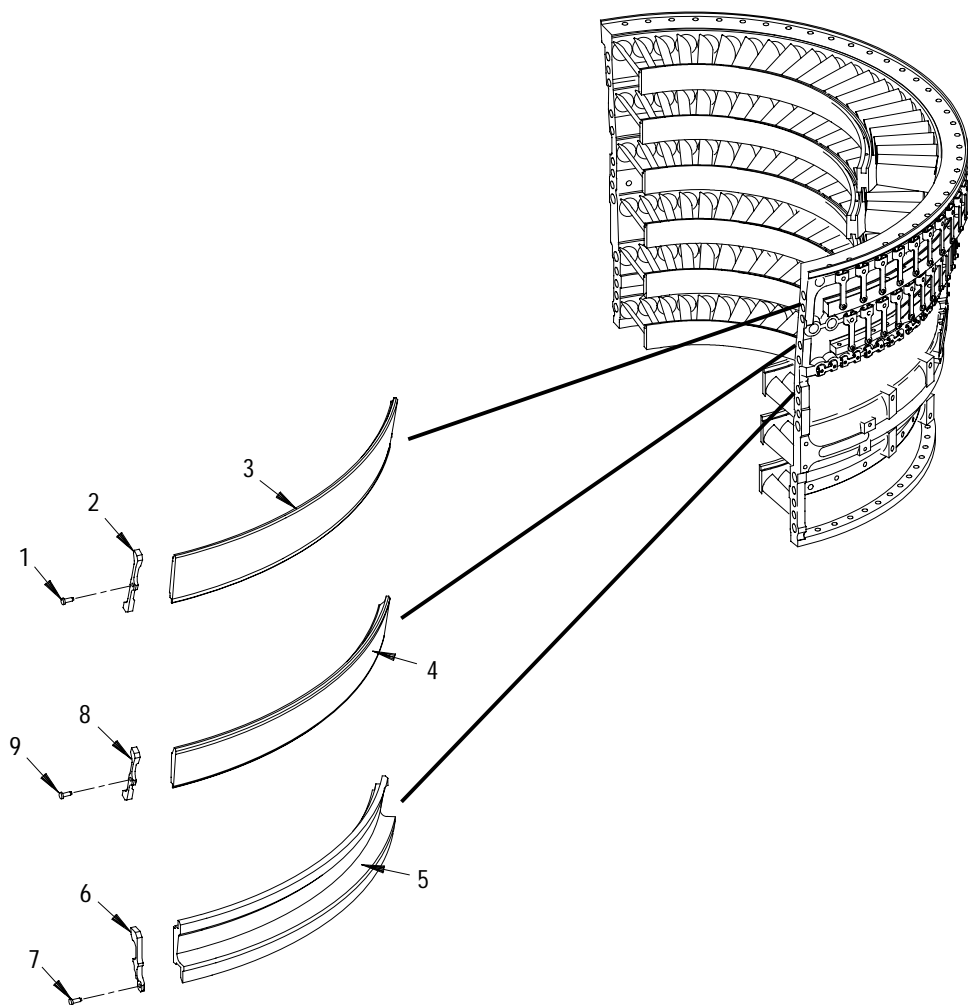
(17) Install a 7th stage duct segment(5, figure 3) by sliding into case from left side.

(18) Secure 7th stage duct segments(5) with key(6) and tight fit pin(7).

(19) Adjust gap (24, figure 2, sheet 4) between stator segments. Gap shall be 0.072 inch maximum.

(20) Torque 12 bolts(12, sheet 3) 115 to 120 pound-inches in sequence from left to right. Break torque of all bolts. Torque bolts 115 to 120 pound-inches in sequence from left to right.

(21) Bend tabs of key washers(13, 14, and 17) against bolts(12).



69241 (36X2)

1. Pin
2. Key
3. Fifth stage duct segment
4. Sixth stage duct segment
5. Seventh stage duct segment
6. Key
7. Pin
8. Key
9. Pin

Figure 3. Fifth, Sixth, and Seventh Stage Duct Segments - Installation



Failure to replace segments as specified may cause downstream blade damage.

- d1. Replace 7th stage stator segments with like part number and dash number with the following exceptions for PN 4079598-11, case and stator assembly - compressor, 4th through 9th stage:

- (1) PN 4083877-01 may replace PN 4077877-01.
- (2) PN 4083877-02 may replace PN 4077877-02.



Failure to meet specified coated blade tip requirements may cause blade damage.

- d2. If one or more new 7th stage stator segments are installed, ensure blades meet coated blade tip requirements per WP 630 00.
- e. Assemble and install 7th stage stator segments incorporating damping springs and shrouds of same arc length as segment as follows:

NOTE

Assembly using PWA 57909 fixture is preferred method.

- (1) Assemble stator segments, damping springs and shrouds using PWA 57909 fixture per paragraph 5A.

- (2) If PWA 57909 fixture is not available, assemble stator segments, damping springs and shrouds as follows:
 - (a) Place a 7th stage stator segment(3, sheet 1) on bench.
 - (b) Apply MIL-L-7808 lubricating oil to mating surfaces of 7th stage shroud(22, sheet 4), 7th stage damping spring(23), and stator segment(3).
 - (c) Position stator segment(3) on bench with antirotation lug down. Position damping spring(23) in slot in ID of stator segment. Tap 7th stage shroud(22) into slot in stator segment using nonmetallic or brass drift and mallet.
 - (d) Assemble remaining 7th stage stator segments, damping springs and shrouds per steps (a) through (c).
- (3) Deleted.
- (4) Deleted.
- (4a) Ensure 7th stage stator segments are installed in their specific locations. See figure 2A.
- (5) Install a -01 7th stage stator segment(3, figure 2, sheet 1) in right side of case by inserting trailing foot of stator segment into groove in case.
- (6) Loosely install a 7th stage rail(1) in case and secure with key washers(13 and 14, sheet 3) and three bolts(12).

NOTE

- Stator segment -02 in lower case half incorporates borescope port hole.
 - Seals are installed between stator segments but not at axial flange where case halves mate.
- (7) Install a -01 stator segment(3, sheet 1) (in upper case half) or a -02 stator segment(3) (in lower case half) with a seal(8, sheet 2) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard. Do not install seals at axial flange where case halves mate. Ensure hole in stator segment aligns with borescope port hole in lower case half.
- (8) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(17, sheet 3) and three bolts(12).



Failure to meet specified blade tip requirements may cause blade damage.

- (8a) If any duct segments were replaced or require replacement, ensure blade tips meet requirements of WP 374 00.
- (9) Install a 7th stage duct segment(5, figure 3) by sliding into case from right side.

- (10) Install a -01 stator segment(3, figure 2, sheet 2) with a seal(8) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (11) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(17, sheet 3) and three bolts(12).
- (12) Install a duct segment(5, figure 3) by sliding into case from left side.
- (13) Install a -01 stator segment(3, figure 2, sheet 2) with a seal(8) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (14) Loosely install a 7th stage rail(1, sheet 1) in case and secure with key washer(13, sheet 3) and three bolts(12).
- (15) Install a 7th stage duct segment(5, figure 3) by sliding into case from left side.
- (16) Secure 7th stage duct segments(5) with key(6) and tight fit pin(7).

- (17) Adjust gap (24, figure 2, sheet 4) between stator segments. Gap shall be 0.072 inch maximum.
- (18) Torque 12 bolts(12, sheet 3) 115 to 120 pound-inches in sequence from left to right. Break torque of all bolts. Torque bolts 115 to 120 pound-inches in sequence from left to right.
- (19) Bend tabs of key washers(13, 14, and 17) against bolts(12).

3A. Deleted.

3B. Deleted.

4. EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING SINGLE DAMPING SPRING AND THREE SHROUDS PER CASE HALF) - ASSEMBLY AND INSTALLATION.

(See figure 2 and Figures 3A, 3B and 4.)



- Reuse of seals may result in leakage.
- Reuse of damper springs is not allowed.

NOTE

- Damper springs between shroud and stator segments must be new.
- There are two seal configurations used between stator segments, formed thin sheet metal type or solid dogbone shape type. Seals must be new.
- There are two configurations 8th and 9th stage stator segment assemblies. One incorporates single damping spring and three shrouds per case half assembled and installed per this paragraph. The other incorporates damping springs and shrouds of same arc length as segments assembled and installed per paragraph 5.
- Following instructions apply to both upper and lower 4th through 9th stage case and stator assembly.
 - a. Position case on table, front flange down.

- b. Apply PWA 36545 antigalling compound to threads and washer face of 20 bolts(15, figure 2, sheet 3). Refer to T.O. 2J-F100-53-1, SWP 098 07. Burnish antigalling compound on threads with a brass brush.

NOTE

- Ninth stage stator segments are installed temporarily into case for assembly of damping spring and shrouds onto segments.
 - Eighth/ninth stage rail bolts are installed without key washers at this time.
- c. Assemble 9th stage stator segments, new damping spring and shrouds into case as follows:
- (1) Loosely install 10 8th/9th stage rails(6, sheet 1) in case with 20 bolts(15, sheet 3).



Failure to replace segments with like part number and dash number can result in downstream blade damage.

NOTE

Ninth stage stator segments require installation in specific locations. See figure 3A.

- (2) Install a -02 9th stage stator segment(7, figure 2, sheet 1) in left side of case with forward foot of stator segment engaged behind 8th/9th stage rails(6).

- (3) Tighten four bolts(15, sheet 3) securing stator segment in case.

NOTE

Seals are installed between stator segments but not at axial flange where case halves mate.

- (4) Install a -03 stator segment(7, sheet 2) with seals(10 and 11) between stator segment and previously installed stator segment. If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals.
- (5) Apply MIL-L-7808 lubricating oil to mating surfaces of 9th stage shroud(18, sheet 4), 9th stage damping spring(19) and stator segments(7).
- (6) Position damping spring(19) in slot in ID of stator segments(7) and using nonmetallic or brass drift and mallet, tap a shroud(18) from right to left into slot in stator segments.
- (7) Install a -03 stator segment(7, sheet 2) with seals(10 and 11) between stator segment and previously installed stator segment. If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals.

- (8) Install a -03 stator segment(7) with seals(10 and 11) between stator segment and previously installed stator segment. If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals.
- (9) Apply MIL-L-7808 lubricating oil to mating surfaces of shroud(18, sheet 4), damping spring(19) and stator segments(7).
- (10) Using nonmetallic or brass drift and mallet, tap a shroud(18) from right to left into slot in stator segments.
- (11) Install a -01 stator segment(7, sheet 2) with seals(10 and 11) between stator segment and previously installed stator segment. If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals.
- (12) Apply MIL-L-7808 lubricating oil to mating surfaces of shroud(18, sheet 4), damping spring(19) and stator segments(7).
- (13) Using nonmetallic or brass drift and mallet, tap a shroud(18) from right to left into slot in stator segments.

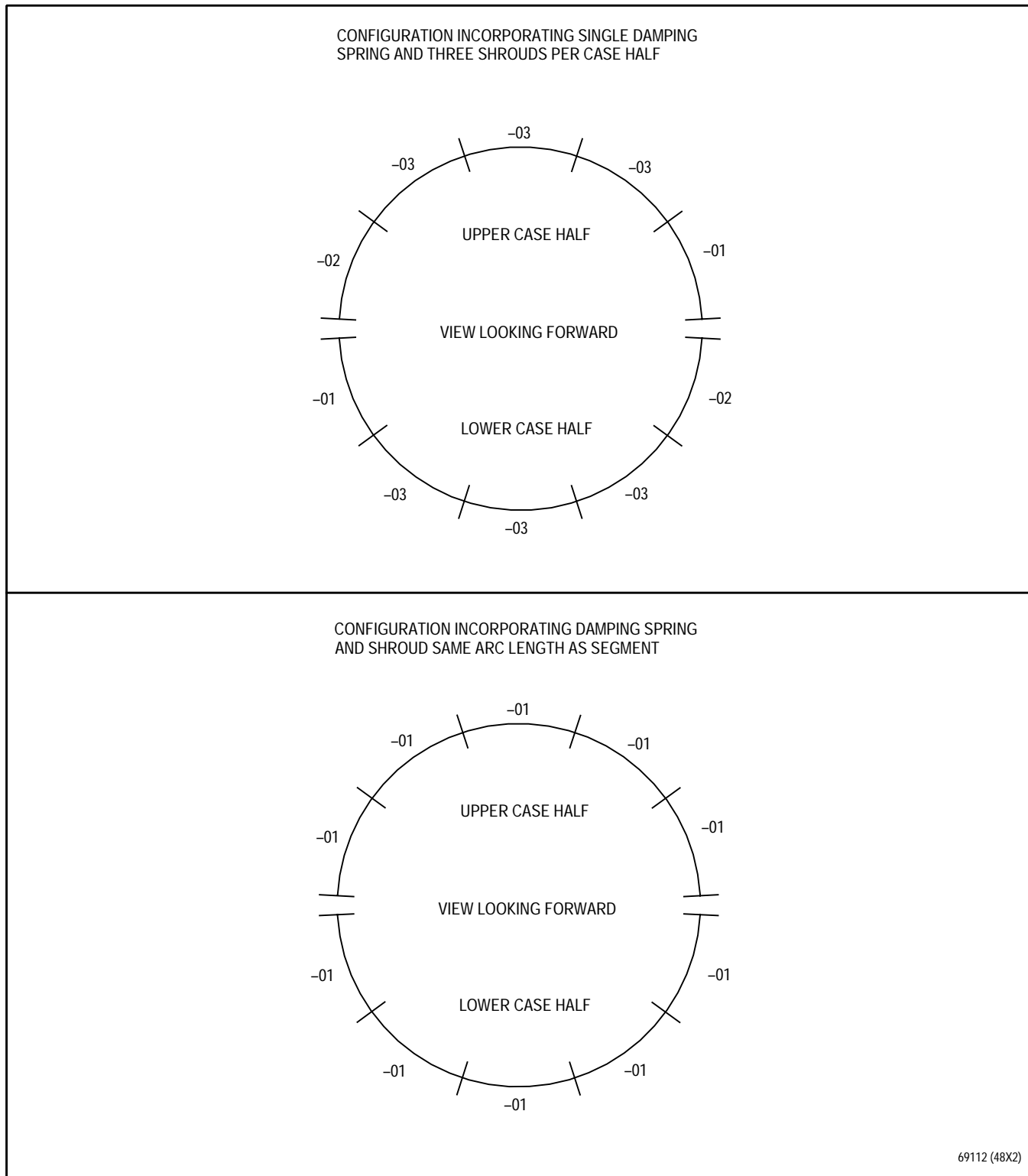


Figure 3A. Ninth Stage Stator Segment - Locations

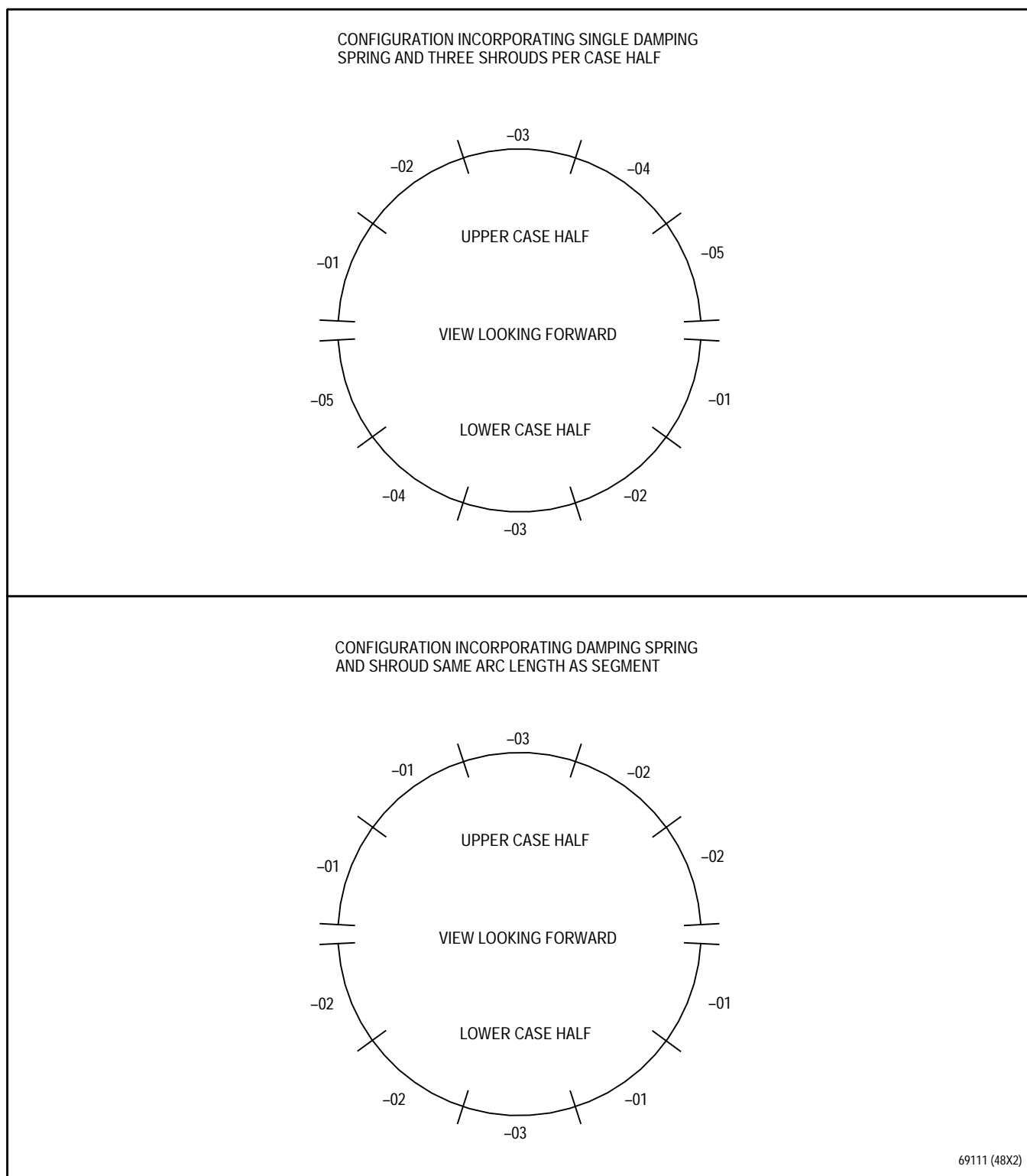


Figure 3B. Eighth Stage Stator Segment - Locations

- d. Remove assembled 9th stage stator segments, damping spring and shrouds from case using PWA 57540 assembly fixture as follows:

- (1) Starting from left side and rotating tool 180 degrees clockwise, install PWA 57540 assembly fixture, detail-1 backup plate(5, figure 4) and detail-2 installation fixture(4) around 9th stage stator segments(3).
- (2) Tighten PWA 57540 assembly fixture, knobs(1) to secure stator segments(3) in detail-2 installation fixture(4).
- (3) Loosen bolts(15, figure 2, sheet 3) that were tightened in step c.(3).
- (4) Lift PWA 57540 backup plate(5, figure 4) and detail-2 installation fixture(4) with 9th stage stator segments(3) out of case and install on detail-3 bench plate(2).
- (5) Remove 20 bolts(15, figure 2, sheet 3) and 10 8th/9th stage rails(6, sheet 1).

- e. Install 8th stage stator segments, damping spring and shrouds into case as follows:



Failure to replace segments with like part number and dash number can result in downstream blade damage.

NOTE

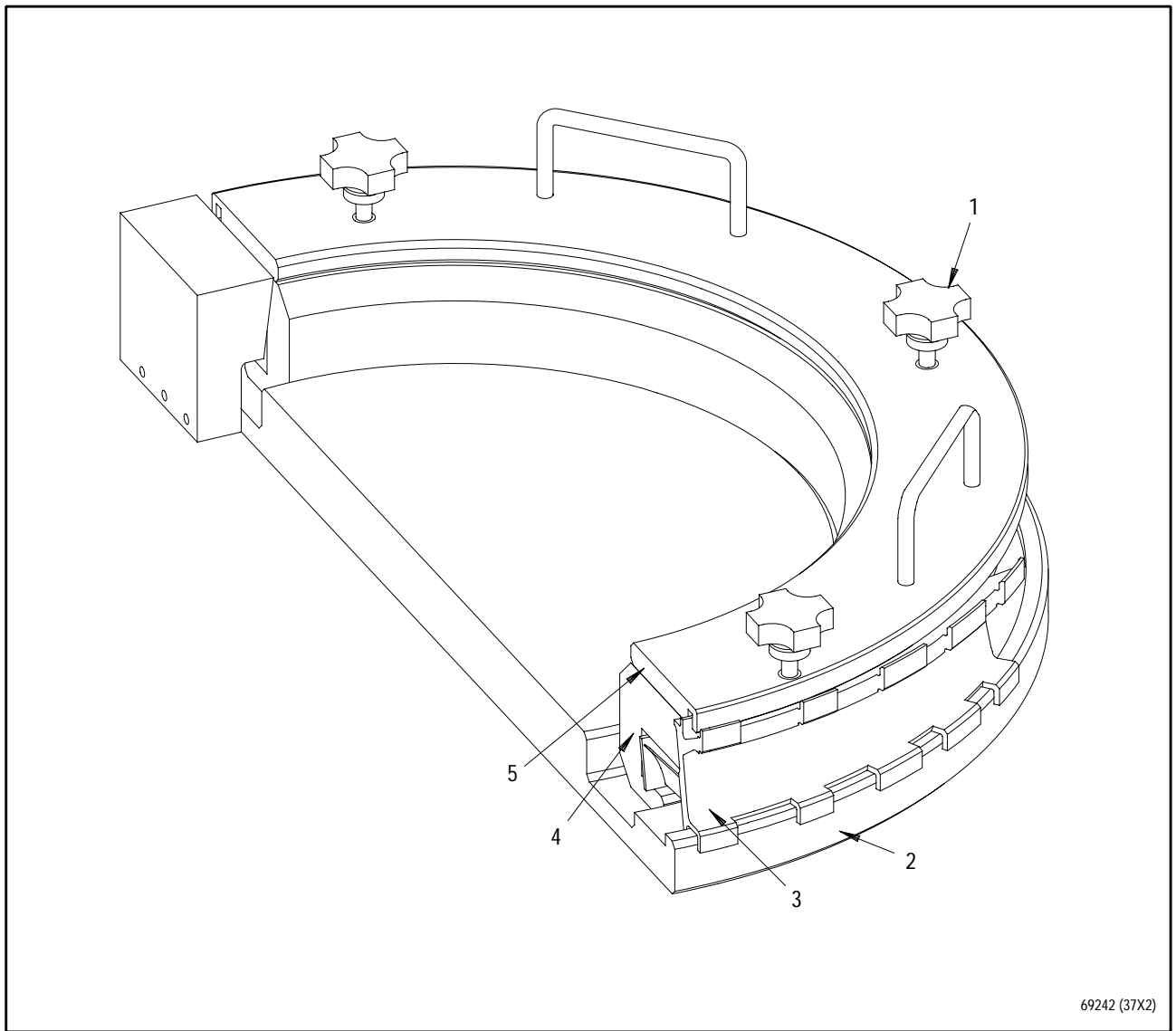
Eighth stage stator segments require installation in specific locations. See figure 3B.

- (1) Install a -01 8th stage stator segment(5, figure 2, sheet 1) in left side of case by inserting forward foot of stator segment into groove in case.
- (2) Secure stator segment(5) with two 8th/9th stage rails(6), two key washers(16, sheet 3) and four bolts(15).
- (3) Tighten four bolts(15) securing stator segment in case.

NOTE

Seals are installed between stator segments but not at axial flange where case halves mate.

- (4) Install a -02 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (5) Secure stator segment(5, sheet 1) with two 8th/9th stage rails(6), two key washers(16, sheet 3) and four bolts(15). Do not tighten bolts(15).



1. Knob
2. Bench plate
3. Ninth stage stator segment
4. Installation fixture
5. Backup plate

Figure 4. Ninth Stage Stators Assembly in PWA 57540 Assembly Fixture

- (6) Apply MIL-L-7808 lubricating oil to mating surfaces of 8th stage shroud(20, sheet 4), 8th stage damping spring(21) and stator segments(5).
 - (7) Position damping spring(21) in slot in ID of stator segments(5) and using nonmetallic or brass drift and mallet, tap a shroud(20) from right to left into slot in stator segments.
 - (8) Install a -03 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
 - (9) Secure stator segment(5, sheet 1) with two 8th/9th stage rails(6), two key washers(16, sheet 3) and four bolts(15). Do not tighten bolts(15).
 - (10) Install a -04 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
 - (11) Secure stator segment(5, sheet 1) with two 8th/9th stage rails(6), two key washers(16, sheet 3) and four bolts(15). Do not tighten bolts(15).
 - (12) Apply MIL-L-7808 lubricating oil to mating surfaces of 8th stage shroud(20, sheet 4), 8th stage damping spring(21) and stator segments(5).
 - (13) Using nonmetallic or brass drift and mallet, tap a shroud(20) from right to left into slot in stator segments.
 - (14) Install a -05 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
 - (15) Secure stator segment(5, sheet 1) with two 8th/9th stage rails(6), two key washers(16, sheet 3) and four bolts(15). Do not tighten bolts(15).
 - (16) Apply MIL-L-7808 lubricating oil to mating surfaces of 8th stage shroud(20, sheet 4), 8th stage damping spring(21) and stator segments(5).
 - (17) Using nonmetallic or brass drift and mallet, tap a shroud(20) from right to left into slot in stator segments.
- f. Loosen bolts(15, sheet 3) that were tightened in step e.(3).

- g. Install 9th stage stator segments(7, sheet 1) in case as follows:
- (1) Lift PWA 57540 assembly fixture, detail-1 backup plate(5, figure 4) and detail-2 installation fixture(4) with 9th stage stators(3) out of detail-3 plate(2).
 - (2) Position 9th stage stator segments and assembly fixture into case with forward foot of stator segments behind 8th/9th stage rails(6, figure 2, sheet 1).
 - (3) Loosen knobs(1, figure 4) and remove detail-1 backup plate(5) and detail-2 installation fixture(4) from case by rotating tool 180 degrees counterclockwise.
- h. Adjust gap (24, figure 2, sheet 4) between stator segments. Gap shall be 0.072 inch maximum.
- i. Torque 20 bolts(15, figure 2, sheet 3) 115 to 120 pound-inches in sequence from right to left. Break torque of all bolts. Retorque bolts 115 to 120 pound-inches in sequence from right to left.
- j. Bend tabs of key washers(16) against bolts(15).

5. EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING DAMPING SPRINGS AND SHROUDS OF SAME ARC LENGTH AS SEGMENTS) - ASSEMBLY AND INSTALLATION.

(See figures 2, 3A, 3B and 4.)



- Reuse of seals may result in leakage.
- reuse of damper springs is not allowed.

NOTE

- Damper springs between shroud and stator segments must be new.
- There are two seal configurations used between stator segments, formed thin sheet metal type or solid dogbone shape type. Seals must be new.
- There are two configurations 8th and 9th stage stator segment assemblies. One incorporates single damping spring and three shrouds per case half assembled and installed per paragraph 4. The other incorporates damping springs and shrouds of same arc length as segments assembled and installed per this paragraph.
- Assembly of 8th and 9th stage stator segments, damping springs and shrouds using PWA 57909 fixture is preferred method.
 - a. Assemble 10 8th stage stator segments(5, figure 2), new damping springs(21) and shrouds(20) using PWA 57909 fixture per paragraph 5A.

- a1. If PWA 57909 fixture is not available, assemble 10 8th stage stator segments, new damping springs and shrouds as follows:

NOTE

There are three dash number configuration 8th stage stator segments, two part number damping springs and two part number shrouds. Parts shall be assembled in specific sets.

- (1) Place four -01 stator segments, four PN 4079215 damping springs, and four PN 4079214-01 shrouds on bench.
- (2) Apply MIL-L-7808 lubricating oil to mating surfaces of one stator segment, damping spring and shroud.
- (3) Position stator segment on bench with antirotation lug down. Position damping spring in slot in ID of stator segment and using nonmetallic or brass drift and mallet, tap a shroud into slot in stator segment.
- (4) Assemble remaining three -01 stator segments per steps (2) and (3).
- (5) Place four -02 stator segments, four PN 4079215 damping springs, and four PN 4079214-01 shrouds on bench.
- (6) Assemble four -02 stator segments, damping springs and shrouds per steps (2) and (3).
- (7) Place two -03 stator segments, two PN 4079268 damping springs and two PN 4079208-01 shrouds on bench.
- (8) Assemble two -03 stator segments, damping springs and shrouds per steps (2) and (3).

- a2. Assemble 10 9th stage stator segments(7), damping springs(19), and shrouds(18) using PWA 57909 fixture per paragraph 5A.
- b. If PWA 57909 fixture is not available, assemble 10 9th stage stator segments, damping springs, and shrouds as follows:

- (1) Place 9th stage stator segment, damping spring, and shroud on bench.
- (2) Apply MIL-L-7808 lubricating oil to mating surfaces of 9th stage shroud, damping spring, and stator segment.
- (3) Position stator segment on bench with antirotation lug down. Position damping spring in slot in ID of stator segment and using nonmetallic or brass drift and mallet, tap a 9th stage shroud into slot in stator segment.
- (4) Assemble remaining 9th stage stator segments per steps (1) through (3).

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case and stator assembly.
 - Following instructions refer to stator segments by dash number but also include the previously assembled damping springs and shrouds.
- c. Install 8th stage stator segments in 4th through 9th stage case as follows:
- (1) Position case on table, front flange down.

- (2) Apply PWA 36545 antigalling compound to threads and washer face of 20 bolts(15, sheet 3). Refer to T.O. 2J-F100-53-1, SWP 098 07. Burnish antigalling compound on threads with a brass brush.
- (3) Ensure 8th stage gasket(4) is still installed in groove in case with ends of gasket equally spaced from edges of case.



Failure to replace segments as specified may cause downstream blade damage.

- (3a) Replace 8th stage stator segments with like part number and dash number with the following exceptions for PN 4079598-11, case and stator assembly - compressor, 4th through 9th stage:

- (a) PN 4083978-01 may replace PN 4077878-01.
- (b) PN 4083978-02 may replace PN 4077878-02.
- (c) PN 4083978-03 may replace PN 4077878-03.



Failure to meet specified coated blade tip requirements may cause blade damage.

- (3b) If one or more new 8th stage stator segments are installed, ensure blades meet coated blade tip requirements per WP 630 00.
- (3c) Ensure 8th stage stator segments are installed in their specific locations. See figure 3B.

- (4) Install a -01 8th stage stator segment(5, figure 2, sheet 1) in left side of case by inserting forward foot of stator segment into groove in case.
- (5) Secure stator segment with two 8th/9th stage rails(6, sheet 1), two key washers(16, sheet 3) and four bolts(15). Handtighten bolts.

NOTE

Seals are installed between stator segments but not at axial flange where case halves mate.

- (6) Install a -01 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard. Do not install seals at axial flange where case halves mate.
- (7) Secure stator segment with two 8th/9th stage rails(6, sheet 1), two key washers(16, sheet 3) and four bolts(15). Handtighten bolts.
- (8) Install a -03 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (9) Secure stator segment with two 8th/9th stage rails(6, sheet 1), two key washers(16, sheet 3) and four bolts(15). Handtighten bolts.

- (10) Install a -02 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (11) Secure stator segment with two 8th/9th stage rails(6, sheet 1), two key washers(16, sheet 3) and four bolts(15). Handtighten bolts.
- (12) Install a -02 stator segment(5, sheet 2) with seal(9) between stator segment and previously installed stator segment. If installing formed sheet metal type seal, install with flat surface inboard.
- (13) Secure stator segment with two 8th/9th stage rails(6, sheet 1), two key washers(16, sheet 3) and four bolts(15). Handtighten bolts.



Failure to replace segments as specified may cause downstream blade damage.

- d. Replace 9th stage stator segments with like part number and dash number with the following exception for PN 4079598-11, case and stator assembly - compressor, 4th through 9th stage:

- (1) PN 4083979-01 may replace PN 4077879-01.



Failure to meet specified coated blade tip requirements may cause blade damage.

NOTE

- Ninth stage stator segments may be installed using PWA 57540 assembly fixture per step h.
 - Ninth stage stator segments are all same dash number and may be installed in any position unless marked for specific positions at disassembly.
 - Bolts(15, sheet 3) may be loosened if necessary for 9th stage stator segment installation.
- e. If one or more new 9th stage stator segments are installed, ensure blades meet coated blade tip requirements per WP 630 00.
- f. Install 9th stage stator segments(7, sheet 1) into 4th through 9th stage case as follows:
- (1) If necessary, place case on table, front flange down.
 - (2) Install a 9th stage stator segment in left side of case with forward foot of stator segment engaged behind previously installed 8th/9th stage rails(6).

NOTE

Seals are installed between stator segments but not at axial flange where case halves mate.

- (3) Install a stator segment(7) with seals(10 and 11) between stator segment and previously installed stator segment. If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals. Do not install seals at axial flange where case halves mate.
 - (4) Install remaining stator segments and seals per steps (2) and (3).
- g. Adjust gap (24, sheet 4) between stator segments. Gap shall be 0.072 inch maximum.
- h. Torque 20 bolts(15, sheet 3) 115 to 120 pound-inches in sequence from right to left. Break torque of all bolts. Retorque bolts 115 to 120 pound-inches in sequence from right to left.
- i. Bend tabs of key washers(16) against bolts(15).
- j. Install 9th stage stator segments(7) into case using PWA 57540 assembly fixture as follows:
- (1) Position PWA 57540 assembly fixture detail-3 bench plate(2, figure 4) flat on workbench and install detail-2 installation fixture(4) in detail-3 bench plate.

NOTE

Seals are installed between stator segments but not at axial flange where case halves mate.

- (2) Install five 9th stage stator segments(7, figure 2, sheet 1) from right to left, with seals(10 and 11, sheet 2) between segments in detail-2 installation fixture(4, figure 4). If installing formed sheet metal type seals, install with flat surface inboard for axially positioned seals and rearward for radially positioned seals. Do not install seals at axial flange where case halves mate.
- (3) Position detail-1 backup plate(5) over detail-2 installation fixture(4) and tighten knobs(1) to secure stator segments(3) in detail-2 installation fixture.

- (4) Lift PWA 57540 assembly fixture, detail-1 backup plate(5) and detail-2 installation fixture(4) with 9th stage stators(3) out of detail-3 plate(2).
- (5) Position 9th stage stator segments and assembly fixture into case with forward foot of stator segments behind 8th/9th stage rails(6, figure 2, sheet 1).
- (6) Loosen knobs(1, figure 4) and remove detail-1 backup plate(5) and detail-2 installation fixture(4) from case by rotating tool 180 degrees counterclockwise.
- (7) Continue procedure at step e.

5A. SEVENTH, EIGHTH AND NINTH STAGE STATOR SEGMENTS (INCORPORATING DAMPING SPRINGS AND SHROUDS OF SAME ARC LENGTH AS SEGMENTS) - ASSEMBLY USING PWA 57909 FIXTURE.

(See Figure 4A.)

NOTE

Eighth stage stator segments, damping springs and shrouds have several combinations of part numbers which must be assembled in specific sets.

- a. If assembling 8th stage hardware, refer to paragraph 5, step a1. for correct assembly part number combinations.
- b. Place PWA 57909 fixture on suitable workbench.



Failure to use correct fixture details will cause damage to hardware.

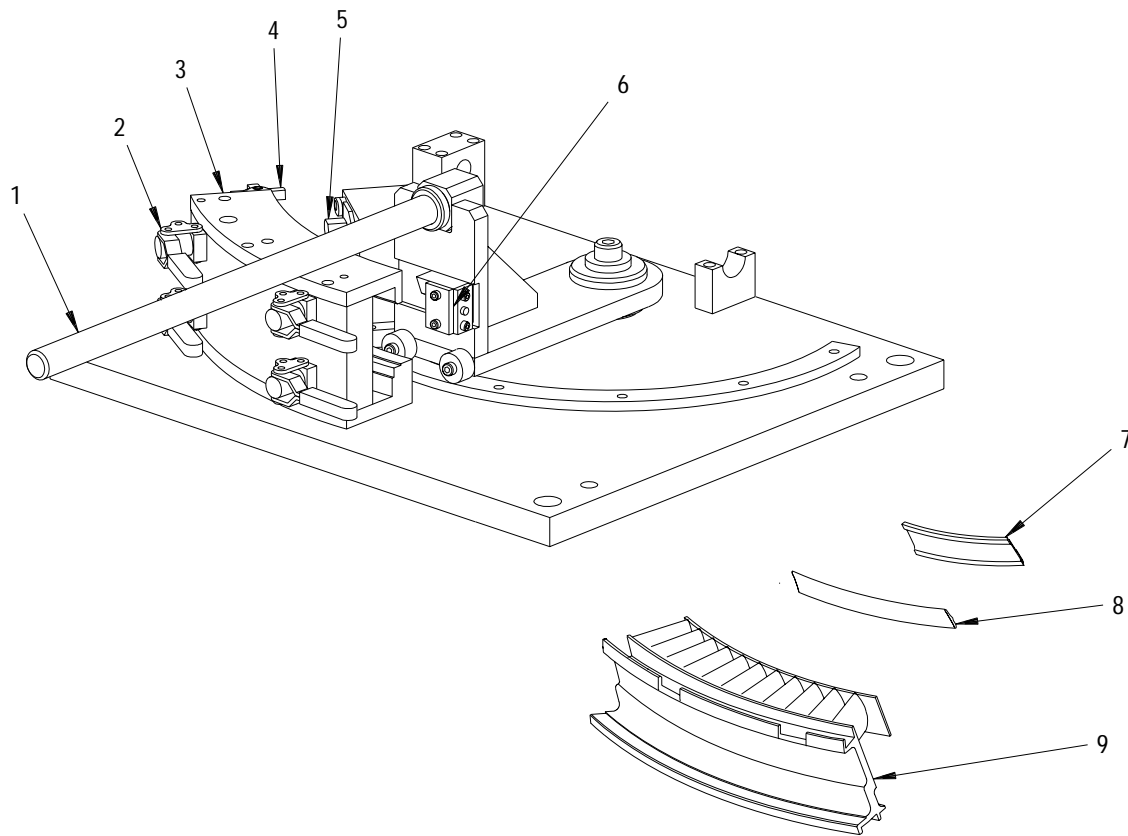
NOTE

Fixture locating segment, end stop assembly and pusher assembly details are marked 7TH, 8TH or 9TH and shall be used in sets for specific stage being assembled.

- c. Install applicable locating segment(3, figure 5A), end stop assembly(5) and pusher assembly(6) details on fixture for hardware stage to be assembled.
- d. Rotate handle assembly(1) counterclockwise away from locating segment.
- e. Release toggle clamps(2). Slide stator segment(9) clockwise into locating segment to contact end stop(4). Secure in place using toggle clamps.
- f. Apply NSN 9150-00-905-1387 (Aero Kroil) or MIL-L-7808 lubricating oil to mating surfaces of stator segment, damping spring(8) and shroud(7).
- g. Install damping spring into groove of stator segment. Manually install shroud part way into groove of stator segment.
- h. Align handle assembly(1) so that pusher assembly(6) contacts end of shroud. Slowly push handle assembly clockwise to push shroud into place until it is flush with lug end of stator segment. If shroud binds during installation, carefully and lightly tap shroud off with nonmetallic drift and mallet and repeat installation procedure.
- i. Release toggle clamps(2). Remove stator segment, damping spring and shroud assembly from locating segment(3).
- j. Repeat steps c. through i. for remaining assemblies using applicable locating segment(3), end stop assembly(5) and pusher assembly(6) for 7th, 8th or 9th stage hardware.



Use of excessive force can cause damage to hardware if shroud binds during installation.



1. Handle assembly
2. Toggle clamp
3. Locating segment
4. End stop
5. End stop assembly
6. Pusher assembly
7. Shroud
8. Damping spring
9. Stator segment

Figure 4A. Seventh, Eighth And Ninth Stage Stator Segments (Incorporating Damping Springs And Shrouds Of Same Arc Length As Segments) - Assembly Using PWA 57909 Fixture

6. FIFTH AND SIXTH STAGE DUCT SEGMENTS - INSTALLATION.

(See figure 3.)

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case.
 - If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.
- a. Install three, 5th stage duct segments(3, figure 3) by sliding them in and around case.
 - b. Secure 5th stage duct segments(3) with key(2) and tap in tight fit pin(1).
 - c. Install three, 6th stage duct segments(4) by sliding them in and around case.
 - d. Secure 6th stage duct segments(4) with key(8) and tap in tight fit pin(9).

7. SIXTH STAGE FIXED VANES - INSTALLATION.

(See Figure 5.)

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case.
 - Maximum of 13 vanes may have leading or trailing edge blends.
- a. Install thrust washer(8, figure 5) on stem of each vane(9) and install stem of vane outward through bushing in case starting at the axial split line, in sequence.

b. Ensure vanes are positioned in case with trailing edge of vanes facing rearward.

c. Apply PWA 36545 antigalling compound to threads of bolts(2, 7, and 13).

NOTE

Shroud segment set located in center of case half secures 14 vane stems. Each of the two outer shroud segment sets secure 15 vane stems. Center shroud segment also has a locating pin.

- d. Install outer aft shroud segment(10) and forward shroud segment(11) on ID stems of 15 outside vanes.
- e. Secure shroud segments(10 and 11) with three bolts(7) (boltheads down) and nuts(6). Torque nuts 32 to 36 pound-inches.
- f. Install center aft shroud segment(5) and forward shroud segment(4) on ID stems of 14 center vanes. Install segments with locating pin facing aft.
- g. Secure shroud segments(4 and 5) with three bolts(13) (boltheads down) and nuts(3). Torque nuts 32 to 36 pound-inches.

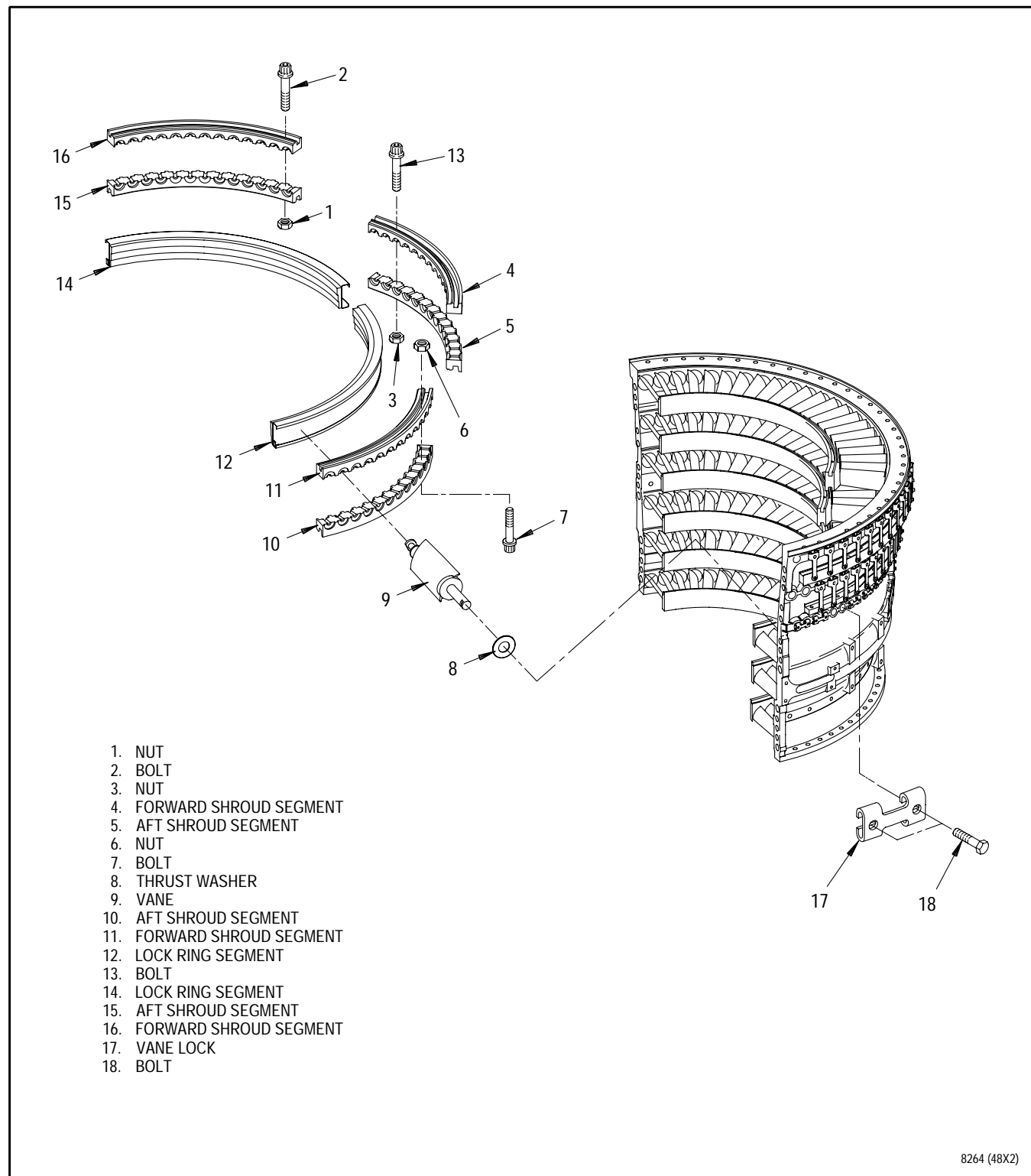


Figure 5. Sixth Stage Fixed Vanes - Installation

- h. Install outer aft shroud segment(15) and forward shroud segment(16) on ID stems of 15 outside vanes.
- i. Secure shroud segments(15 and 16) with three bolts(2) (boltheads down) and nuts(1). Torque nuts 32 to 36 pound-inches.

NOTE

Lubricate lockring segments with Mil-L-7808 engine oil to ease installation.

- j. Slide lock ring segment(12) from right side of case over shroud segments(10 and 11) and over half of shroud segments(4 and 5).
- k. Slide lock ring segment(14) from left side of case over shroud segments(15 and 16) and over half of shroud segments(4 and 5).

NOTE

A nylon drift may be used to install vane lock.

- l. Install a 6th stage vane lock(17) across every two vanes starting at the axial split line.
- m. Install 44 bolts(18) on the vane locks. Check run on torque of self-locking bolts. Minimum run-on torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches.

7A. SIXTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - INSTALLATION.

(See Figures 5A and 6.)

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case.
- Maximum of 13 vanes may have leading or trailing edge blends.
 - a. Install thrust washer(8, figure 5A) on stem of each variable vane(9) and install stem of vane outward through bushing in case.
 - b. Ensure vanes are positioned in case with trailing edge of vanes facing rearward.

NOTE

Shroud segment set located in the center of case half secures 14 vane stems. Each of the two outer shroud segment sets secure 15 vane stems. Center shroud segment has a locating pin which must be facing aft when installed.

- c. Apply PWA 36545 antigalling compound to threads of bolts(2, 7, and 13).
- d. Install outer aft shroud segment(10) and forward shroud segment(11) on ID stems of 15 outside vanes.
- e. Secure shroud segments(10 and 11) with three bolts(7) (boltheads down) and nuts(6). Torque nuts 32 to 36 pound-inches.

- f. Install center aft shroud segment(5) and forward shroud segment(4) on ID of stems of 14 center vanes.
- g. Secure shroud segments(4 and 5) with three bolts(13) (boltheads down) and nuts(3). Torque nuts 32 to 36 pound-inches.
- h. Install outer aft shroud segment(15) and forward shroud segment(16) on ID stems of 15 outside vanes.
- i. Secure shroud segments(15 and 16) with three bolts(2) (boltheads down) and nuts(1). Torque nuts 32 to 36 pound-inches.
- j. Slide lock ring segment(12) from right side of case over shroud segments(10 and 11) and over half of shroud segments(4 and 5).
- k. Slide lock ring segment(14) from left side of case over shroud segments(15 and 16) and over half of shroud segments(4 and 5).
- l. Install four bumpers(4, figure 6) into synchronizing ring(3) as follows:
 - (1) Position bushings(5) in synchronizing ring(3) to obtain maximum gap between case(10) and bumpers(4).
 - (2) Install bumpers(4) through bushings(5).
 - (3) Secure bumpers(4) with 0.190-32 worknuts(6).

NOTE

- Stage number is marked on vane arms.
- Synchronizing rings are marked TOP FRONT or BOTTOM FRONT in center of ring on forward side. Ring marked TOP FRONT may be used on bottom and vice versa as long as side marked FRONT is installed facing forward.
- m. Install 40 vane arms(8) (pin end into OD of ring, slotted end forward) into synchronizing ring(3).
- n. Verify all vane arms(8) are free to rotate.
- o. Secure vane arms(8) in synchronizing ring(3) with tape.
- p. Rotate 6th stage vanes so that slots in vane stems(7) are in an axial position.

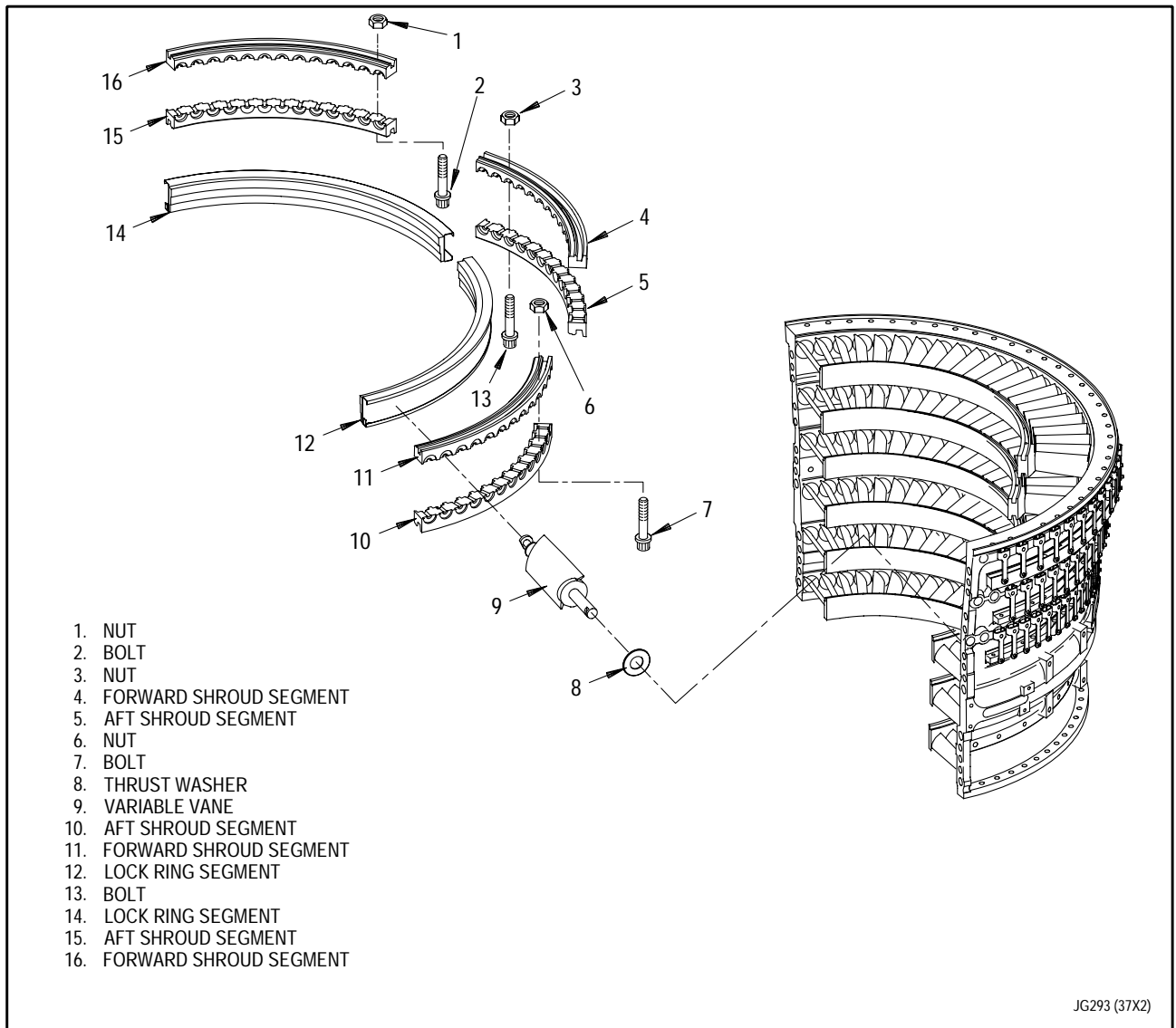


Figure 5A. Sixth Stage Variable Vanes - Installation

- q. Position synchronizing ring(3) around case. Ensure center of synchronizing ring is in line with center of case.
- r. Align slotted end of each vane arm(8) with slots in its mating vane stem(7).
- s. Slide vane arms(8) from front to rear over vane stems(7) to align bolthole in vane arms with threaded hole in vane stems.

- t. Apply PWA 36545 antigalling compound to 40 bolts(9) and install. Check run-on (thread friction) torque of self-locking bolts. Minimum run-on torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches.
- u. Verify that there is zero clearance between vane stems(7) and vane arms(8), and bolts(9) are seated.
- v. Verify that vane arms(8) rotate freely in each direction from center with no binding or hesitation.

8. FIFTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - INSTALLATION.

(See Figures 6, 6A and 7.)



Failure to install correct 5th stage vanes with fixed 6th stage vane configuration can result in limited vane travel and affect engine performance.

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case.
- Maximum of 11 vanes may have leading or trailing edge blends.
 - a. Ensure that a set of PN 4080325 5th stage vanes are used on fixed 6th stage vane configuration.
 - a1. Install thrust washer(8, figure 7) on stem of each variable vane(9) and install stem of vane outward through bushing in case.
 - b. Ensure vanes are positioned in case with trailing edge facing rearward.

NOTE

- Use of new inner bearings(7) is required.
- Shroud segment set located in center of case half secures 12 vane stems. Each of two outer shroud segment sets secure 13 vane stems.
- c. Apply PWA 36545 antigalling compound to threads of bolts(1, 2, and 5).

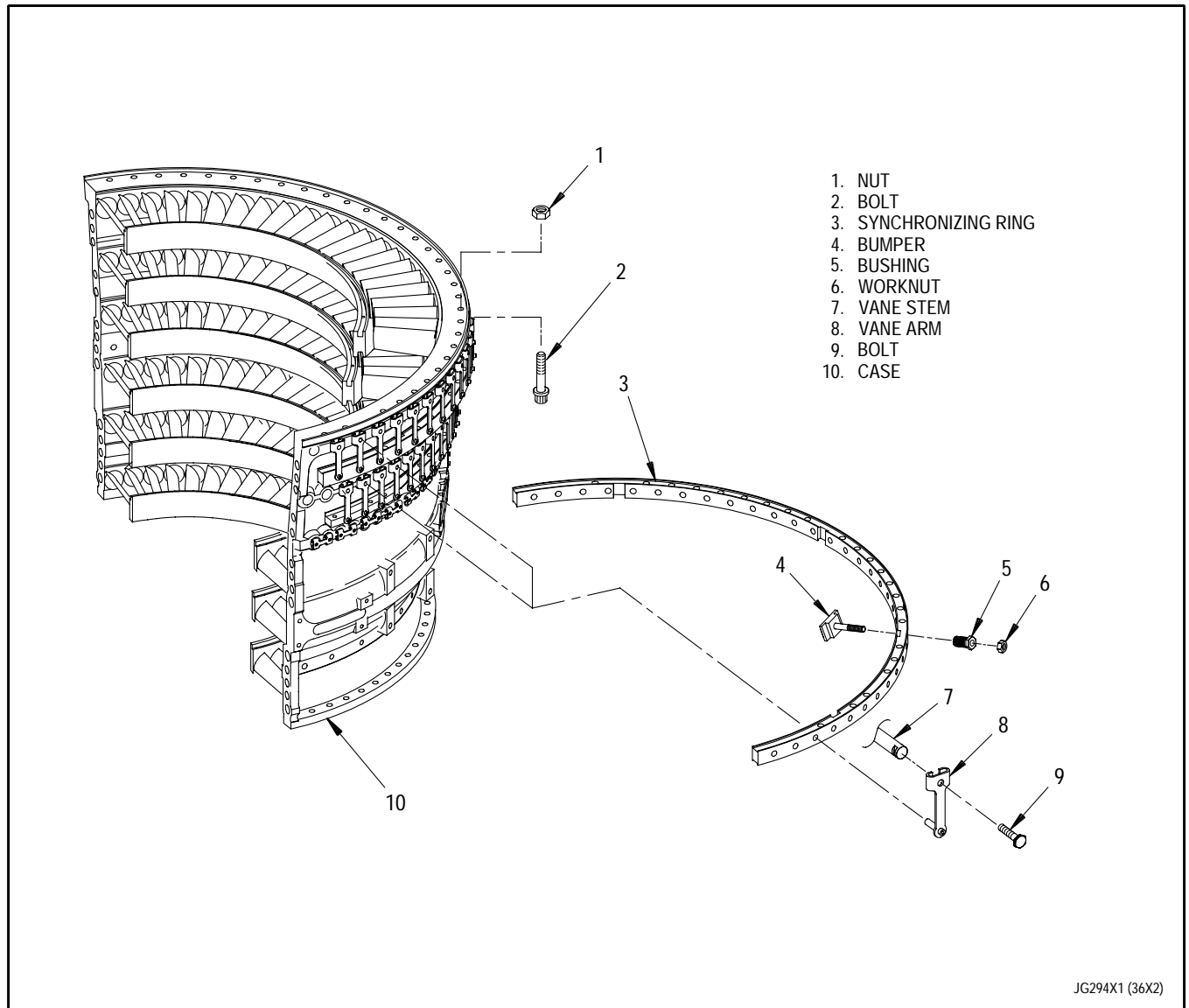


Figure 6. Fourth and Fifth Stage Variable Vane Synchronizing Rings And Vane Arms - Installation (Typical)

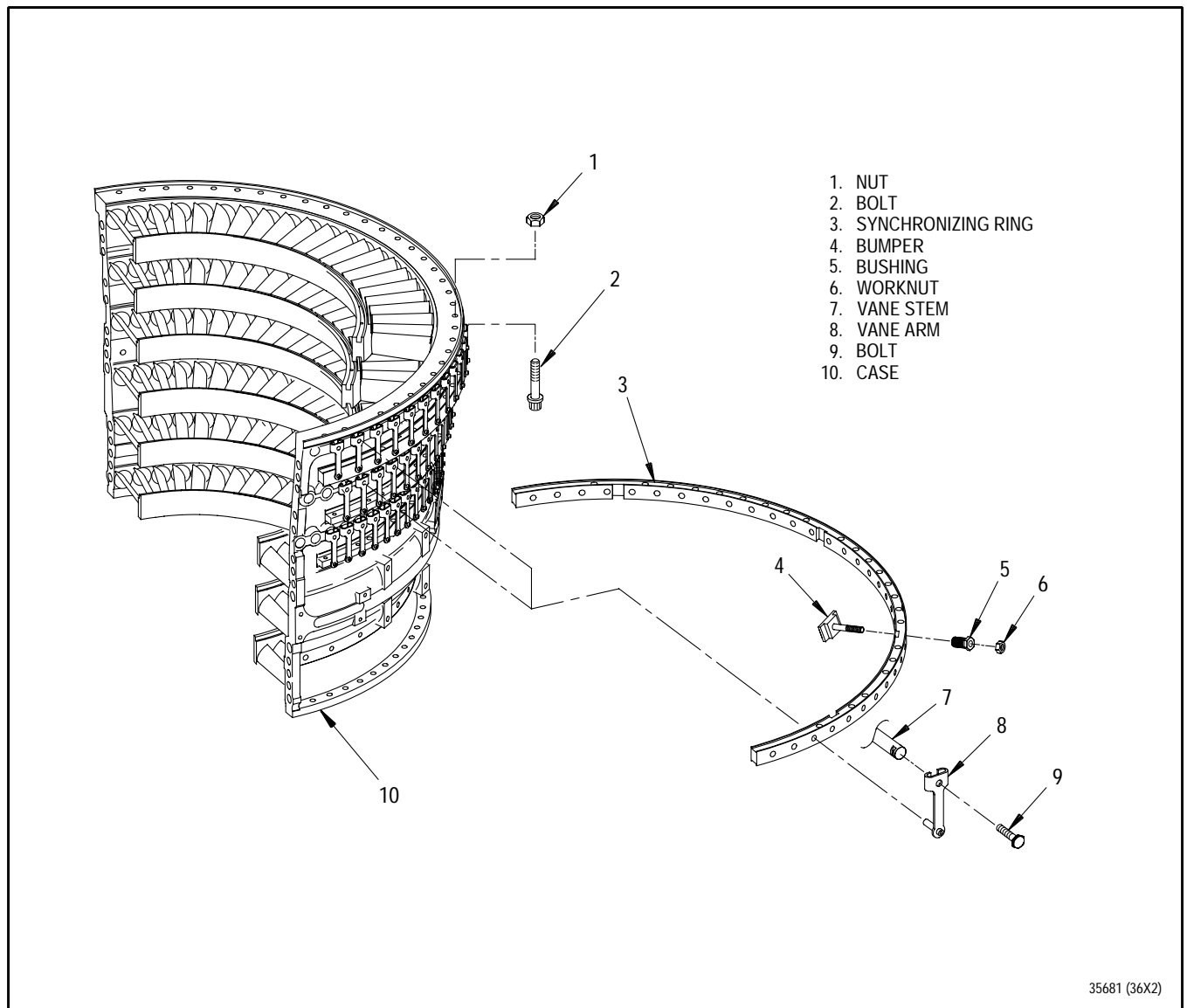


Figure 6A. Fourth, Fifth, And Sixth Stage Variable Vane Synchronizing Rings And Vane Arms - Installation (Typical)

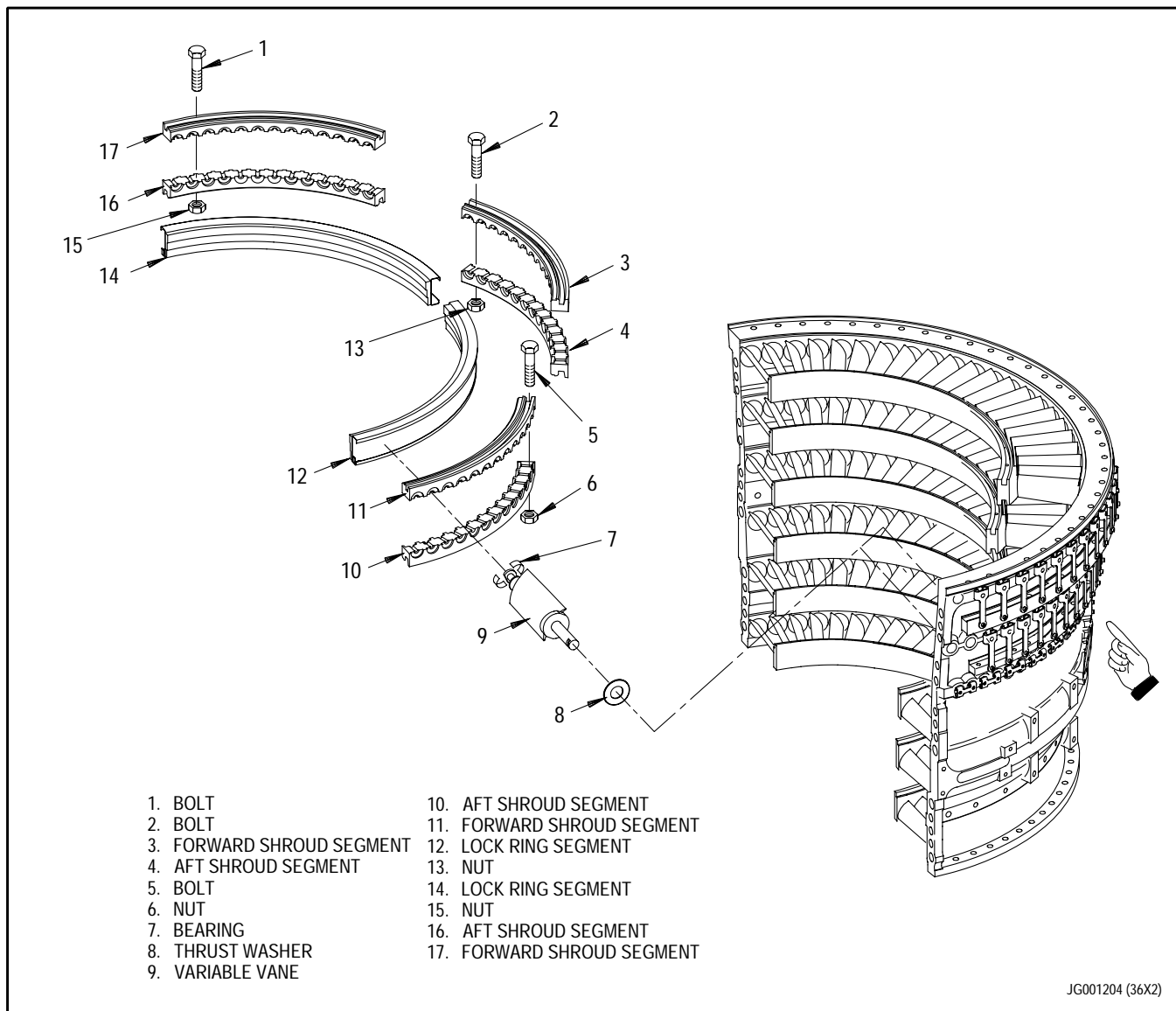


Figure 7. Fourth And Fifth Stage Variable Vanes - Installation (Typical)



Do not re-use inner bearings(7).

- d. Install outer aft shroud segment(10), forward shroud segment(11) and new bearings(7) on ID stems of 13 outside vanes.
- e. Secure shroud segments(10 and 11) with three bolts(5) (boltheads up) and nuts(6). Torque nuts 32 to 36 pound-inches.
- f. Install center aft shroud segment(4), forward shroud segment(3) and new bearings(7) on ID stems of 12 center vanes.
- g. Secure shroud segments(3 and 4) with three bolts(2) (boltheads up) and nuts(13). Torque nuts 32 to 36 pound-inches.
- h. Install outer aft shroud segment(16), forward shroud segment(17) and new bearings(7), antirotation flat faces radially inward, on ID stems of 13 outside vanes.
- i. Secure shroud segments(16 and 17) with three bolts(1) (boltheads up) and nuts(15). Torque nuts 32 to 36 pound-inches.
- j. Ensure all vanes move freely after torquing shroud segments.

NOTE

Lubricate lockring segments with MIL-L-7808 engine oil to ease installation.

- k. Slide lock ring segment(12) from right side of case over shroud segments(10 and 11) and over half of shroud segments(3 and 4).

- l. Slide lock ring segment(14) from left side of case over shroud segments(16 and 17) and over half of shroud segments(3 and 4).
- m. Install four bumpers(4, figure 6) into synchronizing ring(3) as follows:
 - (1) Position bushings(5) in synchronizing ring(3) until bushing is flush with inside diameter of ring to ensure maximum gap between case and bumpers.
 - (2) Install bumpers(4) through bushings(5).
 - (3) Secure bumpers(4) with 0.190-32 worknuts(6).

NOTE

Stage number is marked on vane arms.

- n. Install 34 vane arms(8) (pin end into OD of ring, slotted end forward) into synchronizing ring(3).

- o. Verify all vane arms(8) are free to rotate.
- p. Secure vane arms(8) in synchronizing ring(3) with tape.
- q. Rotate 5th stage vanes so that slots in vane stems(7) are in an axial position. Add strip of tape around circumference of synchronizing ring to hold vane arms in the axial direction

NOTE

Synchronizing rings are marked TOP FRONT or BOTTOM FRONT in center of ring on forward side. Ring marked TOP FRONT may be used on bottom and vice versa as long as side marked FRONT is installed facing forward.

- r. Position synchronizing ring(3) around case. Ensure center of synchronizing ring is in line with center of case.
- s. Align slotted end of each vane arm(8) with slots in its mating vane stem(7).

NOTE

A nylon drift may be used to align bolt holes in vane arms with threaded hole in vane stem. Use drift on ring only.

- t. Slide vane arms(8) from front to rear over vane stems(7) to align bolthole in vane arms with threaded hole in vane stems.
- u. Remove tape from synchronizing ring and vane arms ensuring all residue from tape is removed.

- v. Apply PWA 36545 antigalling compound to 34 bolts(9) and install. Check run-on torque of self-locking bolts. Minimum run-on (thread friction) torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches, maintaining vane arms in axial position by immobilizing synchronizing ring.
- w. Verify that there is zero clearance between vane stems(7) and vane arms(8), and bolts(9) are seated.
- x. Verify that vane arms(8) rotate freely in each direction from center with no binding or hesitation.
- y. Install 4th to 9th stage case per WP 701 00.

9. FOURTH STAGE VARIABLE VANES, SYNCHRONIZING RING AND VANE ARMS - INSTALLATION.

(See figures 6 and 7.)

NOTE

- Following instructions apply to both upper and lower 4th through 9th stage case.
- Maximum of 10 vanes may have leading or trailing edge blends.
- a. Install thrust washer(8, figure 7) on stem of each variable vane(9) and install stem of vane outward through bushing in case.
- b. Ensure vanes are positioned in case with trailing edge facing rearward.

NOTE

Shroud segment set located in the center of case half secures 11 vane stems. Each of the two outer shroud segment sets secure 12 vane stems.

- c. Apply PWA 36545 antigalling compound to threads of bolts(1, 2, and 5).



Do not re-use inner bearings(7).

- d. Install outer aft shroud segment(10), forward shroud segment(11) and new bearings(7) on ID stems of 12 outside vanes.
- e. Secure shroud segments(10 and 11) with three bolts(5) (boltheads up) and nuts(6). Torque nuts 32 to 36 pound-inches.
- f. Install center aft shroud segment(4), forward shroud segment(3) and new bearings(7) on ID stems of 11 center vanes.

- g. Secure shroud segments(3 and 4) with three bolts(2) (boltheads up) and nuts(13). Torque nuts 32 to 36 pound-inches.
- h. Install outer aft shroud segment(16), forward shroud segment(17) and new bearings(7) on ID stems of 12 outside vanes.
- i. Secure shroud segments(16 and 17) with three bolts(1) (boltheads up) and nuts(15). Torque nuts 32 to 36 pound-inches.
- j. Ensure all vanes move freely after torquing shroud segments.

NOTE

Lubricate lockring segments with MIL-L-7808 engine oil to ease installation.

- k. Slide lock ring segment(12) from right side of case over shroud segments(10 and 11) and over half of shroud segments(3 and 4).
- l. Slide lock ring segment(14) from left side of case over shroud segments(16 and 17) and over half of shroud segments(3 and 4).
- m. Install four bumpers(4, figure 6) into synchronizing ring(3) as follows:
 - (1) Position bushings(5) in synchronizing ring(3) until bushing is flush with inside diameter of ring to ensure maximum gap between case and bumpers.

(2) Install bumpers(4) through bushings(5).

(3) Secure bumpers(4) with 0.190-32 worknuts(6).

NOTE

Case forward flange bolts shall be installed prior to installation of 4th stage synchronizing ring.

n. Install bolts(2) into forward flange of case(10) and secure with nuts(1) handtight.

NOTE

Stage number is marked on vane arms.

o. Install 33 vane arms(8) (pin end into OD of ring, slotted end forward) into synchronizing ring(3).

p. Verify all vane arms(8) are free to rotate.

q. Secure vane arms(8) in synchronizing ring(3) with tape.

r. Rotate 4th stage vanes so slots in vane stems(7) are in an axial position. Add strip of tape around circumference of synchronizing ring to hold vane arms in the axial position.

NOTE

Synchronizing rings are marked TOP FRONT or BOTTOM FRONT in center of ring on forward side. Ring marked TOP FRONT may be used on bottom and vice versa as long as side marked FRONT is installed facing forward.

s. Position synchronizing ring(3) around case. Ensure center of synchronizing ring is in line with center of case.

t. Align slotted end of each vane arm(8) with slots in its mating vane stem(7).

NOTE

A nylon drift may be used to align bolt holes in vane arms with threaded hole in vane stem. Use drift on ring only.

u. Slide vane arms(8) from front to rear over vane stems(7) to align bolthole in vane arms with threaded hole in vane stems.

v. Remove tape from synchronizing ring and vane arms ensuring all residue from tape is removed.

w. Apply PWA 36545 antigalling compound to 33 bolts(9) and install. Check run-on (thread friction) torque of self-locking bolts. Minimum run-on torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches.

x. Verify that there is zero clearance between vane stems(7) and vane arms(8), and bolts(9) are seated.

y. Verify that vane arms(8) rotate freely in each direction from center with no binding or hesitation.

z. Remove nuts(1) from forward flange bolts(2).

**10. BLEED VALVE STRAP LOCKING SEAT -
INSTALLATION.**

(See Figure 8.)

- a. Apply MIL-L-7808 lubricating oil to four bolts(1, figure 8) and 18 bolts(4).
- b. Position two bleed valve strap locking seats(2) at split flanges of case halves.
- c. Secure locking seats(2) with bolts(1). Torque bolts 45 to 55 pound-inches.
- d. Bend tabs of locking seats(2) against bolts(1).
- e. Position locking seats(3) at nine locations around case halves.
- f. Secure locking seats(3) with bolts(4). Torque bolts 45 to 55 pound-inches.
- g. Bend tabs of locking seats(3) against bolts(4).

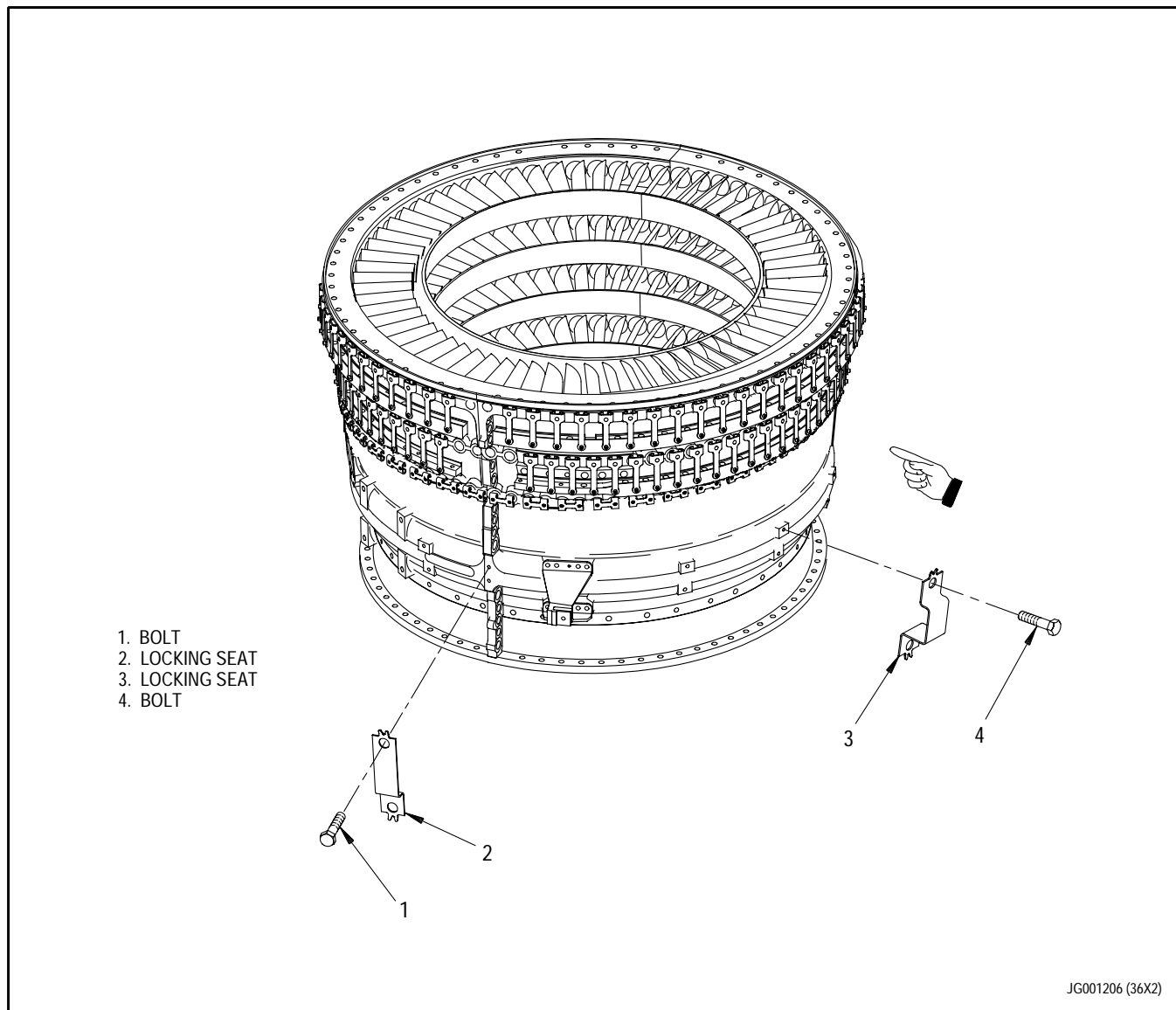


Figure 8. Bleed Valve Strap Locking Seats - Installation

11. COMPRESSOR STATOR LINKAGE ARM BRACKET AND BLEED VALVE STRAP SEAT - INSTALLATION.

(See Figure 9.)

NOTE

The following instructions apply to both upper and lower fourth through ninth stage case.

a. Apply MIL-L-7808 lubricating oil to bolts(4, figure 9).

b. Position bleed valve strap seat(2) and compressor stator linkage arm bracket(3) on fourth through ninth stage case(1). Secure with eight bolts.

c. Torque bolts(4) 45 to 55 pound-inches and secure with MS9226-04 lockwire.

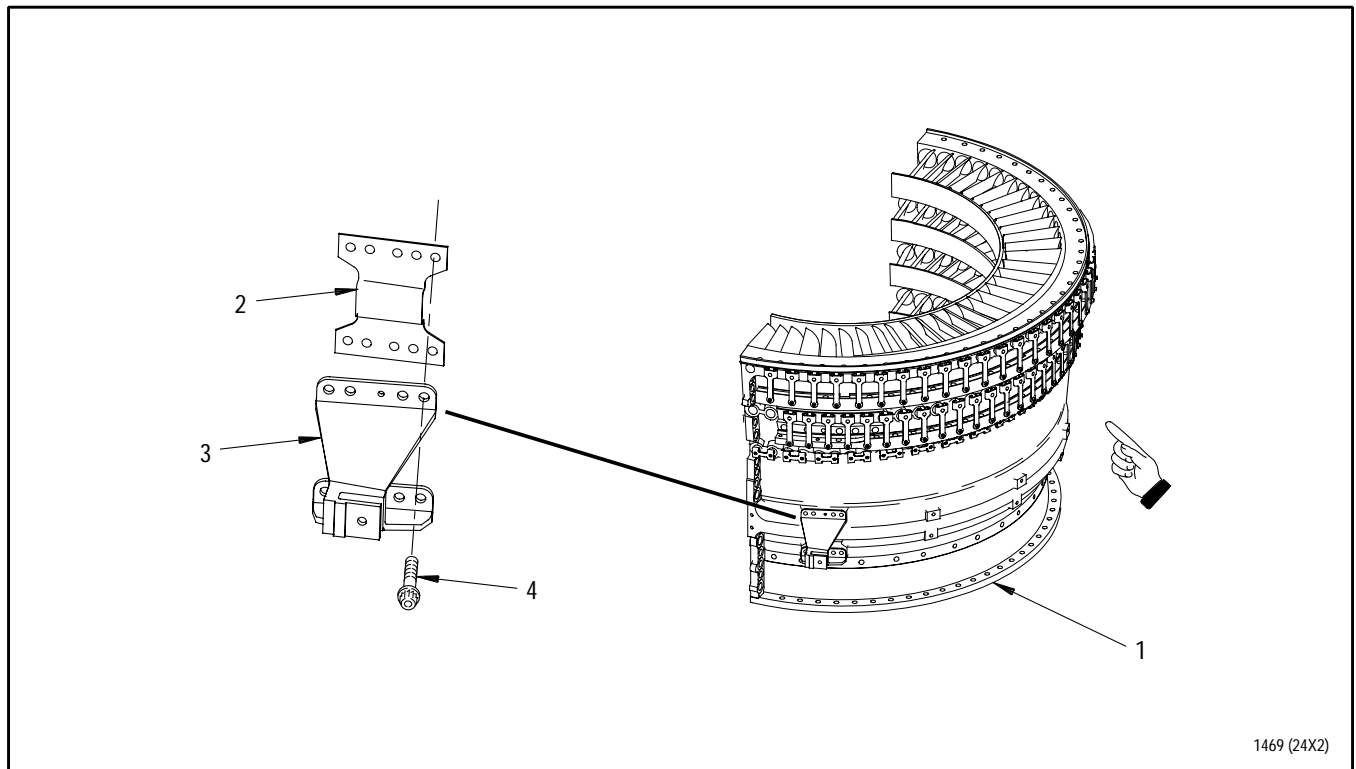


Figure 9. Compressor Stator Linkage Arm Bracket and Bleed Valve Strap Seat - Installation

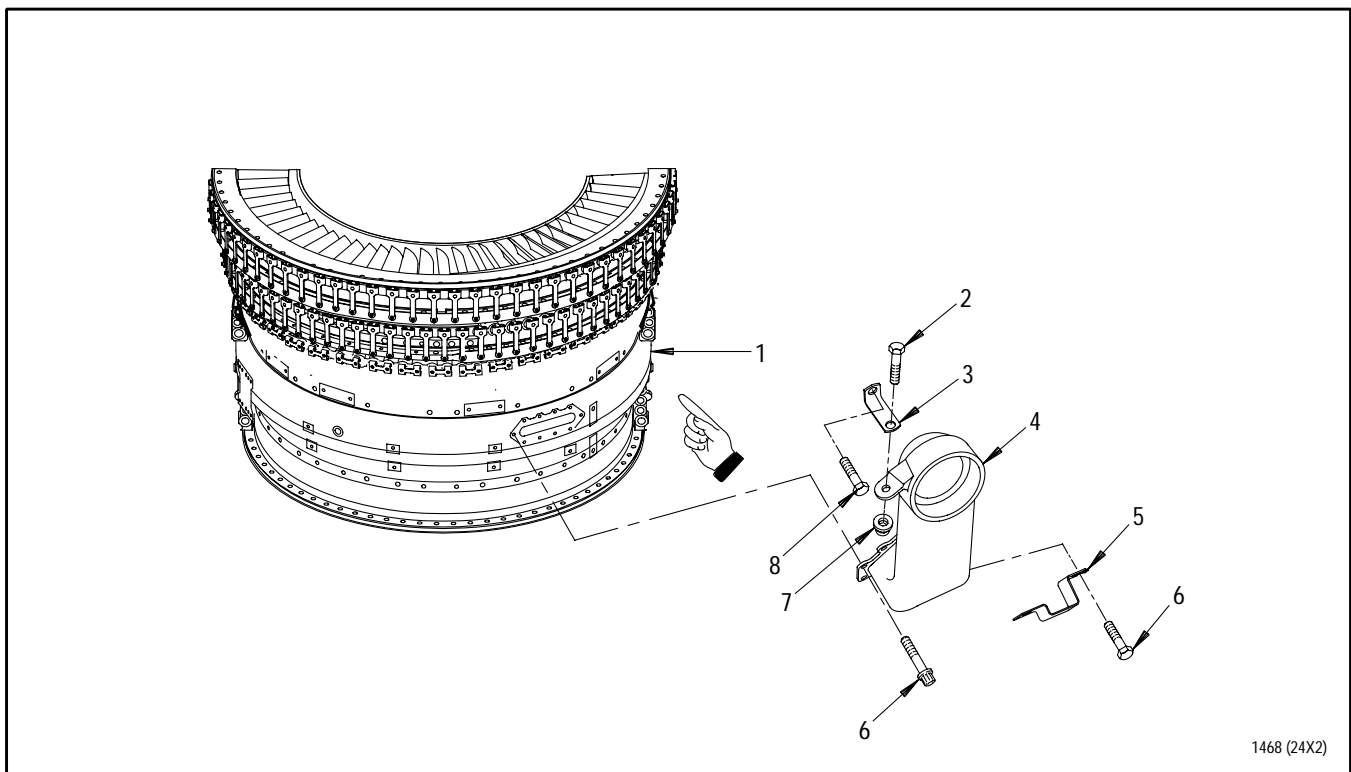
1. Fourth through ninth stage case and stator assembly (upper and lower)
2. Bleed valve strap seat
3. Compressor stator linkage arm bracket
4. Bolt.

Figure 9. Compressor Stator Linkage Arm Bracket and Bleed Valve Strap Seat - Installation

12. COMPRESSOR BLEED TUBE ASSEMBLY - INSTALLATION.

(See Figures 10 and 11.)

- a. Apply MIL-L-7808 lubricating oil to bolts(6, figure 10).
- b. Position bleed tube assembly(4) and locking bleed valve strap seat(5) on lower fourth through ninth stage case(1) and secure with 10 bolts.
- c. Torque bolts 45 to 55 pound-inches in sequence shown in figure 11.
- d. Secure bolts(6, figure 10) with MS9226-04 lockwire.
- e. Secure angle bracket(3) to case with bolt(8). Torque bolt 85 to 95 pound-inches.
- f. Secure bleed tube assembly to bracket with bolt(2) and nut(7). Torque nut 75 to 85 pound-inches.



1468 (24X2)

Figure 10. Compressor Bleed Tube Assembly - Removal

1. Fourth through ninth stage case and stator assembly (lower)
2. Bolt
3. Angle bracket
4. Compressor bleed tube assembly
5. Locking bleed valve strap seat
6. Bolt
7. Nut
8. Bolt

Figure 10. Compressor Bleed Tube Assembly - Removal

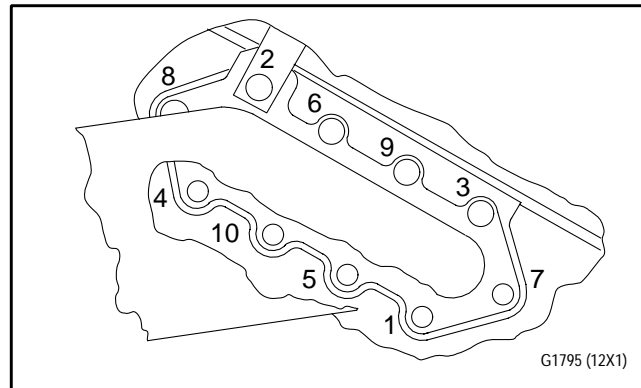


Figure 11. Compressor Bleed Tube Assembly - Torquing Sequence

WORK PACKAGE**TECHNICAL PROCEDURES****ROTOR ASSEMBLY, REAR COMPRESSOR -****ASSEMBLY****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 38

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	10	20	21 - 22	0
2	28	10A - 10B Added	20	23 - 24	30
2A Added	28	11 - 12	0	25	1
2B Blank Added	28	13	29	26	3
3	30	14	2	27	20
4 - 6	20	15 - 16	31	28	0
6A Added	30	17	0	29	20
6B Blank Added	30	18 - 19	8	30	0
7 - 8	30	20	3	31	4
9	0			32	0

REFERENCE MATERIAL REQUIRED

Title	Number
Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Compound, Antigalling (PWA 36545) Application	
(SPOP 748) - - - - -	SWP 098 07

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-536	30 July 95	O/I	Installation of No. 3 Bearing Rear Seal Assembly, PN 4068215 Incorporating No. 3 Bearing Support PN 4068182 or PN 4080875-01 Incorporating No. 3 Bearing Support PN 4080874 and Installation of No. 3 Bearing Air Seal PN 4080811, F100-PW-229 Engines, F16 Aircraft (ECP 91QA186R2)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BEESWAX (PWA 36018)	C-B-191
BRUSH, BRASS	-
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
OIL, LUBRICATING	MIL-L-7808
PENCIL (CRAYON), SILVER METAL MARKING (HARD) (PMC 4059-7)	COLORBRITE NO. 2101 OR ANADEL NO. 1936
PENCIL (CRAYON), SILVER METAL MARKING (HARD)	COLOR-TEX NO. 1843

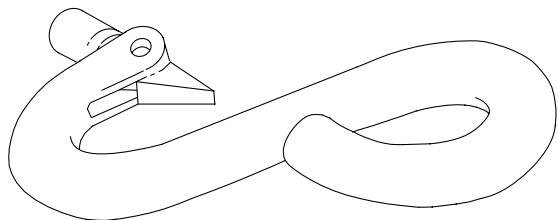
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
LOCK ASSY-COMPRESSOR BLADE, 10TH STAGE	4080787-03	2
LOCK ASSY-COMPRESSOR BLADE, 11TH STAGE	4080787-04	2
LOCK ASSY-COMPRESSOR BLADE, 12TH STAGE	4080787-05	2
LOCK ASSY-COMPRESSOR BLADE, 13TH STAGE	4080787-06	2
LOCK ASSY-COMPRESSOR BLADE, 8TH STAGE	4080787-01	2
LOCK ASSY-COMPRESSOR BLADE, 9TH STAGE	4080787-02	2
SEAL, COMPRESSOR ROTOR	4074839-01	2
SEAL, COMPRESSOR ROTOR	4074839-02	2
SEAL, COMPRESSOR ROTOR	4074839-03	2
SEAL, COMPRESSOR ROTOR	4074839-04	2
SEAL, COMPRESSOR ROTOR	4074839-05	2
SEAL, COMPRESSOR ROTOR	4074839-06	2
SEAL	4077107	74
SEAL	4077108	80

APPLICABLE SUPPORT EQUIPMENT

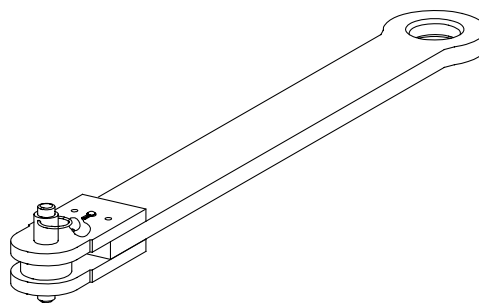
Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR REAR ROTOR - ASSEMBLY	
	STAND, BUILD, REAR COMPRESSOR ROTOR - - - - -	PWA 57722
	SPACER, MODULE - - - - -	PWA 50993
	STAND - - - - -	PWA 50775
		OR
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR	
	REAR HUB - - - - -	PWA 57937
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR	
	HUB - - - - -	PWA 51298
	ARM, LIFT AND TURN - - - - -	PWA 26584
	HOOK, SAFETY - - - - -	PWA 2388
	FIXTURE, LIFTING - - - - -	PWA 57516
	DRIFT, REAR COMPRESSOR REAR HUB HEAT SHIELD - - - - -	PWA 57686
	FIXTURE, TORQUE, INSTALLATION OF COMPRESSOR TIERODS	PWA 57537
3	SIXTH STAGE DISK AND HUB - ASSEMBLY AND INSTALLATION	
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR	
	FRONT HUB - - - - -	PWA 57938
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT	
	HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584
	HOOK, SAFETY - - - - -	PWA 2388
4	FOURTH AND FIFTH STAGE ROTOR - ASSEMBLY AND INSTALLATION	
	FIXTURE, LIFT, 4TH AND 5TH STAGE DISK - - - - -	PWA 57603
	PULLER/PUSHER, 4TH/5TH STAGE DISK TO 6TH STAGE DISK	PWA 57604
	HOLDER, DRY ICE/LN2, 6TH STAGE DISK AND HUB - - - - -	PWA 57707
	HOOK, SAFETY - - - - -	PWA 2388
	HEATER - - - - -	PWA 51932
	PUMP, HYDRAULIC, DOUBLE ACTING - - - - -	PWA 51946
	ADAPTER, COMPRESSOR TIEROD - - - - -	PWA 57608
5	NO. 3 BEARING REAR AIR SEAL - INSTALLATION	
	DRIFT, NO. 3 BEARING AIR SEAL AND SEAT - - - - -	PWA 51673

ILLUSTRATED SUPPORT EQUIPMENT



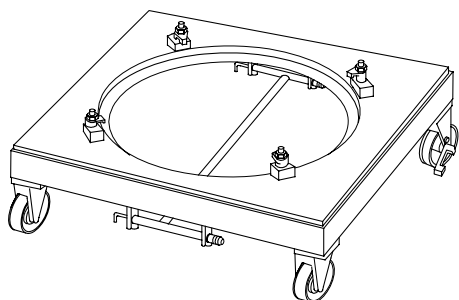
PWA 2388 -C

Figure T1. PWA 2388 HOOK



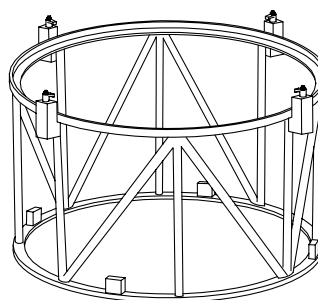
PWA 26584 -C

Figure T2. PWA 26584 ARM



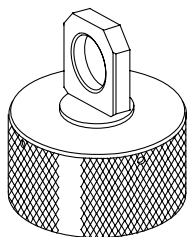
PWA 50775 -C

Figure T3. PWA 50775 STAND



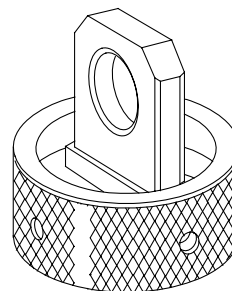
PWA 50993 -C

Figure T4. PWA 50993 SPACER



PWA 51298 -C

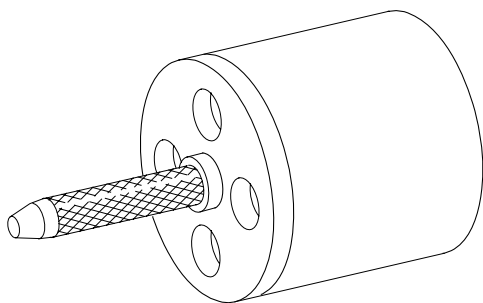
Figure T5. PWA 51298 EYE



PWA 51371 -C

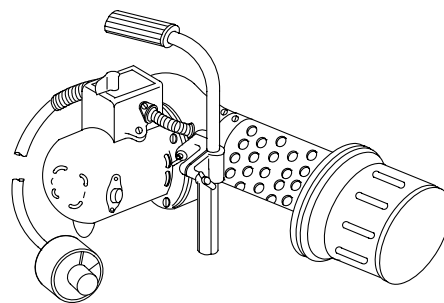
Figure T6. PWA 51371 EYE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



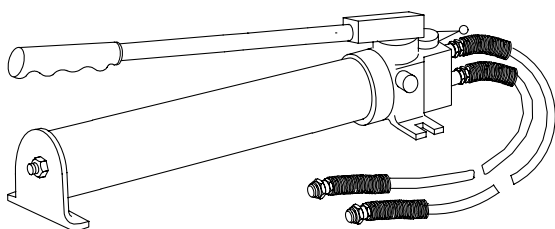
PWA 51673 -C

Figure T7. PWA 51673 DRIFT



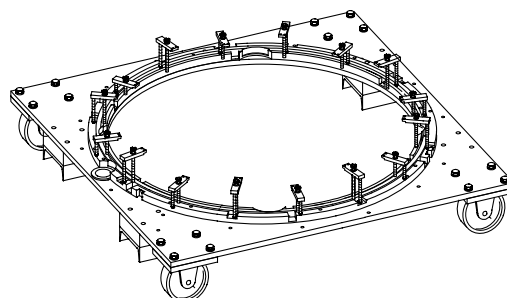
PWA 51932 -C

Figure T8. PWA 51932 HEATER



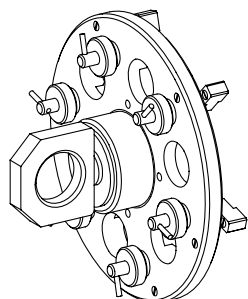
PWA 51946 -C

Figure T9. PWA 51946 PUMP



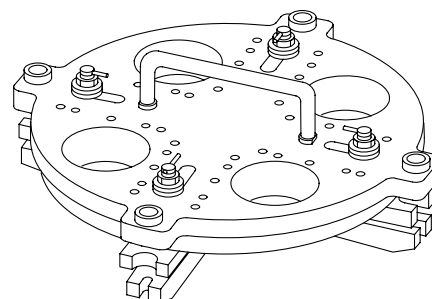
PWA 56338 -C

Figure T10. PWA 56338 STAND



PWA 57516 -C

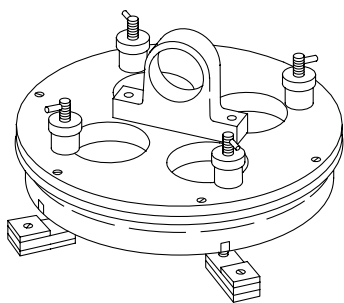
Figure T11. PWA 57516 FIXTURE



PWA 57537 -C

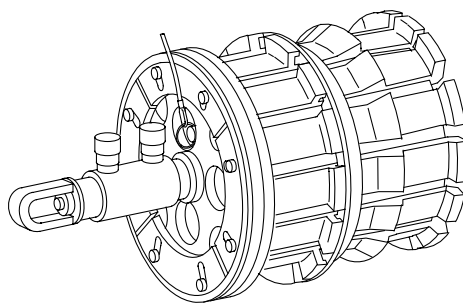
Figure T12. PWA 57537 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



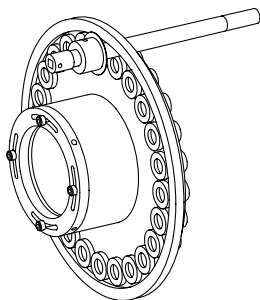
PWA 57603 -C

Figure T13. PWA 57603 FIXTURE



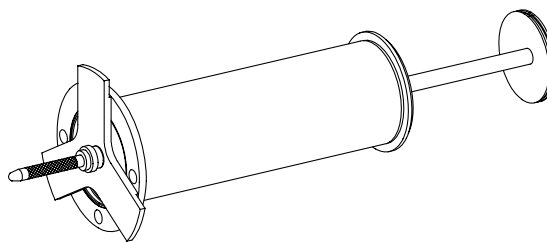
PWA 57604 -C

Figure T14. PWA 57604 PULLER/PUSHER



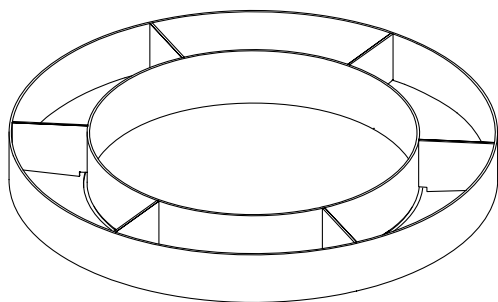
PWA 57608 -C

Figure T15. PWA 57608 ADAPTER



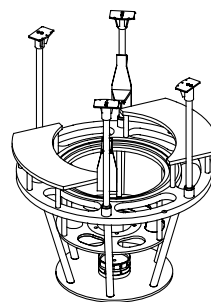
PWA 57686 -C

Figure T16. PWA 57686 DRIFT



PWA 57707 -C

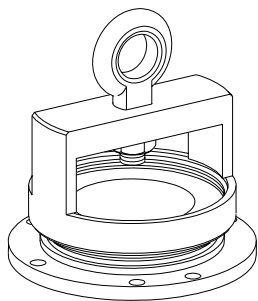
Figure T17. PWA 57707 HOLDER



PWA 57722 -C

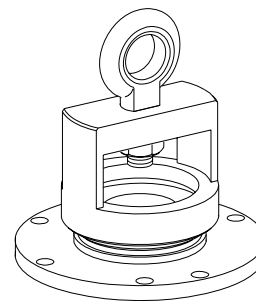
Figure T18. PWA 57722 STAND

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 57937 -C

Figure T19. PWA 57937 FIXTURE



PWA 57938 -C

Figure T20. PWA 57938 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for assembly of rear compressor rotor assembly.

2. REAR COMPRESSOR REAR ROTOR - ASSEMBLY.

(See Figures 1 through 10.)

- a. Prepare PWA 57722 stand for use as follows:

- (1) Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- (2) Position PWA 50993 spacer on PWA 50775 or PWA 56338 stand and secure with stand detail clamps.
- (3) Position PWA 57722 stand in PWA 50993 spacer and secure stand with spacer detail clamps.

NOTE

Rear compressor rear rotor may be in storage in PWA 57837 transportation stand or on workbench.

- a1. If rear compressor rear rotor(3, figure 1) is stored in PWA 57837 transportation stand, proceed to step a2. If rotor is on workbench, install in PWA 57722 stand as follows:

- (1) Install PWA 57937 fixture(1) on driveshaft of rear compressor rear rotor(3).
- (2) Attach PWA 26584 arm(2) to hoist with PWA 2388 hook.
- (3) Attach arm(2) to PWA 57937 fixture(1).
- (4) Lift rear compressor rear rotor(3) from workbench.

- (5) Install PWA 57516 fixture(5) as follows:

- (a) Position PWA 57516 fixture, detail-12 clamp assemblies(4, figure 2) inward prior to installing fixture.

- (b) Install fixture into bore of rear compressor rear rotor, aligning dowel pin(2) with any tierod hole in rotor.

- (c) Turn detail-12 clamp assemblies(4) so feet are under tierod flange and dowel pins(5) point outward. Tighten knurled knobs(3).

- (6) Attach PWA 26584 arm(4, figure 1) to hoist with PWA 2388 hook.

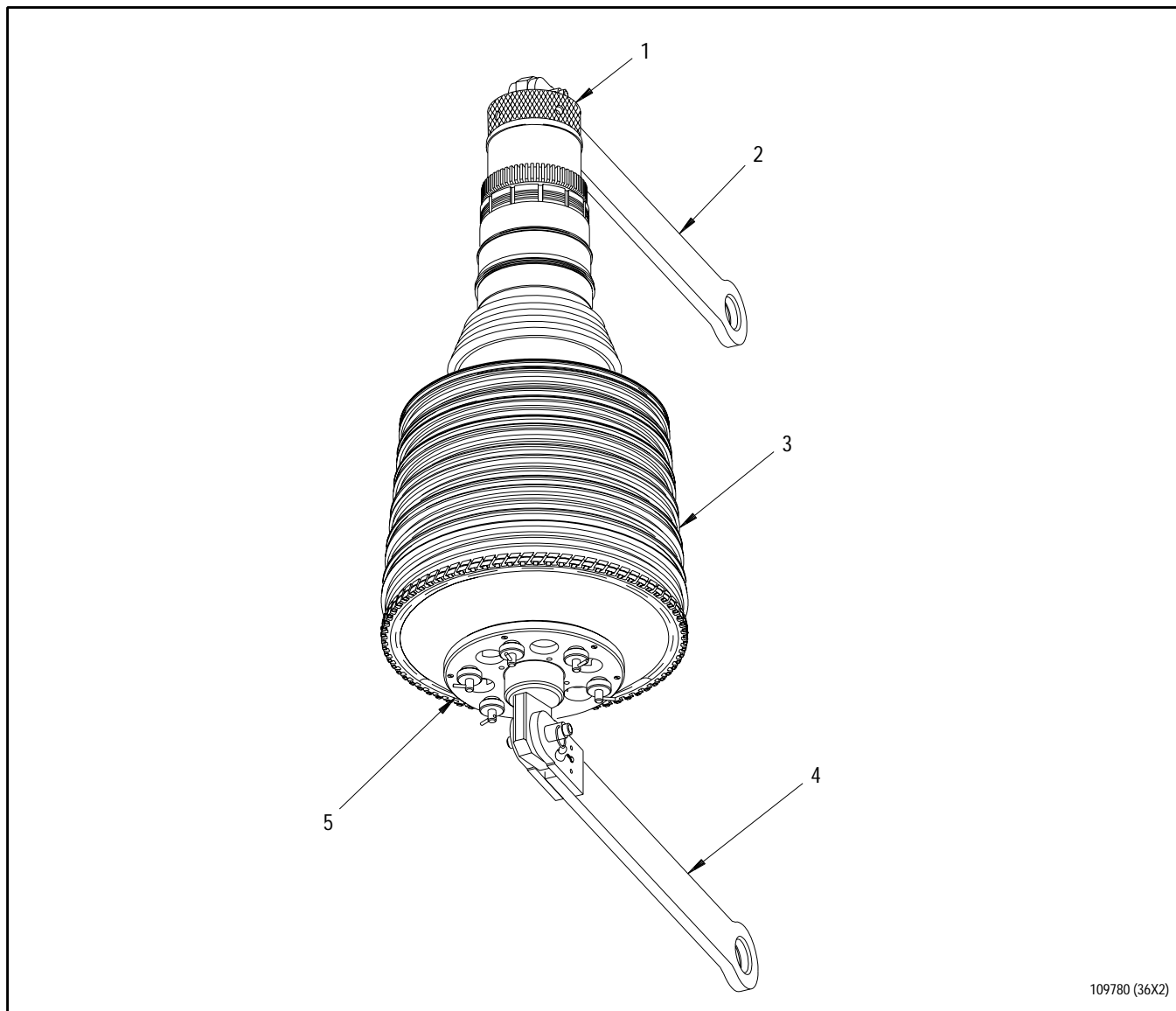
- (7) Attach arm(4) to lifting eye of PWA 57516 fixture(5).

- (8) Work hoists to rotate rear compressor rear rotor(3) to shaft end down position.

- (9) Remove PWA 26584 arm(2) and PWA 57937 fixture(1) from driveshaft of rear compressor rear rotor(3).

- (10) Lower rear compressor rear rotor(3) into PWA 57722 stand. Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate.

- (11) Remove PWA 26584 arm(4) and PWA 57516 fixture(5).



109780 (36X2)

1. PWA 57937 fixture
2. PWA 26584 arm
3. Rear compressor rear rotor
4. PWA 26584 arm
5. PWA 57516 fixture

Figure 1. Rear Compressor Rear Rotor - Rotating

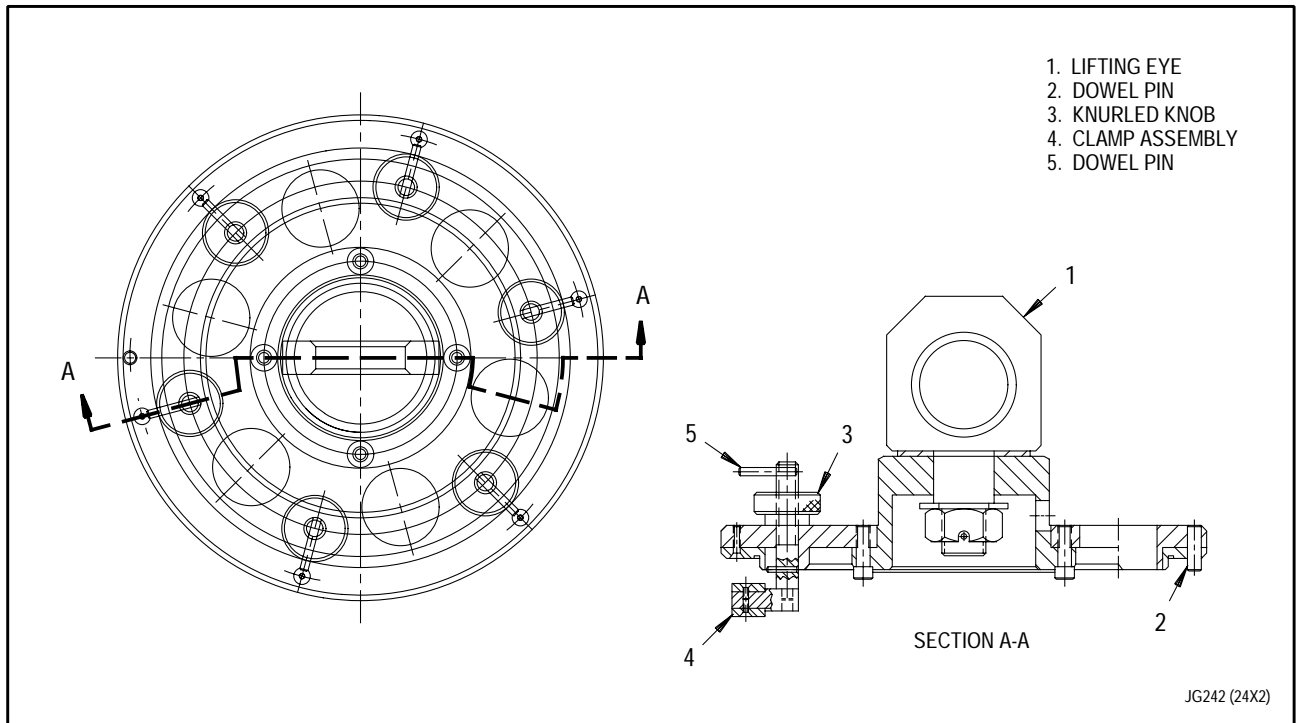


Figure 2. Installation of PWA 57516 Lift Fixture

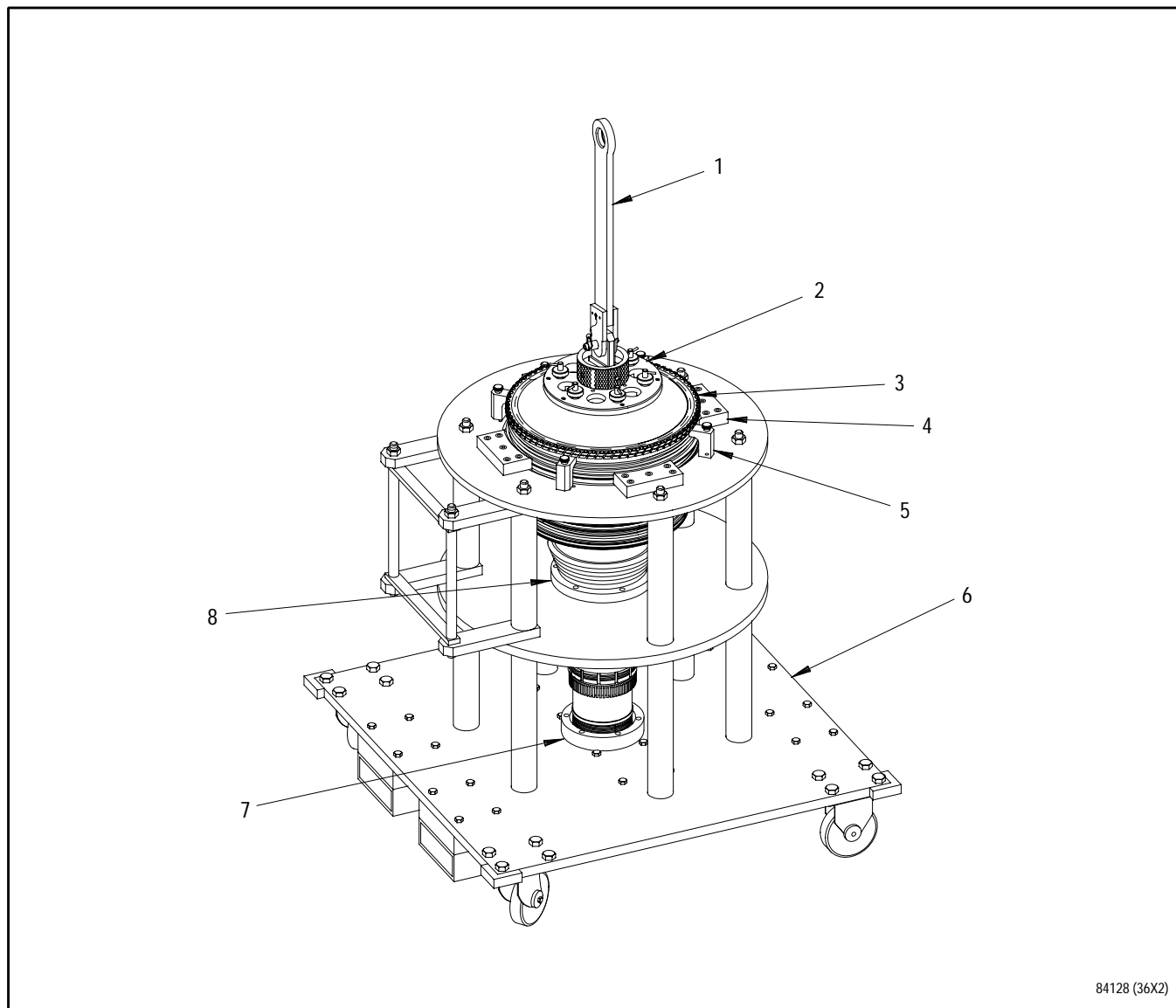
a2. If rear compressor rear rotor(3, figure 2A) is stored in PWA 57837 transportation stand(6), install in PWA 57722 build stand as follows:

- (1) Install PWA 57516 lift fixture(2) as follows:
 - (a) Position PWA 57516 lift fixture, detail-12 clamp assemblies(4, figure 2) inward prior to installing lift fixture.
 - (b) Install lift fixture into bore of rear compressor rear rotor, aligning dowel pin(2) with any tierod hole in rotor.
 - (c) Turn detail-12 clamp assemblies(4) so feet are under tierod flange and dowel pins(5) point outward. Tighten knurled knobs(3).
- (2) Attach PWA 26584 lifting arm(1, figure 2A) to hoist with PWA 2388 hook.
- (3) Attach lifting arm(1) to lifting eye of PWA 57516 lift fixture(2).
- (4) Loosen knurled knobs and rotate clamps(5) on PWA 57837 stand counterclockwise to open.



Failure to use care when raising rear compressor rear rotor from stand can result in damage to rotor knife-edge seals.

- (5) Steady rotor by hand and slowly raise it from PWA 57837 stand. Carefully guide rotor as each stage of knife-edge seals pass through top plate and upper guide support blocks(4) and as driveshaft passes through center support ring(8).
 - (6) Lower rear compressor rear rotor(3) into PWA 57722 build stand. Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate.
 - (7) Remove PWA 26584 lifting arm(1) and PWA 57516 lift fixture(2).
- b. Install heat shield(5, figure 3) into hub of rear compressor rear rotor(6) using PWA 57686 drift(1) as follows:
- (1) Install detail-2 protective sleeve(2) into bore of rear compressor rear rotor(6).
 - (2) Install heat shield(5) over detail-1 piston assembly(3).
 - (3) Install heat shield(5) and detail-1 piston assembly(3) through detail-2 protective sleeve(2) and seat using nonmetallic hammer.
 - (4) Remove PWA 57686 drift(1).



84128 (36X2)

1. PWA 26584 lifting arm
2. PWA 57516 lift fixture
3. Rear compressor rear rotor
4. Upper guide support block
5. Clamp
6. PWA 57837 transportation stand
7. Lower guide ring
8. Center support ring

Figure 2A. Rear Compressor Rear Rotor - Removal From PWA 57837 Transportation Stand

- (5) Position PWA 57516 lift fixture, detail-12 clamp assemblies(4, figure 2) inward prior to installing lift fixture.
- (6) Install lift fixture into bore of rear compressor rear rotor, aligning dowel pin(2) with any tierod hole in rotor.
- (7) Turn detail-12 clamp assemblies(4) so feet are under tierod flange and dowel pins(5) are pointing outward. Tighten knurled knobs(3).
- (8) Attach hoist to detail-16 lifting eye(1) with PWA 2388 hook.
- (9) Work hoist to lift rear compressor rear rotor(6, figure 3) from PWA 57722 build stand.
- (10) Install retaining ring(4) in hub of rear compressor rear rotor(6). Ensure retaining ring is seated in ring groove.
- (11) Lower rear compressor rear rotor(6) into PWA 57722 build stand. Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate.
- (12) Remove PWA 57516 lift fixture.

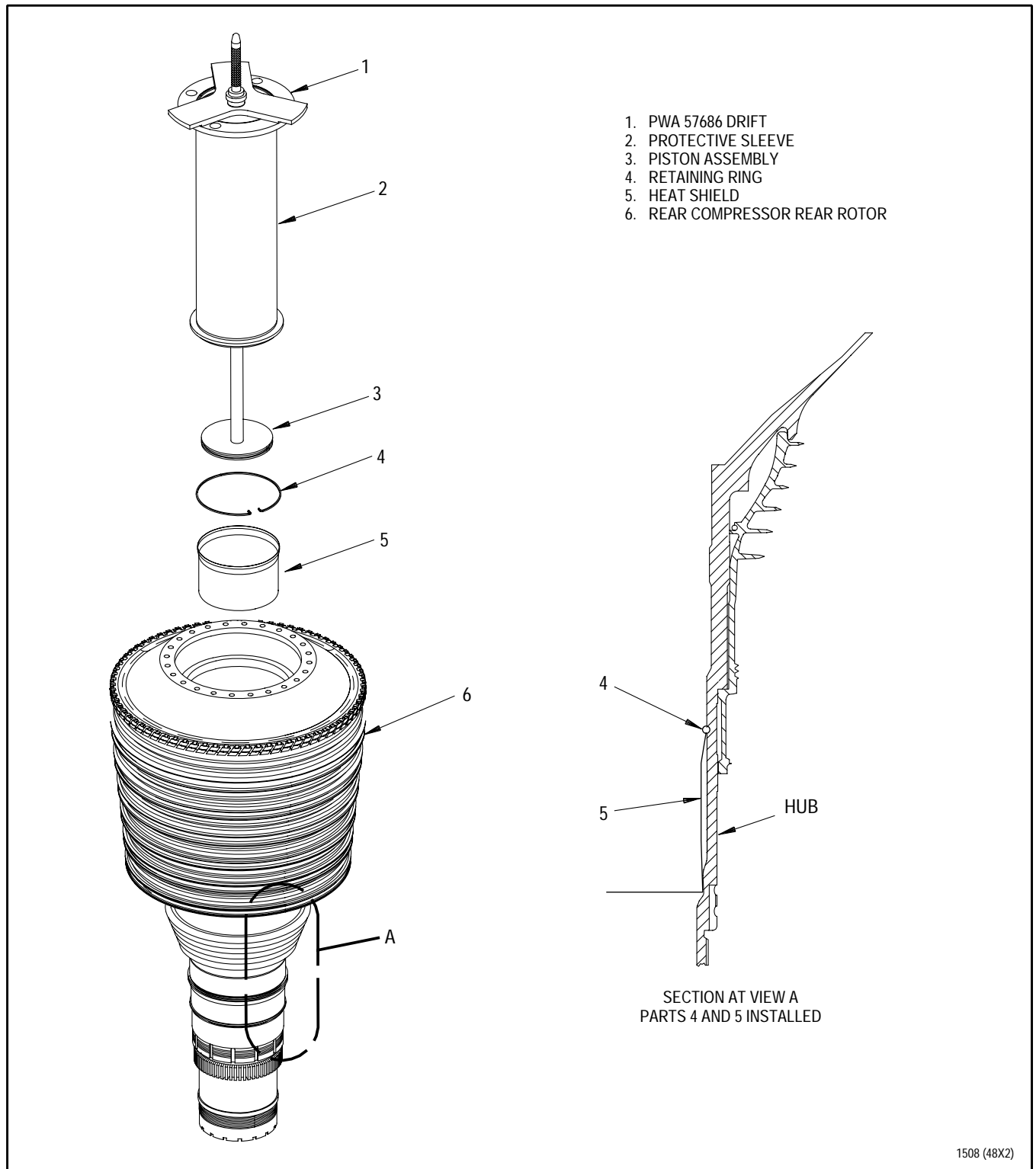


Figure 3. Rear Hub Heat Shield - Installation

c. Install tierods(3, figure 4) and nuts(6) as follows:

- (1) Apply PWA 36545 antigalling compound per
T.O. 2J-F100-53-1,
SWP 098 07 to 24 tierod
nuts(6).
- (2) Burnish tierod nuts(6) with
a brass brush to remove
excess antigalling compound.
- (3) Hold tierod nut(6) inside
rear compressor rear
rotor(5) and thread
tierod(3), (beveled end of
tierod to the rear) into
nut. Tighten tierods hand
tight only. Install
remaining tierods and nuts.

d. Torque tierods(3) using
PWA 57537 torque fixture as
follows:

- (1) Move PWA 57537 torque
fixture, detail-11 slide
assemblies(1) inward prior
to installation of tool.
- (2) Carefully lower PWA 57537
fixture onto rear compressor
rear rotor(5) aligning four
bushings(4) with any four
tierods(3).

(3) Move detail-11 slide
assemblies(1) to outward
most position.

(4) Tighten nut on detail-4
swing bolt(2). This will
hold tierod nut(6) square.

(5) Using a standard stud driver
and torque wrench, torque
tierods(3) 500 to 550 pound
inches.

(6) Release detail-11 slide
assemblies(1).

(7) Lift torque fixture and move
to adjacent set of
tierods(3). Continue
procedure until all tierods
are torqued.

(8) Remove PWA 57537 torque
fixture.

e. Locate high point mark C and
unbalance mark A on rear
compressor rear rotor. See
figure 5 for typical location of
high point and unbalance marks.
Using silver pencil, transpose
marks to area between seventh
and eighth stage of rotor.

- f. Install 8th through 13th stage compressor rotor blades(1, figure 6) as follows:

NOTE

- Installation of 8th through 13th stage blades is the same.
- For ease of maintenance, blades can be installed from either direction starting at disk loading slot.

- Compressor rotor seals can be identified by locating and counting the number of bands at end of wire. One band is for 8th stage, two bands are for 9th stage, three bands are for 10th stage, four bands are for 11th stage, five bands are for 12th stage, and six bands are for 13th stage.

- (1) Inspect compressor rotor seals(9) and discard seals with wear of any kind. Install 8th through 13th stage seals(9) into forward and aft groove of each disk, locating end gaps 180 degrees apart in each disk. Secure seals in place with beeswax.

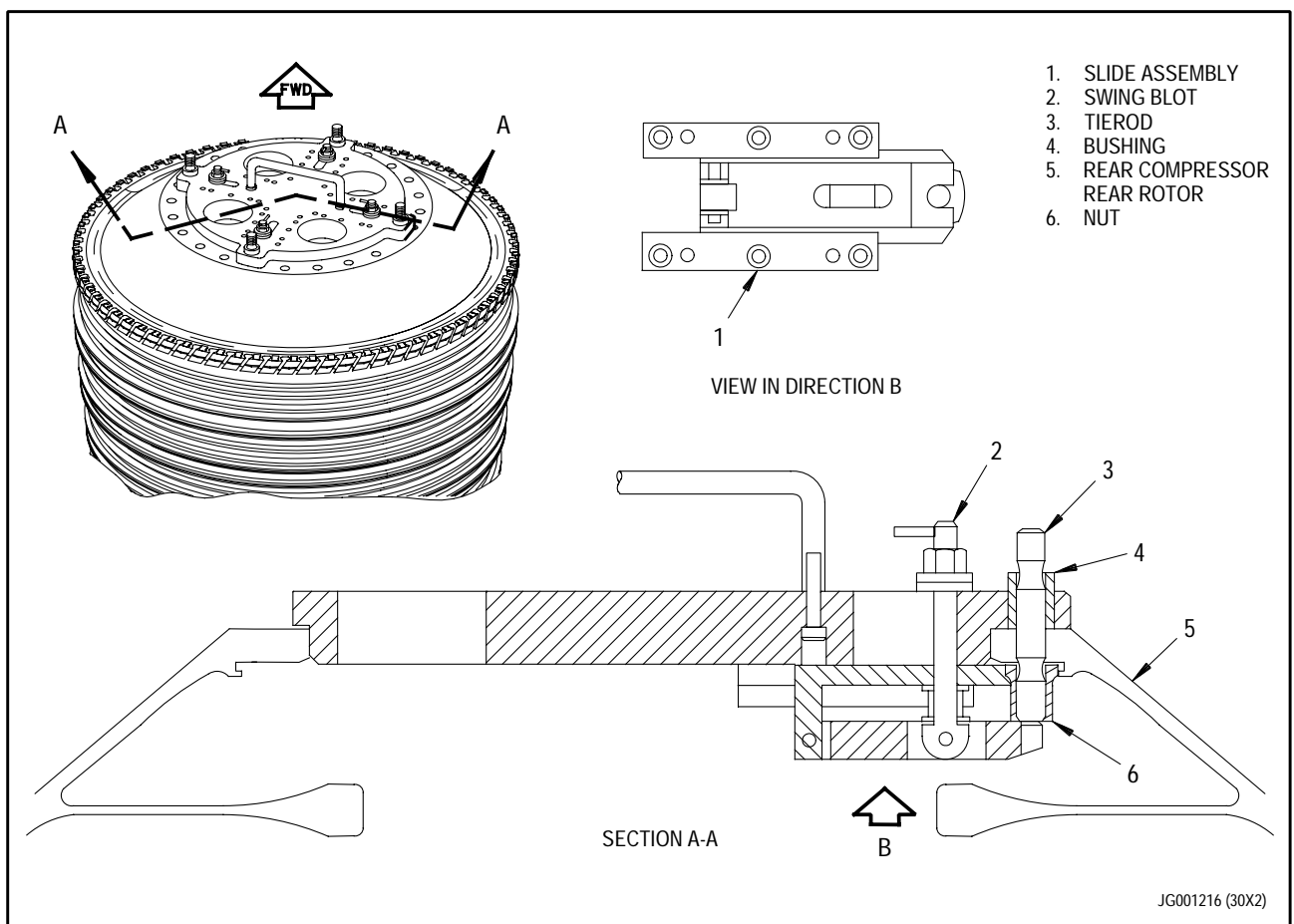


Figure 4. Installation of Tierods Using PWA 57537 Torque Fixture

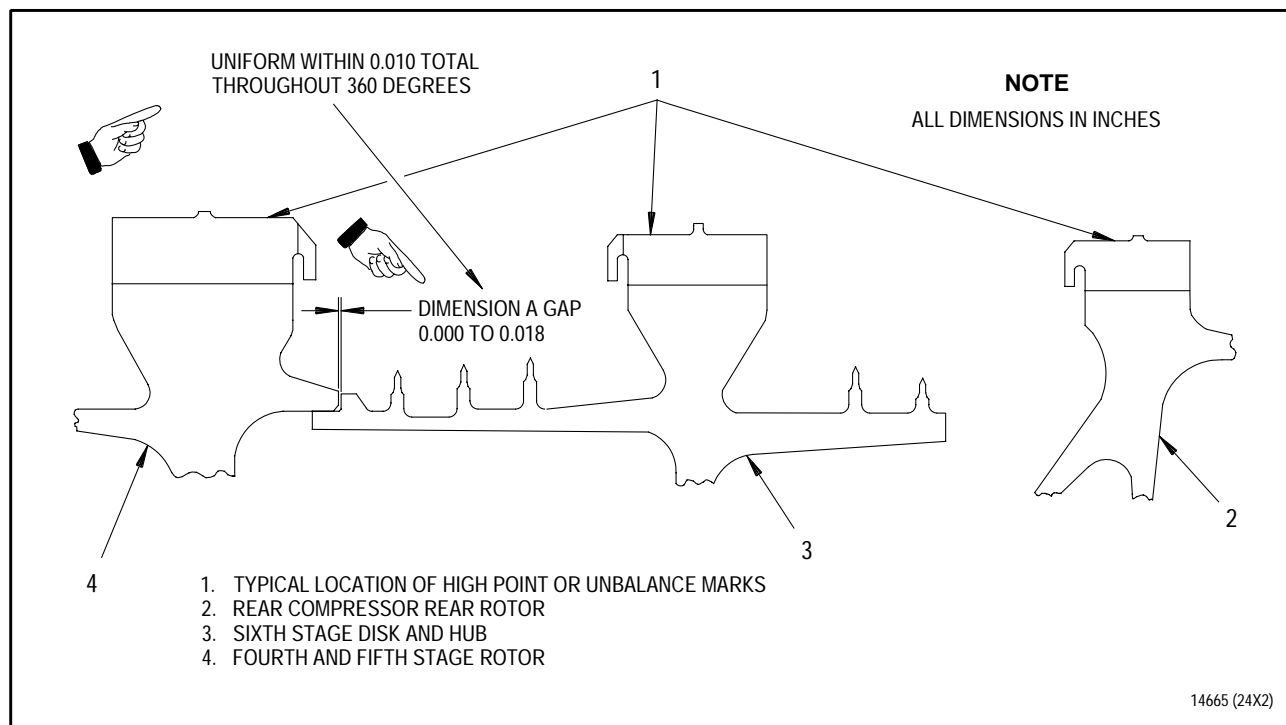
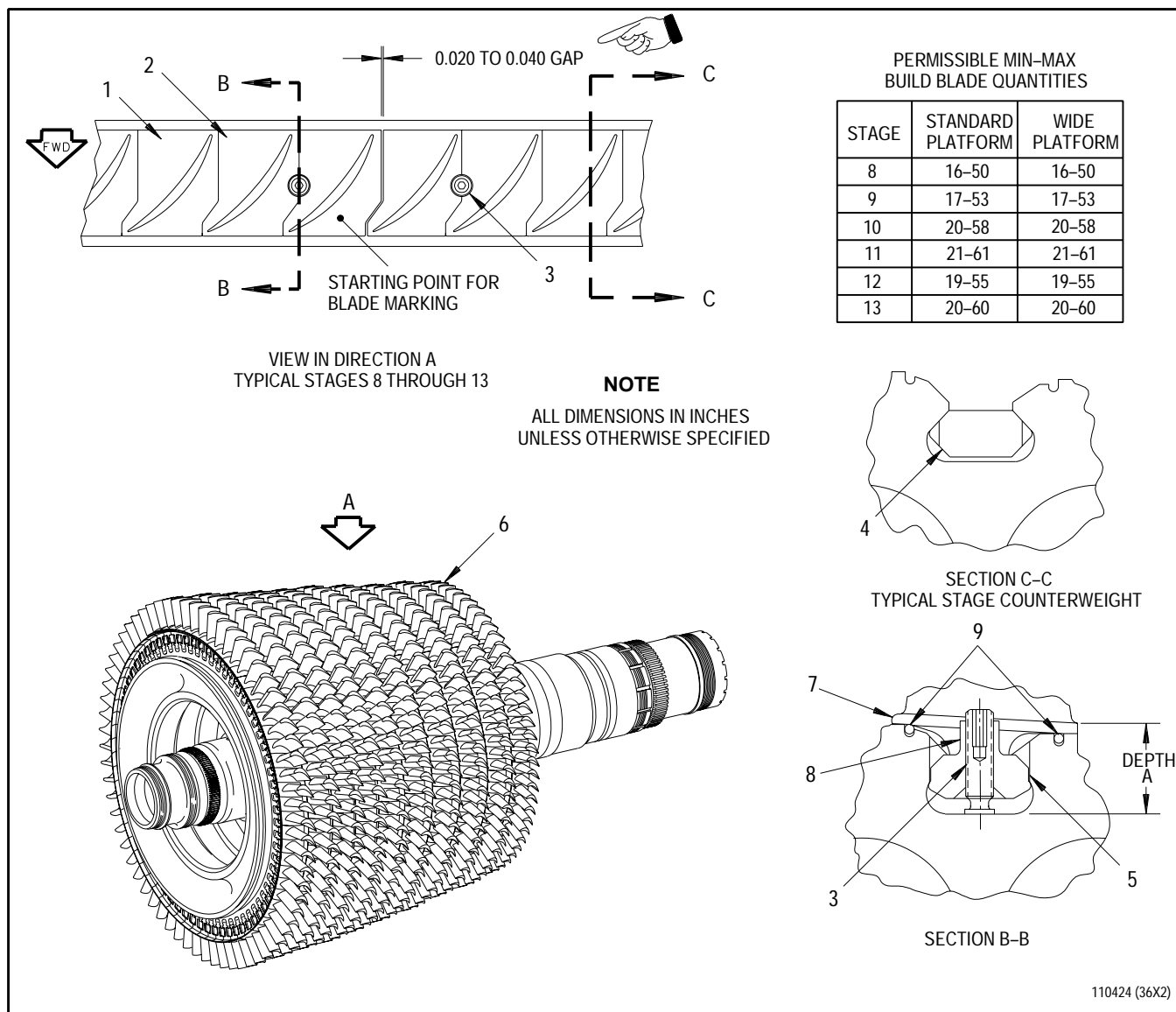


Figure 5. Typical Location of High Point or Unbalance Marks



- | | |
|--------------------------------|------------------------------|
| 1. Compressor rotor blade | 6. Compressor rotor assembly |
| 2. Locking blade (4 per stage) | 7. Blade platform |
| 3. Setscrew (2 per stage) | 8. Blade lock shank |
| 4. Counterweight (typical) | 9. Compressor rotor seal |
| 5. Blade lock (2 per stage) | |

Figure 6. Eighth Through Thirteenth Stage Compressor Rotor Blades - Installation (Typical)

(2) Using silver pencil, mark center of both locking blade slots and transpose marks onto rear face of disk.

(3) Verify seals(9) are below or flush to disk outermost diameter.

NOTE

- A distribution of wide blades and standard blades evenly mixed around disk circumference is preferred but not required.
 - Locking blades are located on each side of loading slot.
 - Locking blades have same platform width as standard blades.
- (4) Lay out and arrange 8th through 13th stage blades, standard, wide, and locking blades. (See figure 7 for typical blade layout pattern.)



Do not re-use blade locks.

NOTE

Use of new blade lock(5, figure 6) is required.

(5) Install compressor rotor blades(1), three locking blades(2), and one new blade lock(5) into disk loading slot. Ensure blade lock is installed in proper stage as marked. Tighten blade lock. Do not install final blade lock and locking blade.

g. Measure maximum blade gap as follows:

NOTE

Blades should be positioned in a radially outward direction while applying circumferential force. This will ensure the blade set remains straight during gap measurement.

- (1) Apply a circumferential force to platforms of outermost blades in blade set. If necessary, a nonmetallic drift and hammer can be used.
- (2) While applying force, measure gap at missing locking blade location. Record as dimension B.
- (3) Measure platform width of final locking blade to be installed. Record as dimension C.
- (4) Subtract dimension C from dimension B to obtain dimension D. Dimension D must be between 0.020 and 0.040 inch gap. See figure 6.
- (5) Loosen blade lock(5).
- (6) If dimension D is not within limits, do the following:
 - (a) Remove locking blades(2) and blade lock(5) from disk loading slot.

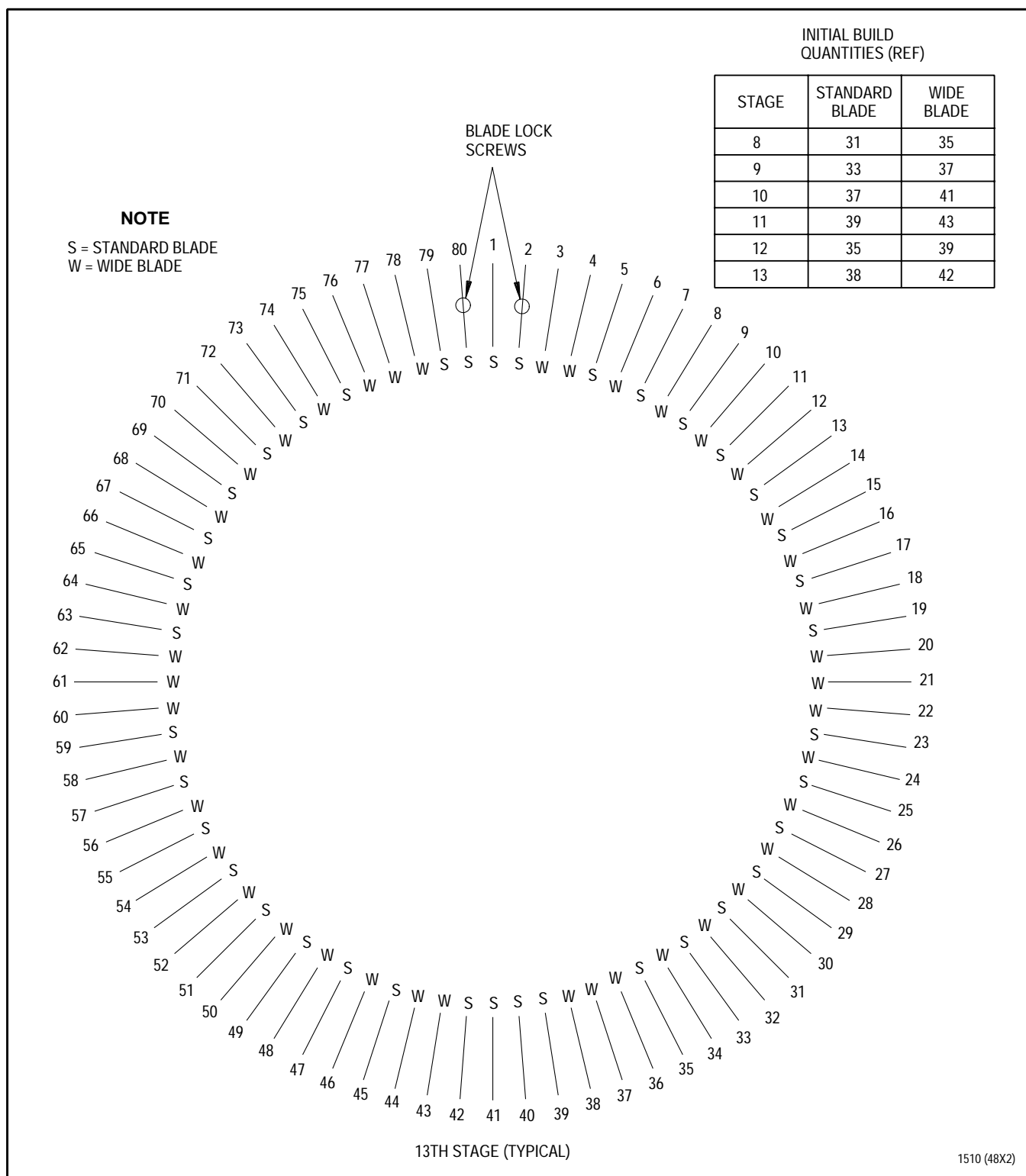


Figure 7. Typical Blade Lay-Out Pattern

NOTE

Compressor rotor blades have either wide or standard sized blade platforms. The width of a wide blade platform is 0.010 inch greater than the width of a standard blade platform.

(b) Remove blade(1) adjacent to disk loading slot. Replace blade with a blade having a wide or standard sized blade platform in order to obtain dimension D.

(c) Install locking blades(2) and blade lock(5) into disk loading slot. Do not install final blade lock and locking blade. Measure gap again.

h. Install final locking blade(2) and blade lock(5) into disk loading slot. Ensure blade lock is installed in proper stage as marked.

i. Tap blade set around disk approximately 1/2 blade platform width to align setscrew(3) with mark on rear face of disk.

j. Deleted.

k. Using CMS-5 (NSN 5120-00-439-8267) Allen wrench or equivalent, for hex head setscrews, tighten two blade lock setscrews(1, figure 8) as follows:

(1) Ensure setscrew of blade locks(4) are backed out completely before tightening.

NOTE

Setscrew must bottom out against disk within 3 1/2 to 6 1/2 turns.

(2) Tighten setscrew(1) and count number of turns required to bottom out setscrew against disk(5). Number of turns shall be 3 1/2 to 6 1/2. If number of turns is less than 3 1/2 or more than 6 1/2, do the following:

(a) Loosen setscrew(1).

(b) If number of turns is less than 3 1/2, realign blade lock(4) to ensure it is properly installed in disk(5).

(c) If number of turns is greater than 6 1/2, recheck blade lock stage marking for proper stage.

(d) Retighten setscrew(1) per steps k.(1) and k.(2).

(3) Deleted.

(b) Deleted.

(a) Deleted.

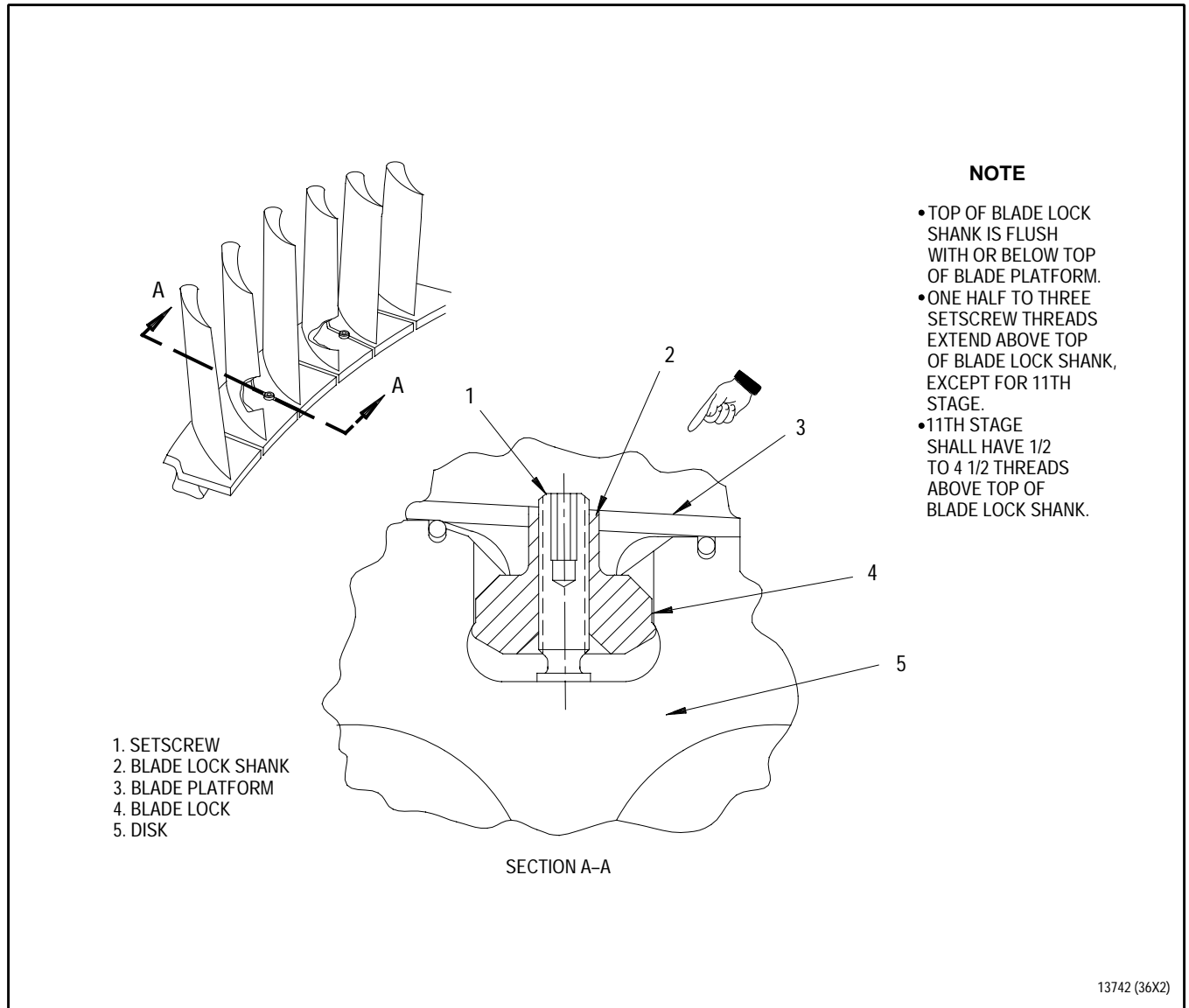


Figure 8. Compressor Rotor Blade Lock - Installation (Typical)

- (4) Torque two hex head (fluted) setscrews(1) as follows:

NOTE

While rotating setscrew through 360 degrees, torque will fluctuate from zero to a peak value. Peak value of 1.5 to 11 pound-inches is required.

- (a) Tighten setscrew and determine torque value just prior to seating blade lock against drum. Torque value shall be 1.5 to 11 pound-inches. If this requirement is not satisfied, replace blade lock assembly.
- (b) Torque setscrews(1) 1 to 3 pound-inches above torque value determined in step k.(4) (a) above.
- (5) Ensure top of blade lock shank(2) is flush with or slightly below top of blade platform(3).
- (6) Ensure 1/2 to 3 threads of setscrew(1) extend above top of blade lock shank(2), except for 11th stage. Eleventh stage blade lock shall have 1/2 to 4 1/2 threads visible above top of blade lock shank(2). If visible number of threads is outside range, do the following:
- (a) Loosen setscrew(1).

- (b) Realign blade lock(4) to ensure it is properly installed in disk(5).

- (c) Retighten setscrew(1) per step k.

1. Install seventh stage compressor rotor blades(2, figure 9) as follows:

- (1) Install adhesive backed seal(3) under root of blades(2).
- (2) Slide blades(2) into disk. Load blades against blade slots and secure to each other in pairs with rubber bands.
- (3) Install lockring(1) into groove in forward face of disk, to secure blades to disk.
- (4) Measure gap between ends of lockring(3, figure 10). Dimension shall be 0.030 to 0.100 inch.
- (5) Verify lockring(3) engages tangs of all compressor rotor blades(1).
- (6) Remove rubber bands securing blades.

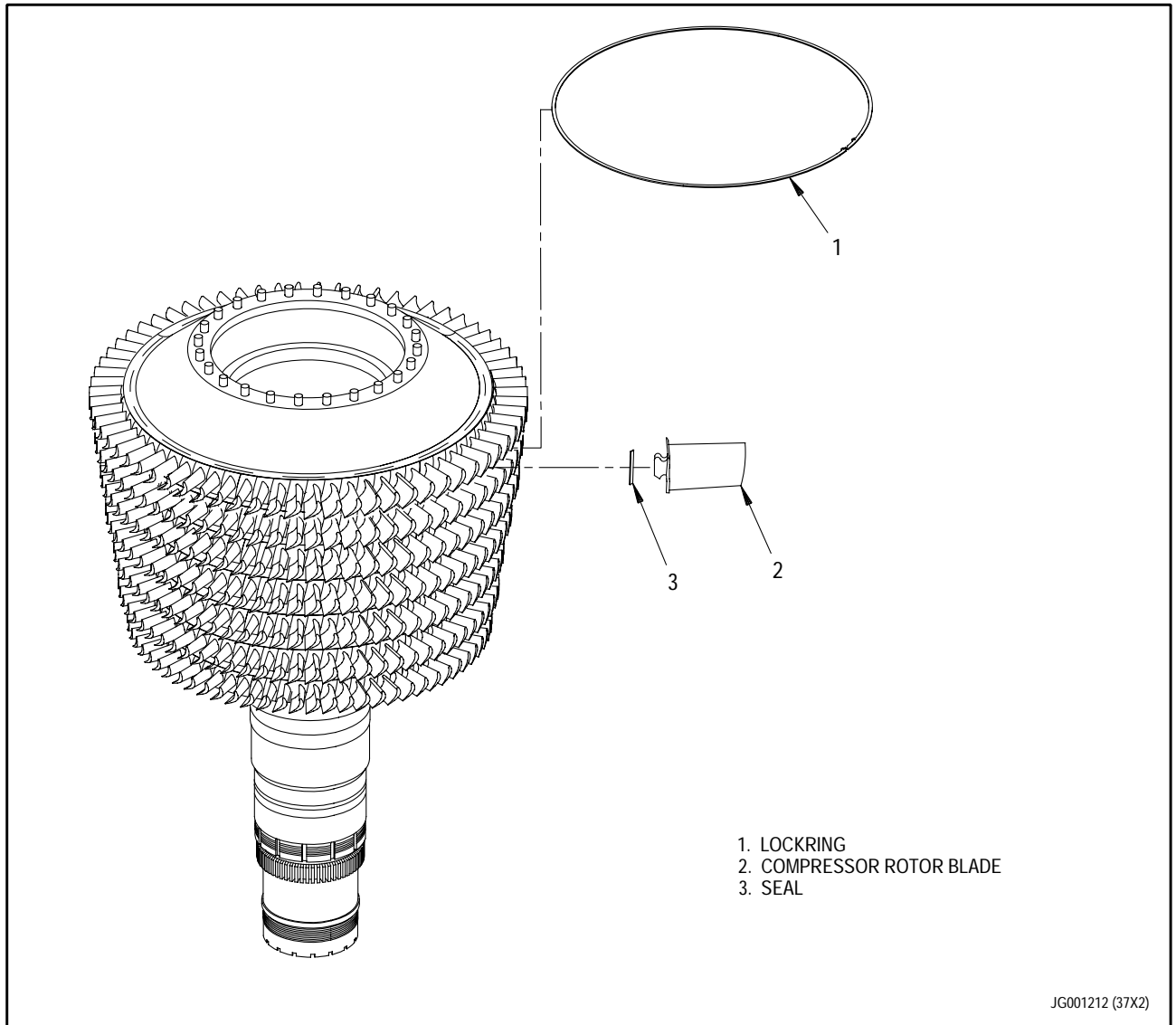


Figure 9. Seventh Stage Compressor Rotor Blades - Installation

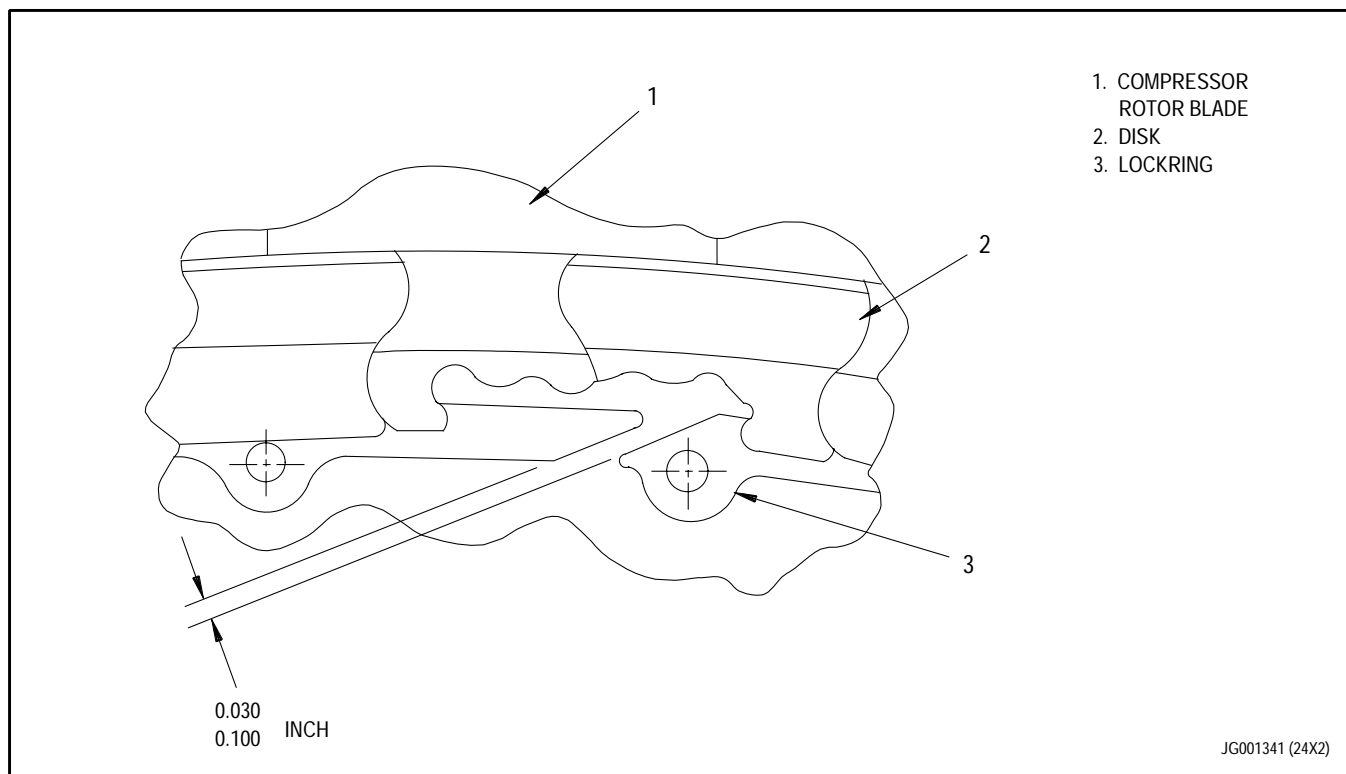


Figure 10. Compressor Rotor Blade Lockring - Installation

3. SIXTH STAGE DISK AND HUB - ASSEMBLY AND INSTALLATION.

(See figures 5, 10 and Figure 11.)

- a. Locate high point mark D on 6th stage disk and hub. See figure 5 for typical location of high point mark. Using silver pencil, transpose mark to forward face of 6th stage disk.
- b. Install adhesive backed seal(5, figure 11) under root of blades(6).
- c. Slide blades(6) into disk. Load blades against blade slots and secure to each other in pairs with rubber bands.
- d. Install lockring(4) into groove in forward face of disk, to secure blades to disk.
- e. Measure gap between ends of lockring(3, figure 10). Dimension shall be 0.030 to 0.100 inch.
- f. Verify lockring(3) engages tangs of all compressor rotor blades(1).
- g. Remove rubber bands securing blades.
- h. Thread PWA 57938 fixture(2, figure 11) on hub of 6th stage disk and hub(3).
- i. Attach PWA 26584 arm(1) to hoist with PWA 2388 hook.
- j. Attach PWA 26584 arm(1) to PWA 57938 fixture(2).



Use caution when installing 6th stage disk and hub not to damage threads of tierods.

- k. Install 6th stage disk and hub onto rear compressor rear rotor. Align high point mark D on 6th stage disk and hub, 180 degrees opposite high point mark C on rear compressor rear rotor.

Legend for figure 11

1. PWA 26584 arm
2. PWA 57938 fixture
3. 6th stage disk and hub
4. Lockring
5. Seal
6. Compressor rotor blade

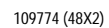


Figure 11. Sixth Stage Disk and Hub - Assembly and Installation

4. FOURTH AND FIFTH STAGE ROTOR - ASSEMBLY AND INSTALLATION.

(See figures 5, 10 and Figures 12 through 14.)

- a. Locate unbalance mark B on fourth and fifth stage rotor. See figure 5 for typical location of unbalance mark. Using silver pencil, transpose mark to forward face of fourth stage disk.
- b. Place drum rotor on bench over fifth stage lock ring.
- c. Place fourth stage lockring on forward face of fifth stage disk.

NOTE

- Step d. is an alternate method of arranging blades in sets and may be used instead of step e.
 - Installation of fourth and fifth stage blades is the same.
 - Fourth and fifth stage blades are pan weighed and installed in sets. A blade set consists of two blades of same pan weight within 0.02 ounces. Ensure matched blade 180 degrees away is within 0.02 ounces.
- d. Install fourth and fifth stage blades as follows:
 - (1) Place blades(1, figure 12) into blade sets, with heaviest blade of each stage matched with next heaviest blade from same stage.

- (2) Install blades so each blade of matched set is 180 degrees opposite each other. Retain blades with rubber bands.
 - (3) Install next set of blades so lightest blade of set is next to heaviest blade of adjacent set. Continue installing blade sets so heaviest blade of each set is adjacent to lightest blade of next set.
- e. Lay out blades in sets so pan weights of blades are within 0.02 ounces.
 - (1) Arrange blades so matched blades of each set are installed 180 degrees apart.
 - (2) Number blades in order of installation.
 - (3) Install blades in order and retain with rubber bands.

- f. Install lockring(2) into groove in rear face of disk, position lockring split under blade lug(1, figure 10) as shown. Secure blades to disk.
- g. Measure gap between ends of lockring(3, figure 10). Dimension shall be 0.030 to 0.100 inch.
- h. Verify lockring(3) engages tangs of all compressor rotor blades(1).
- i. Remove tape securing blades.
- j. Repeat steps d through i for installation of fifth stage blades.
- j1. When it is necessary to move fourth and fifth stage rotor around shop, use PWA 57603 lift fixture.

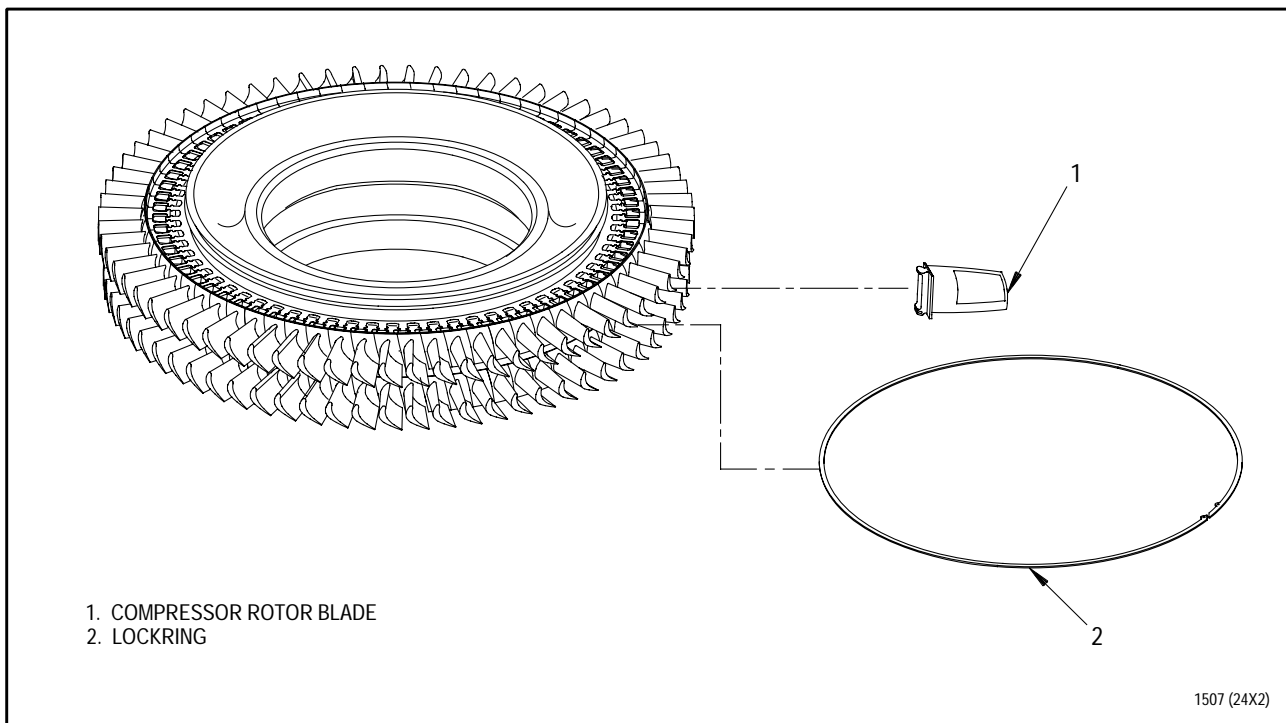


Figure 12. Fourth and Fifth Stage Compressor Rotor Blades - Installation (Typical)

- k. Install 4th and 5th stage rotor(7, figure 13) using PWA 57604 pusher/puller as follows:
- (1) Chill snap diameter, forward of 6th stage disk, with LN2 for a minimum of 5 minutes using PWA 57707 holder or dry ice in plastic bags for at least 20 minutes.
 - (2) Install detail-14 nylon protector(8) in ID bore of 4th and 5th stage rotor(7).
 - (3) Install detail-12 collet(10) through center of disk bore until it rests on detail-14 nylon protector(8).
 - (4) Install detail-13 spreader(9) in center of detail-12 collet(10) and tap on upper surface until detail-13 spreader is seated on shoulder of detail-12 collet.
 - (5) Install hydraulic cylinder(2), detail-16 plate(14) and detail-11 puck(11).
 - (6) Load detail-7 jaw ring segments(13) inward to capture detail-12 collet(10) and secure with detail-6 ring(4).
 - (7) Thread detail-8 nut (5) onto 6th stage hub(6).
 - (8) Attach hoist and PWA 2388 hook to hoist ring(1).
 - (9) Use PWA 51932 heat gun to heat snap diameter rear of 5th stage disk, 150° to 160°F (65° to 71°C) for 30 minutes.
 - (10) Remove LN2 holder or bags of dry ice.
 - (11) Install 4th and 5th stage rotor(7) over 6th stage hub(6). Align unbalance mark B on 4th and 5th stage rotor, 180 degrees opposite unbalance mark A on rear compressor rear rotor.
 - (12) Remove hoist and PWA 2388 hook.
 - (13) Rotate PWA 57604 pusher/puller, detail-11 puck(11) to engage shoulder bolts(12). Install ball lock pin(3) to prevent rotation.
 - (14) Connect PWA 51946 hydraulic hand pump to couplers of hydraulic cylinder(2).

NOTE

Hydraulic cylinder couplers are identified as RET and ADV.

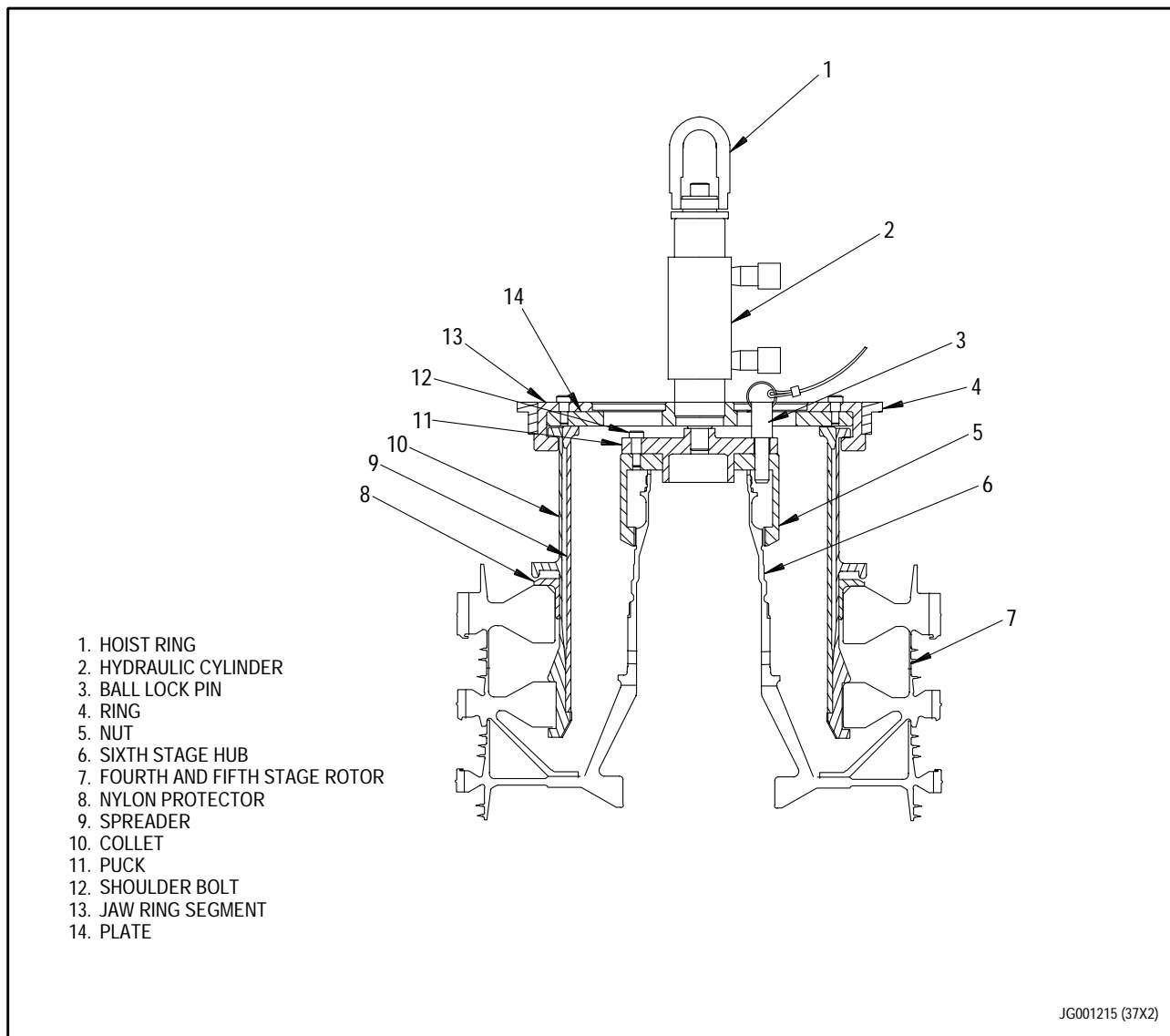


Figure 13. Installation of Fourth and Fifth Stage Rotor Using PWA 57604 Pusher/Puller

- (15) Ensure tierods are properly aligned and apply hydraulic pressure and seat 4th and 5th stage rotor(7) to 6th stage hub(6). Do not exceed 3000 psi to seat 4th and 5th stage rotor.
 - (16) Hold pressure on 4th and 5th stage rotor until temperatures normalize.
 - (17) Remove PWA 51946 hydraulic hand pump and PWA 57604 pusher/puller.
- l. Verify 5th and 6th stage disks are seated using 0.001 inch feeler stock between bolt flange on 4th through 5th stage drum and 6th stage disk and hub, and air seal gap, reference Dimension A. (See figure 5.) If feeler stock cannot be inserted between flanges, and Dimension A is obtained, disks are seated. If 0.001 inch feeler stock can be inserted or Dimension A is not obtained, remove 4th through 5th stage drum and reinstall per steps k and l.
- m. Install and torque tierod nuts(5, figure 14) using PWA 57608 adapter as follows:
- (1) Apply PWA 36545 antigalling compound to 24 tierod nuts(5). Refer to T.O. 2J-F100-53-1, SWP 098 07.
 - (2) Burnish tierod nuts(5) with a brass brush to remove excess antigalling compound.
 - (3) Install tierod nuts(5), handtight.
 - (4) Install PWA 57608 tierod nut adapter(2) over 6th stage hub(3).
 - (5) Torque tierod nuts(5) 300 to 350 pound-inches in pairs, 180 degrees apart in sequence as marked on PWA 57608 adapter.
 - (6) Repeat torquing until all tierod nuts(5) maintain torque without turning.
 - (7) Apply angle of turn to tierod nuts(5), one at a time while maintaining torque on all other tierod nuts as follows:
 - (a) Loosen tierod nut(5).
 - (b) Torque tierod nut(5) 35 to 40 pound-inches above run on torque.
 - (c) Apply angle of turn 125 degrees \pm 2 degrees. Ensure torque on tierod nut(5) is 550 to 1200 pound-inches. If required torque is not obtained, replace tierod nut.
 - (d) Apply angle of turn to each tierod nut(5) in sequence as marked on PWA 57608 tierod nut adapter(2).
 - (8) Remove PWA 57608 tierod nut adapter(2).

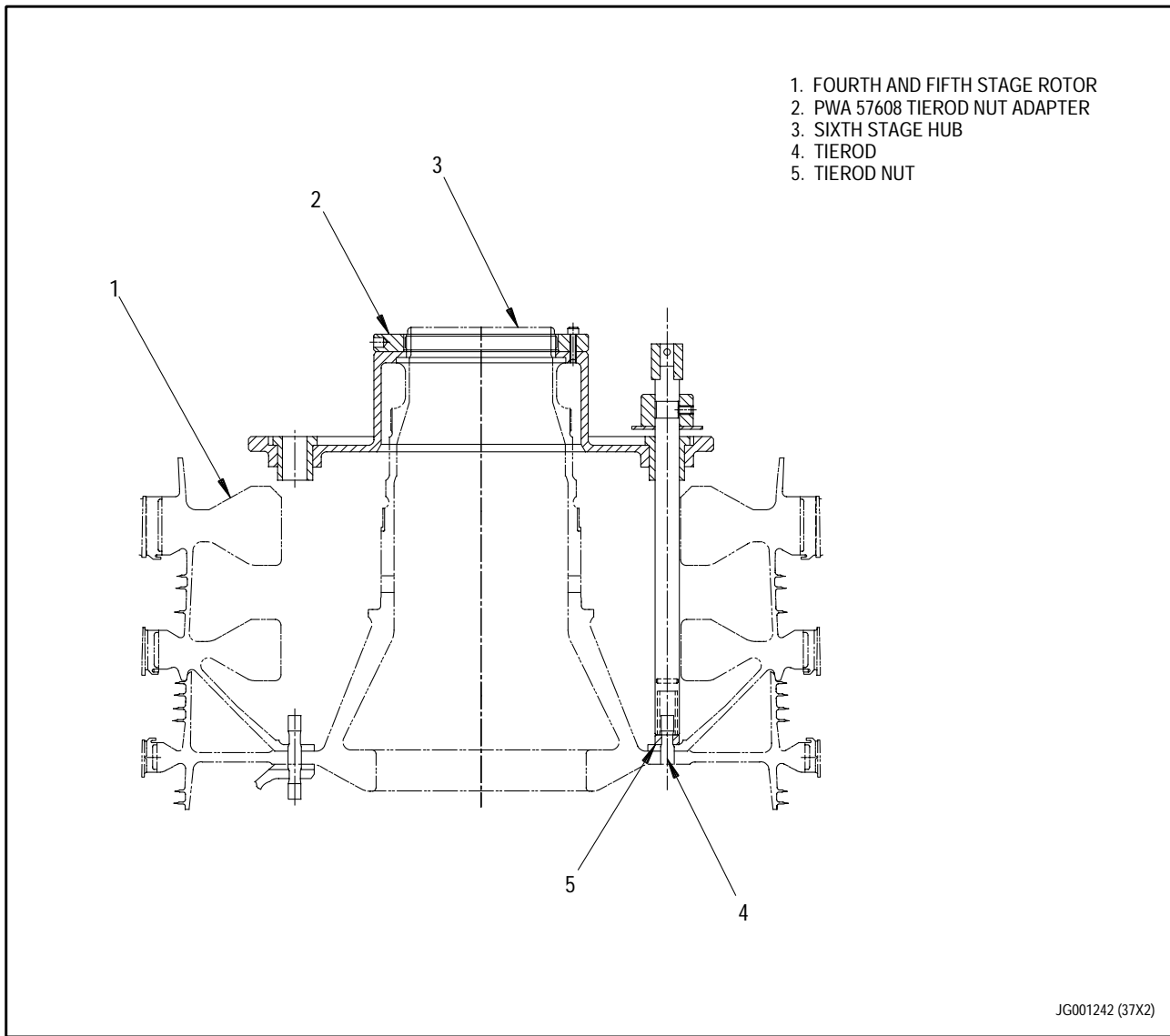


Figure 14. Tierod Nut Torquing Using PWA 57608 Adapter

5. NO. 3 BEARING REAR AIR SEAL - INSTALLATION.

(See Figure 15.)

NOTE

The No. 3 bearing rear air seal measurement will be used to determine if air seal is seated.

- a. Install No. 3 bearing rear air seal per figure 15.

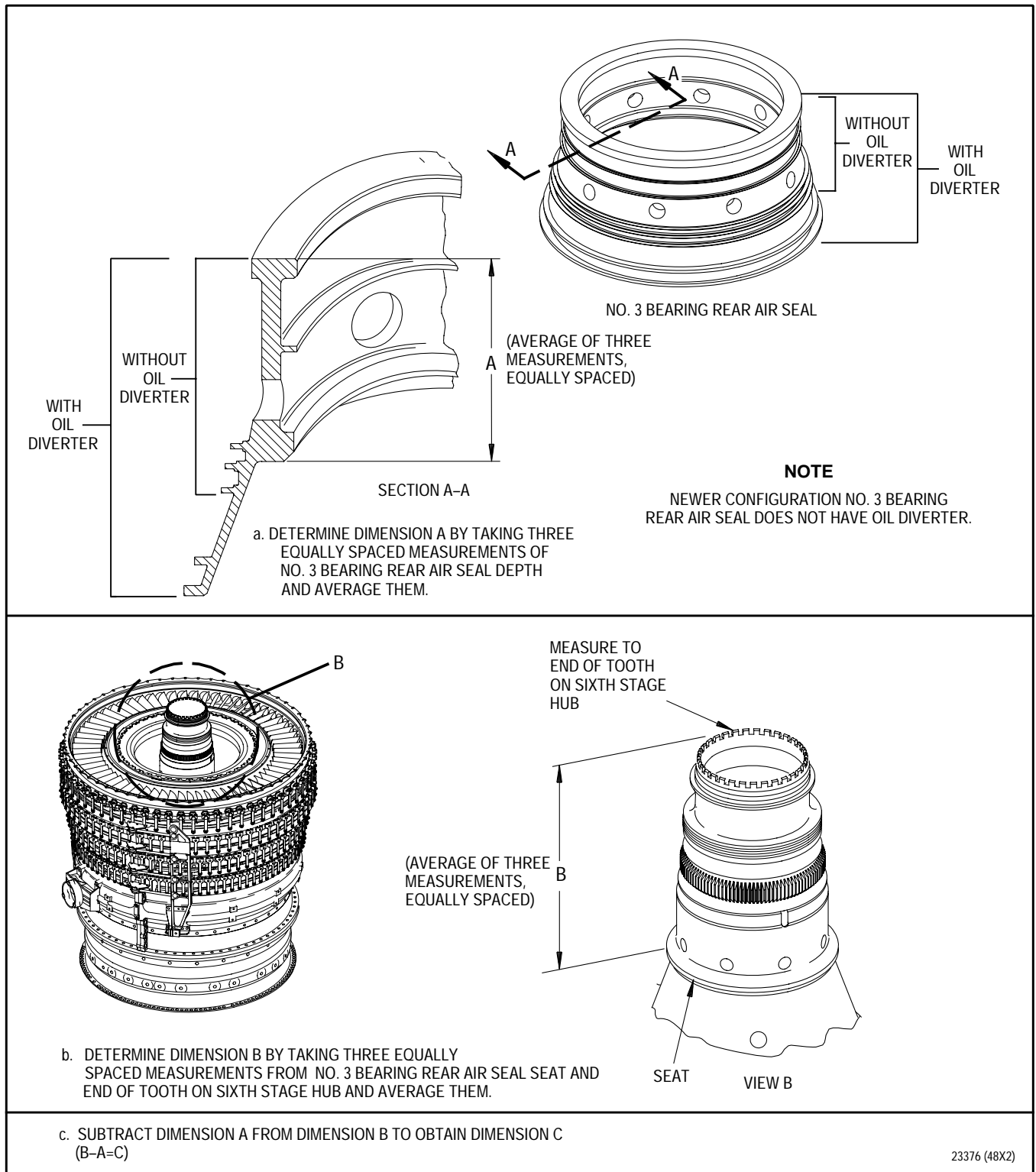
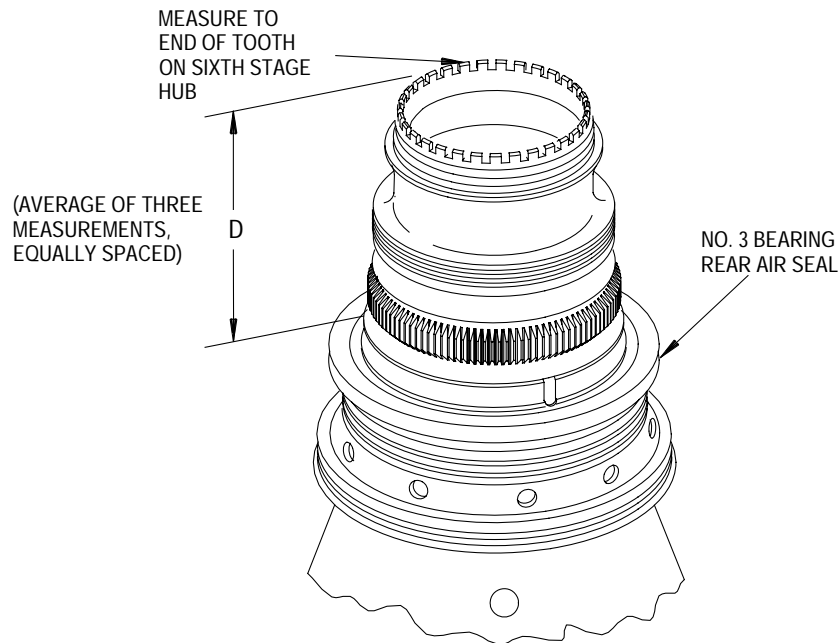


Figure 15. No. 3 Bearing Rear Air Seal - Installation (Sheet 1 of 2)

d. INSTALL NO. 3 BEARING REAR AIR SEAL AS FOLLOWS:

1. HEAT AIR SEAL IN OVEN, 225° TO 275°F (107° TO 135°C) FOR 20 MINUTES.
2. INSTALL AIR SEAL ON SIXTH STAGE HUB. SEAT WITH PWA 51673 DRIFT.



e. DETERMINE DIMENSION D BY TAKING THREE EQUALLY SPACED MEASUREMENTS FROM TOP OF NO. 3 BEARING REAR AIR SEAL AND END OF TOOTH ON SIXTH STAGE HUB AND AVERAGE THEM.

f. COMPARE DIMENSION C WITH DIMENSION D. DIMENSION D SHALL BE EQUAL TO OR GREATER THAN DIMENSION C. IF DIMENSION REQUIREMENT IS NOT MET, REMOVE NO. 3 BEARING REAR AIR SEAL AND REPEAT THIS PROCEDURE.

G1740 (36X2)

Figure 15. No. 3 Bearing Rear Air Seal - Installation (Sheet 2 of 2)

6. FOLLOW-ON MAINTENANCE.

- a. Balance rear compressor rotor assembly per WP 624 00.
- b. Perform blade tip grinding per WP 626 00.
- c. Install No. 4 bearing front air seal per WP 706 00.
- d. Perform balance after blade tip grinding per WP 624 00.
- e. Apply PWA 36056 adhesive sealant to fourth and fifth stage blades per WP 627 00.

WORK PACKAGE**TECHNICAL PROCEDURES****ROTOR ASSEMBLY, REAR COMPRESSOR -****INSTALLATION OF DYNAMIC BALANCE TOOLING****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 26

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	11	0	16B Added	9
2A Added	30	12	14	17	30
2B Blank Added	30	13	0	18	0
3 - 7	30	14	30	19	30
8	1	15 - 16	9	20	0
9	0	16A	22	21	30
10	1			22 Blank	0

T.O. 2J-F100-53-7

WP 623 00

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature

Specification/Vendor Part Number

GLOVES, LINT-FREE

-

OIL, LUBRICATING

MIL-L-7808

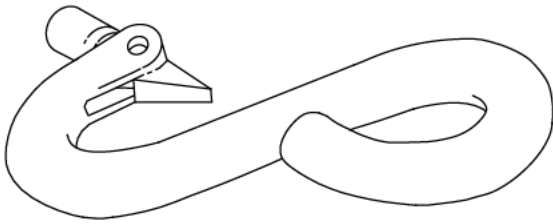
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

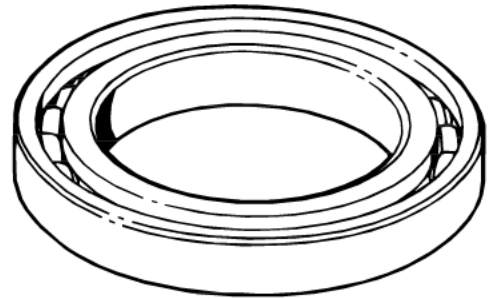
Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR ROTOR ASSEMBLY - DYNAMIC BALANCE TOOLING INSTALLATION	
	SPACER, REAR COMPRESSOR REAR HUB BALANCE BEARING REAR - - - - -	PWA 50966
	PUSHER/PULLER, REAR BALANCE BEARING AND SPACER - - -	PWA 57780
	SPACER, BALANCE REAR COMPRESSOR ROTOR - - - - -	PWA 52637
	SPACER, REAR COMPRESSOR ROTOR FRONT BALANCE BEARING FIXTURE, BALANCE, HOUSING/SPACER/RETAINER, REAR COMPRESSOR ROTOR - - - - -	PWA 50906 PWA 57697
	BEARING, BALANCE REAR COMPRESSOR ROTOR FRONT - - - -	PWA 21350-43
	ADAPTER, BEARING REAR COMPRESSOR FRONT HUB BALANCE -	PWA 50940
	BASE, NO. 3 BEARING BEVEL GEAR AND BEARING ADAPTER -	PWA 50612
	DRIFT, BALANCE BEARING SPACER TO ADAPTER - - - - -	PWA 50909
	HEATER, MANIFOLD, TURBINE HUB/GBX DRIVE BEVEL GEAR -	PWA 56326
		OR
	HEATER, GEARBOX DRIVE, BEVEL GEARSHAFT - - - - -	PWA 52665
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
	DRIFT, NO. 3 BEARING REAR SEAL SEAT - - - - -	PWA 51673
	EQUIPMENT SET, IMMOBILIZER AND ADAPTER, COMPRESSOR BALANCE BEARING RETAINING NUTS - - - - -	PWA 57737
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - -	PWA 56338
		OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - -	PWA 50775
	BASE, BALANCE FIXTURE REAR COMPRESSOR - - - - -	PWA 57710
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 57938
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 57937
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 51298
	BEARING, BALANCE REAR COMPRESSOR ROTOR REAR - - - -	PWA 21350-44
	WRENCH, REAR COMPRESSOR REAR BALANCE BEARING RETAINING NUT - - - - -	PWA 50985
	EQUIPMENT SET, BALANCE, SUPPORT/SHIELD REAR COMPRESSOR ROTOR - - - - -	PWA 57698
	HOOK, SAFETY - - - - -	PWA 2388

ILLUSTRATED SUPPORT EQUIPMENT



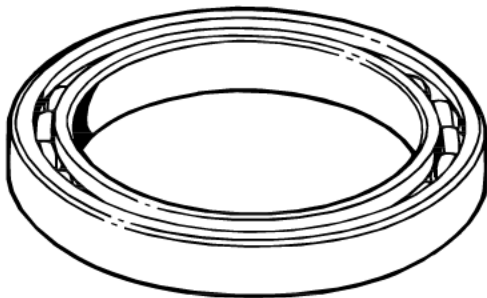
PWA 2388 -C

Figure T1. PWA 2388 HOOK



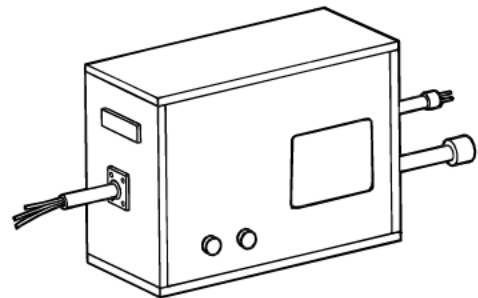
PWA 21350-43 -C

Figure T2. PWA 21350-43 BEARING



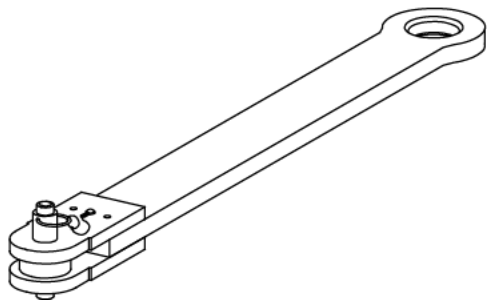
PWA 21350-44 -C

Figure T3. PWA 21350-44 BEARING



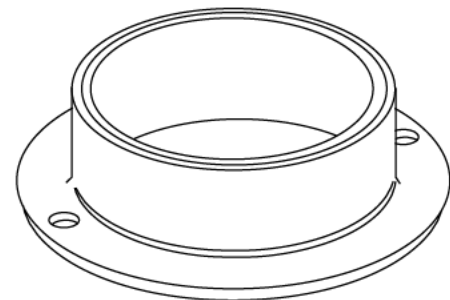
PWA 25672 -C

Figure T4. PWA 25672 CONTROL



PWA 26584 -C

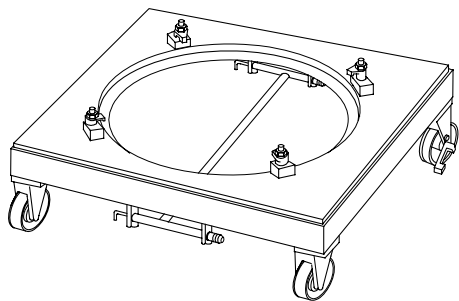
Figure T5. PWA 26584 ARM



PWA 50612 -C

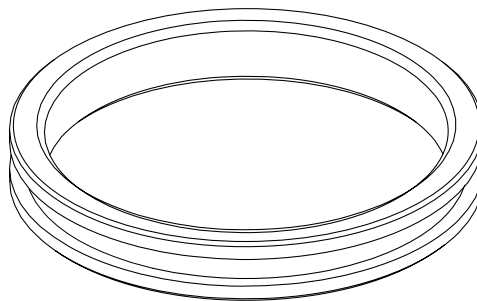
Figure T6. PWA 50612 BASE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



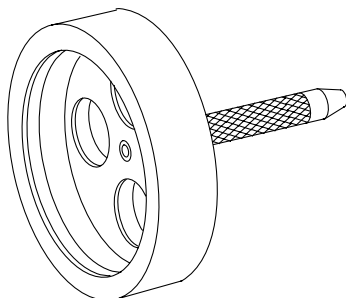
PWA 50775 -C

Figure T7. PWA 50775 STAND



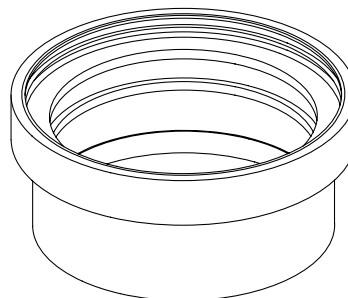
PWA 50906 -C

Figure T8. PWA 50906 SPACER



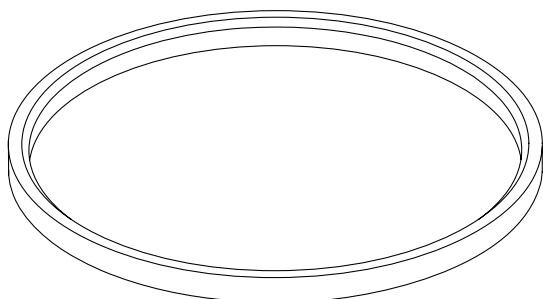
PWA 50909 -C

Figure T9. PWA 50909 DRIFT



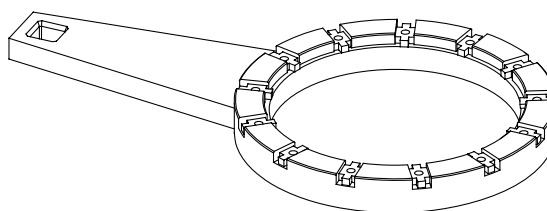
PWA 50940 -C

Figure T10. PWA 50940 ADAPTER



PWA 50966 -C

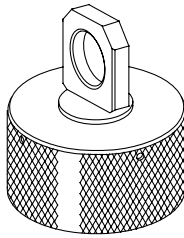
Figure T11. PWA 50966 SPACER



PWA 50985 -C

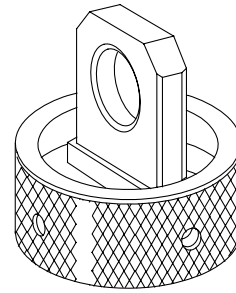
Figure T12. PWA 50985 WRENCH

ILLUSTRATED SUPPORT EQUIPMENT (continued)



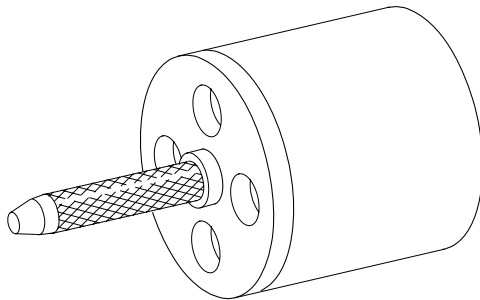
PWA 51298 -C

Figure T13. PWA 51298 EYE



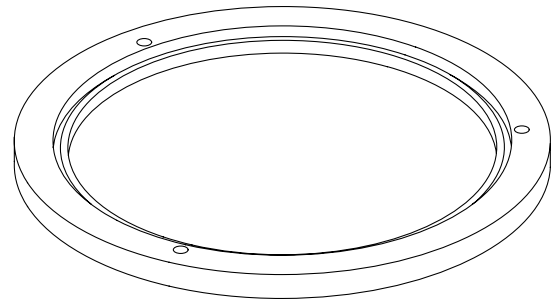
PWA 51371 -C

Figure T14. PWA 51371 EYE



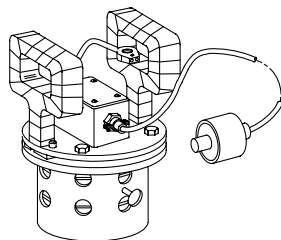
PWA 51673 -C

Figure T15. PWA 51673 DRIFT



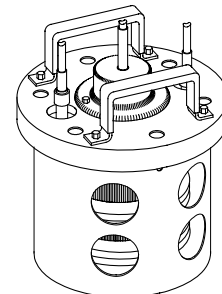
PWA 52637 -C

Figure T16. PWA 52637 SPACER



PWA 52665 -C

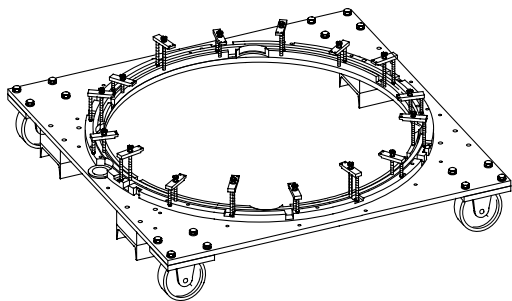
Figure T17. PWA 52665 HEATER



PWA 56326 -C

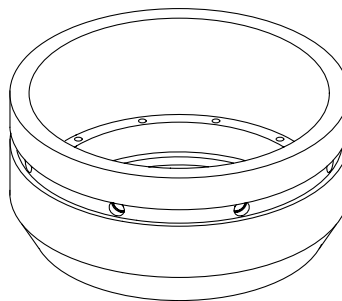
Figure T18. PWA 56326 HEATER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



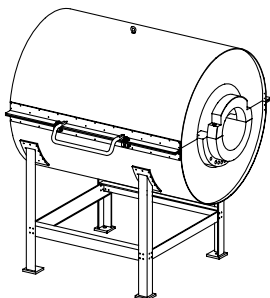
PWA 56338 -C

Figure T19. PWA 56338 STAND



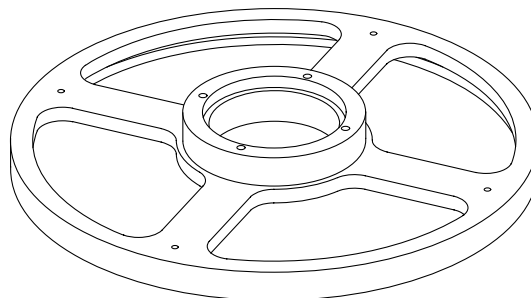
PWA 57697 -C

Figure T20. PWA 57697 FIXTURE



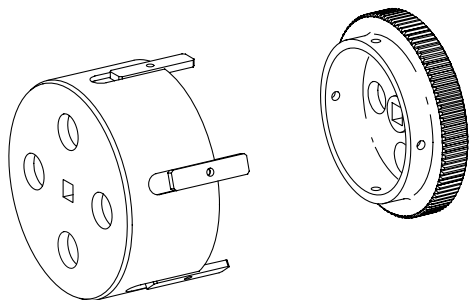
PWA 57698 -C

Figure T21. PWA 57698 EQUIPMENT SET



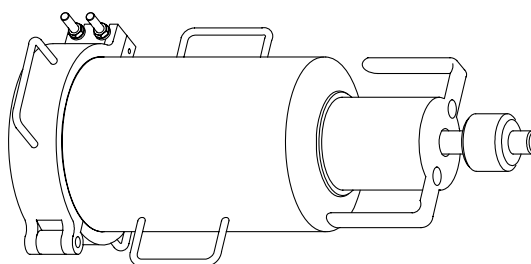
PWA 57710 -C

Figure T22. PWA 57710 BASE



PWA 57737 -C

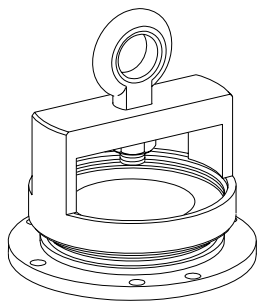
Figure T23. PWA 57737 EQUIPMENT SET



PWA 57780 -C

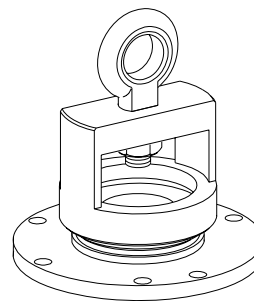
Figure T24. PWA 57780 PUSHER/PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



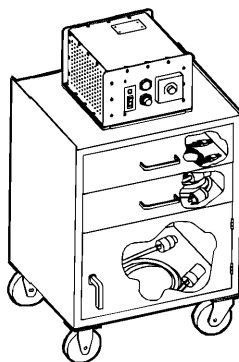
PWA 57937 -C

Figure T25. PWA 57937 FIXTURE



PWA 57938 -C

Figure T26. PWA 57938 FIXTURE



PWA 61685 -C

Figure T27. PWA 61685 CONTROL

1. INTRODUCTION.

- a. This work package contains instructions for installation of tooling required for dynamic balance of the rear compressor rotor assembly.

2. REAR COMPRESSOR ROTOR ASSEMBLY - DYNAMIC BALANCE TOOLING INSTALLATION.

(See Figures 1 through 5.)

- a. Place following tools in oven, at temperature of 250°F (121°C), for at least ten minutes.

- PWA 50966 spacer
- PWA 52637 spacer
- PWA 50906 spacer
- PWA 57697, detail-1 housing

- b. Install PWA 21350-43 balance bearing(5, figure 1) in PWA 57697, detail-1 housing(6) as follows:

NOTE

- Method of determining balance bearing acceptability is to monitor fluctuation of balance machine meter during final balance operations with a total meter fluctuation greater than 0.100 ounce-inch being an indicator of unacceptable balance bearings. It is recommended that balance bearings be removed for inspection and refurbishment when meter fluctuations exceed 0.100 ounce-inch.

- PWA 21350-43 balance bearing shall be inspected every six months. Repeated installation and removal may cause wear on ID surface of bearing inner race. Wear in this area can affect fit tightness and concentricity of inner race. Balancing machine will not detect concentricity increase in balance bearing.

- (1) Ensure that PWA 21350-43 balance bearing(5) has been inspected and accepted for use within the last six months and is free of foreign material.

NOTE

Steps (2), (3), and (4) shall be done in rapid succession to minimize heat loss.

- (2) Remove PWA 57697, detail-1 housing(6) from oven and position on bench with largest OD up.
- (3) Install PWA 21350-43 balance bearing(5) in PWA 57697, detail-1 housing(6) using nylon drift and mallet.

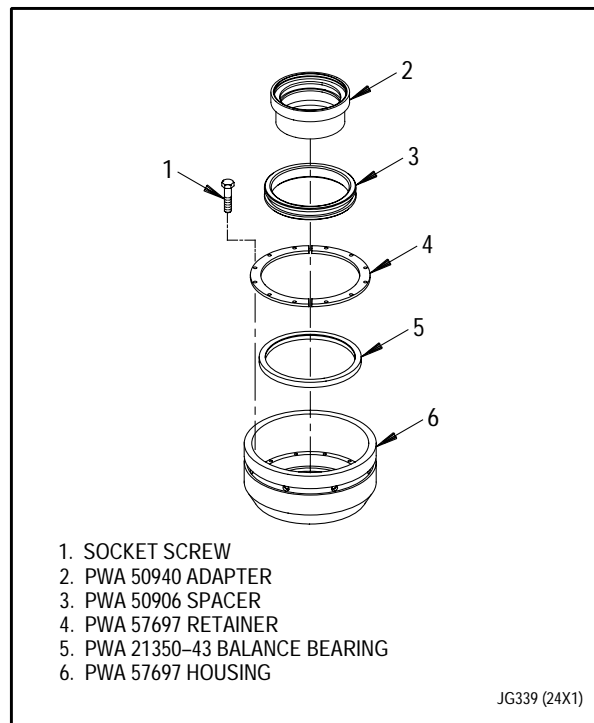


Figure 1. Rear Compressor Rotor Assembly Front Hub Balance Bearing - Assembly

- (4) Secure bearing(5) with two PWA 57697, detail-2 retainers(4) and 12 detail socket screws(1).
- (5) Place PWA 57697, detail-1 housing(6), with PWA 21350-43 balance bearing(5) installed, in hot oil tank at temperature of 225° to 275°F (107° to 135°C) for a minimum of 10 minutes. Place PWA 50940 adapter(2) in freezer for 10 minutes.
- (6) Position PWA 50612 base on arbor press.
- (7) Place PWA 50940 adapter(2) with large OD down on PWA 50612 base.

NOTE

Steps (8) through (11) shall be done in rapid succession to minimize heat loss.

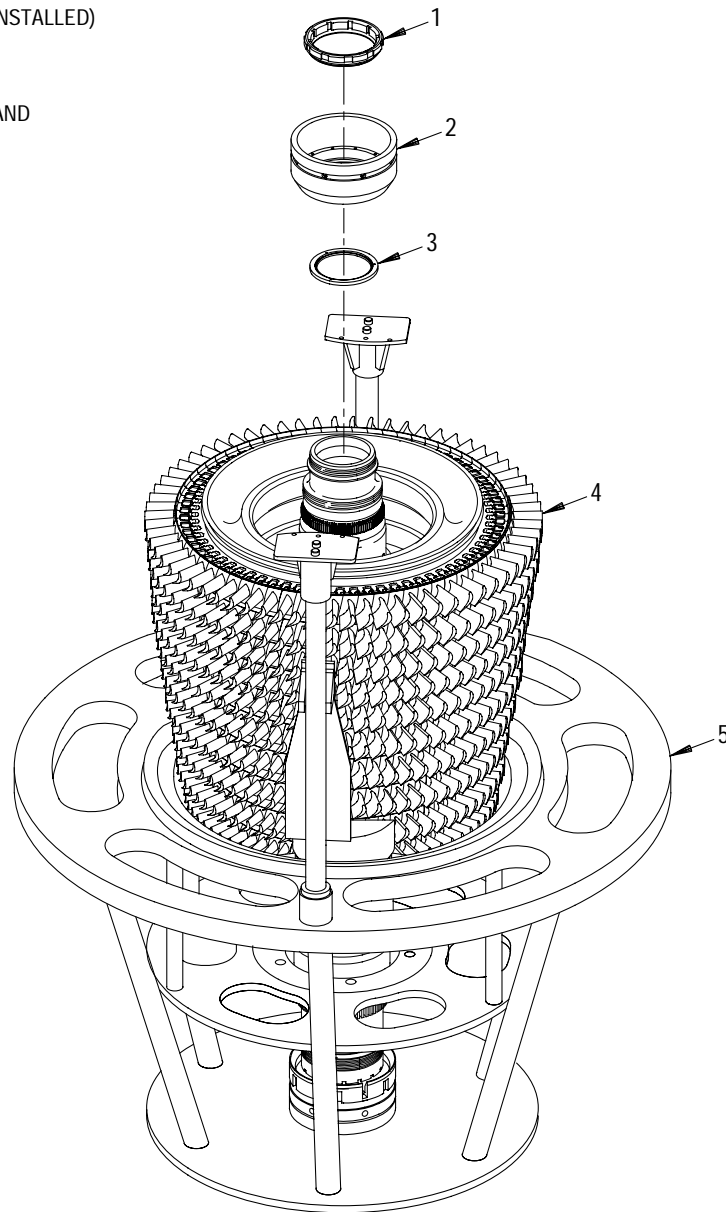
- (8) Remove PWA 50906 spacer(3) from oven and install on PWA 50940 adapter(2).
- (9) Use PWA 50909 drift and arbor press to seat PWA 50906 spacer(3). Remove adapter(2) and spacer(3) from arbor.
- (10) Remove PWA 21350-43 balance bearing(5) and PWA 57697, detail-1 housing(6) from hot oil tank. Install bearing and housing, large OD up.

- (11) Place PWA 50906 spacer(3) and PWA 50940 adapter(2) in PWA 57697, detail-1 housing(6).
- (12) Seat assembly with PWA 50909 drift and arbor press.
- (13) Use clean cloth to wipe oil from balance bearing and housing. Place assembly on heat resistant surface, large OD down.

c. Install PWA 57697, detail-1 housing(2, figure 2) on front hub of rear compressor rotor assembly(4) as follows:

- (1) Before installing heater, check exposed heater detail fasteners for tightness. Inspect to ensure they cannot loosen and drop into engine during assembly operation.
- (2) Install PWA 56326 or PWA 52665 heater into bore of PWA 21350-43 balance bearing inside of PWA 57697, detail-1 housing(2). Attach PWA 61685 or PWA 25672 heater control to heater. Heat assembly at 250°F (121°C) for 10 minutes.

1. NO. 3 BEARING RETAINING NUT
2. PWA 57697 HOUSING
(BALANCE BEARING INSTALLED)
3. PWA 52637 SPACER
4. REAR COMPRESSOR
ROTOR ASSEMBLY
5. PWA 57722 BUILD STAND



JG340 (44X2)

Figure 2. Rear Compressor Rotor Assembly Front Hub Balance Bearing and Housing - Installation

NOTE

Rear compressor rotor assembly will remain in PWA 57722 build stand for installation of PWA 57697, detail-1 housing.

- (3) Lightly coat rear compressor rotor assembly(4) front hub bearing journal with MIL-L-7808 lubricating oil. Wipe off excess.

NOTE

Steps (4) through (8) shall be done in rapid succession to minimize heat loss.

- (4) Remove PWA 52637 spacer(3) from oven and install, with seal groove up, on front hub of rear compressor rotor assembly(4).
- (5) Use PWA 51673 drift and mallet to seat PWA 52637 spacer(3).
- (6) Remove PWA 56326 or PWA 52665 heater from PWA 21350-43 balance bearing and PWA 57697, detail-1 housing(2). Install housing, large OD up, on front hub of rear compressor rotor assembly(4).

- (7) Use PWA 51673 drift and mallet to seat PWA 57697, detail-1 housing(2).

- (8) Secure PWA 21350-43 balance bearing and PWA 57697, detail-1 housing(2) with No. 3 bearing retaining nut(1).

- (9) Use PWA 57737, detail-1 adapter to torque nut(1), 650 to 750 pound-inches. After assembly has cooled to room temperature, ensure assembly is seated by attempting to insert 0.001 inch feeler stock between mating surfaces. Repeat nut torque of 650 to 750 pound-inches if not seated properly.

- (10) Remove PWA 57737, detail-1 adapter.

- (11) Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.

- d. Install PWA 57710 base(11, figure 3) on PWA 56338 or PWA 50775 stand(7). Secure base with detail clamps(8).

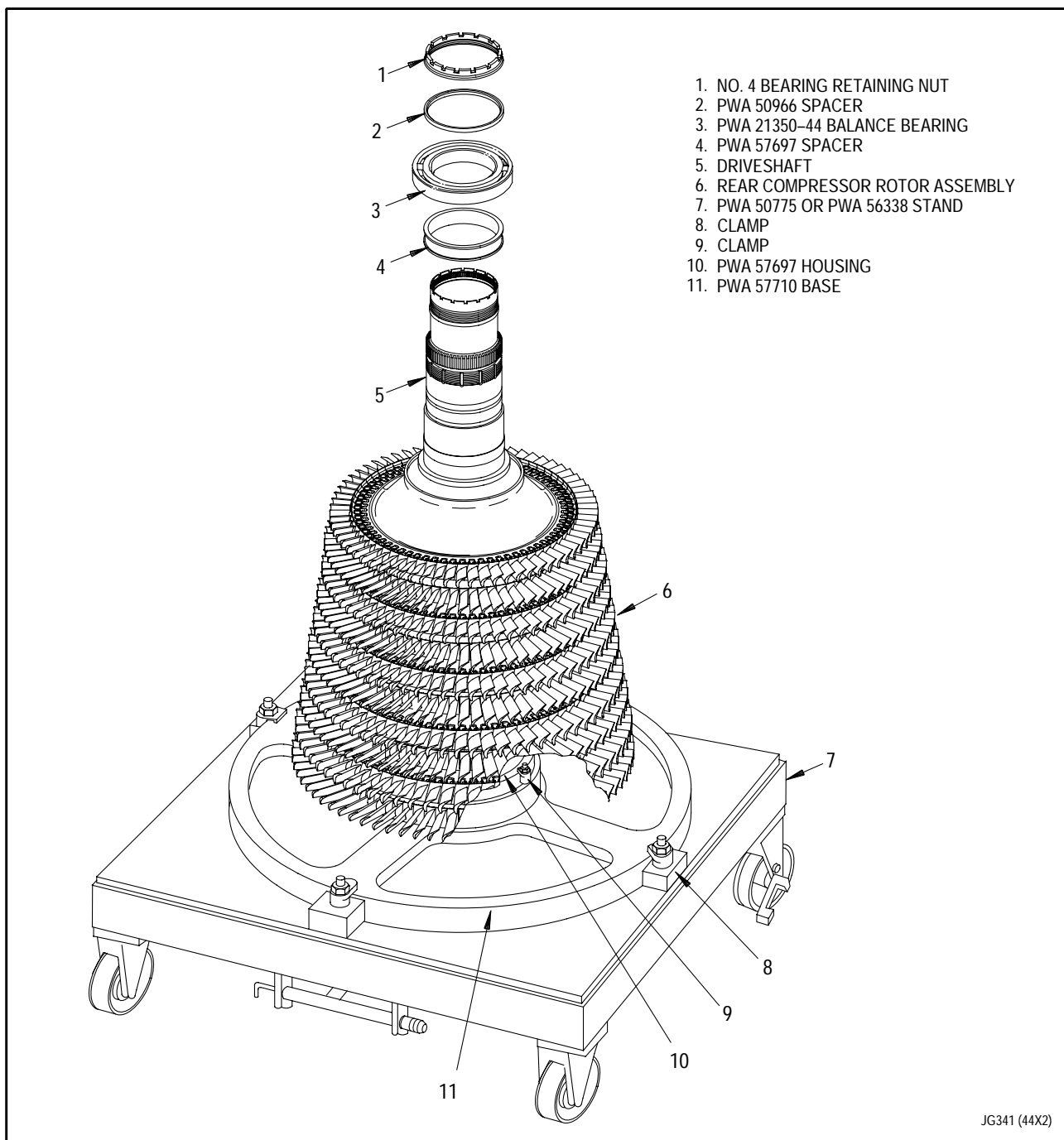


Figure 3. Rear Compressor Rotor Assembly Driveshaft Balance Bearing - Installation

- e. Turn rear compressor rotor assembly(4, figure 4) to front end down position as follows:
 - (1) Install PWA 57938 fixture(2) on front hub(3) of rear compressor rotor assembly(4).
 - (2) Attach PWA 26584 arm(1) to hoist.
 - (3) Attach PWA 26584 arm(1) to PWA 57938 fixture(2) and work hoist to lift rear compressor rotor assembly(4) from PWA 57722 stand.
 - (4) Install PWA 57937 fixture(6) on driveshaft(5) of rear compressor rotor assembly(4).
 - (5) Attach PWA 26584 arm(7) to hoist.
 - (6) Attach PWA 26584 arm(7) to PWA 57937 fixture(6) and work hoists to rotate rear compressor rotor assembly(4) to front end down position.
 - (7) Remove PWA 26584 arm(1).
- f. Lower rear compressor rotor assembly(6, figure 3) onto PWA 57710 base(11) and secure PWA 57697, detail-1 housing(10) to base with detail clamps(9).
- g. Remove PWA 26584 arm(7, figure 4) and PWA 57937 fixture(6) from driveshaft(5).

- h. Install No. 4 bearing front air seal per figure 3A.

- i. Install PWA 21350-44 balance bearing(3, figure 3) as follows:

NOTE

- Method of determining balance bearing acceptability is to monitor fluctuation of balance machine meter during final balance operations with a total meter fluctuation greater than 0.100 ounce-inch being an indicator of unacceptable balance bearings. It is recommended that balance bearings be removed for inspection and refurbishment when meter fluctuations exceed 0.100 ounce-inch.
- PWA 21350-44 balance bearing shall be inspected every six months. Repeated installation and removal may cause wear on ID surface of bearing inner race. Wear in this area can affect fit tightness and concentricity of inner race. Balancing machine will not detect concentricity increase in balance bearing.
 - (1) Ensure that PWA 21350-44 balance bearing(3) has been inspected and accepted for use and is free of foreign material.

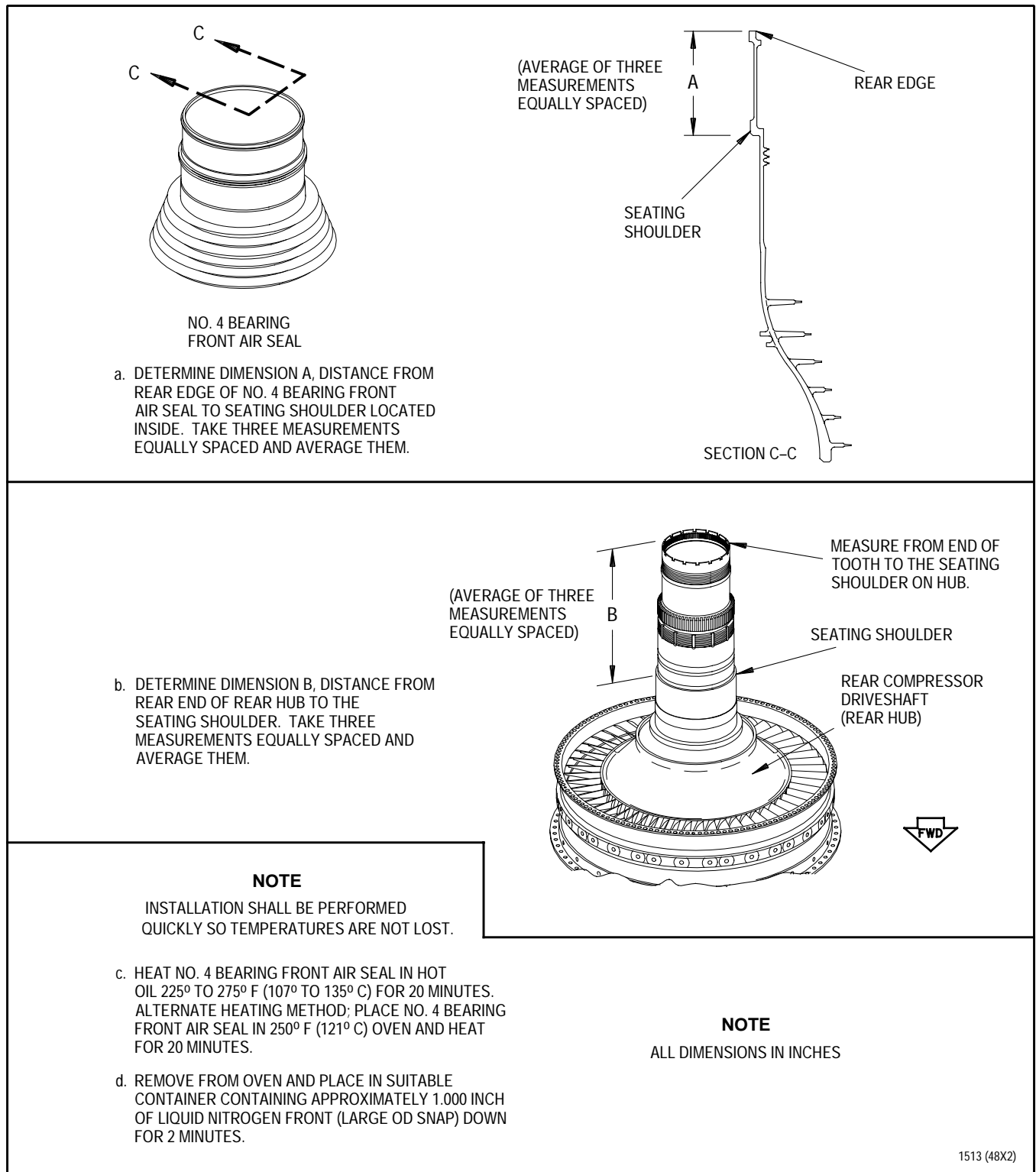


Figure 3A. No. 4 Bearing Front Air Seal - Installation (Sheet 1 of 4)

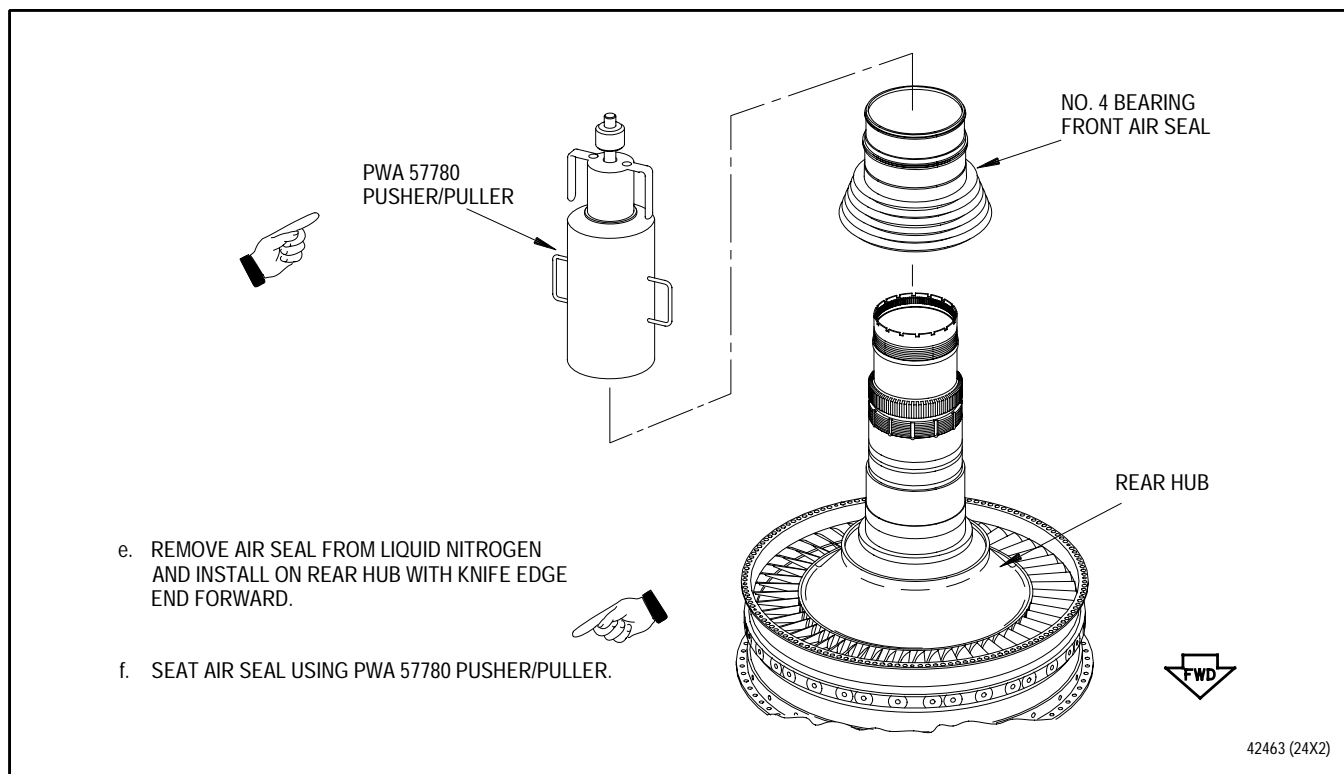


Figure 3A. No. 4 Bearing Front Air Seal - Installation (Sheet 2 of 4)

g. INSTALL AIR SEAL OVER REAR COMPRESSOR DRIVESHAFT.

h. THREAD PWA 57780 PUSHER/PULLER DETAIL-1 HUB ADAPTER ONTO REAR COMPRESSOR HUB THEN BACK OFF ONE (1) TURN.



FAILURE TO USE CARE WHEN INSTALLING TUBE ADAPTER CAN RESULT IN ENGINE PART DAMAGE.

i. SLIDE DETAIL-3 TUBE ADAPTER OVER DETAIL-1 HUB ADAPTER UNTIL TUBE END CONTACTS NO. 4 BEARING AIR SEAL.

j. REMOVE DETAIL-8 KNURLED NUT FROM DETAIL-2 ROD.

k. INSTALL DETAIL-4 PUSHER PLATE OVER DETAIL-2 ROD WITH FLAT SIDE OF PLATE AGAINST TUBE ADAPTER.

l. USING DETAIL-7 HANDLES, INSTALL HYDRAULIC CYLINDER OVER DETAIL-2 ROD AND SLIDE FORWARD UNTIL IT BUTTS AGAINST DETAIL-4 PUSHER PLATE.

m. INSTALL DETAIL-8 KNURLED NUT AND RUN ON UNTIL TOP OF CYLINDER IS MET. HAND TIGHTEN ONLY, USE NO TOOLS.

n. CONNECT PWA 55380 PUMP TO HYDRAULIC CYLINDER AND ACTUATE PUMP TO SEAT AIR SEAL. MAINTAIN HYDRAULIC PRESSURE UNTIL AIR SEAL REACHES ROOM TEMPERATURE.

o. REMOVE TOOLING.

NO. 4 BEARING FRONT AIR SEAL

DETAIL-3
TUBE ADAPTER

DETAIL-1
HUB ADAPTER

DETAIL-4
PUSHER PLATE

DETAIL-7
HANDLE

COUPLING

DETAIL-8
KNURLED NUT

HYDRAULIC CYLINDER

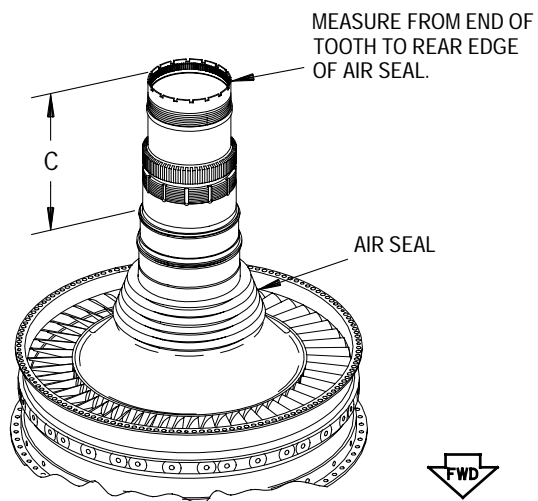
DETAIL-2 ROD

REAR COMPRESSOR
DRIVESHAFT

91400 (48X2)

Figure 3A. No. 4 Bearing Front Air Seal - Installation (Sheet 3 of 4)

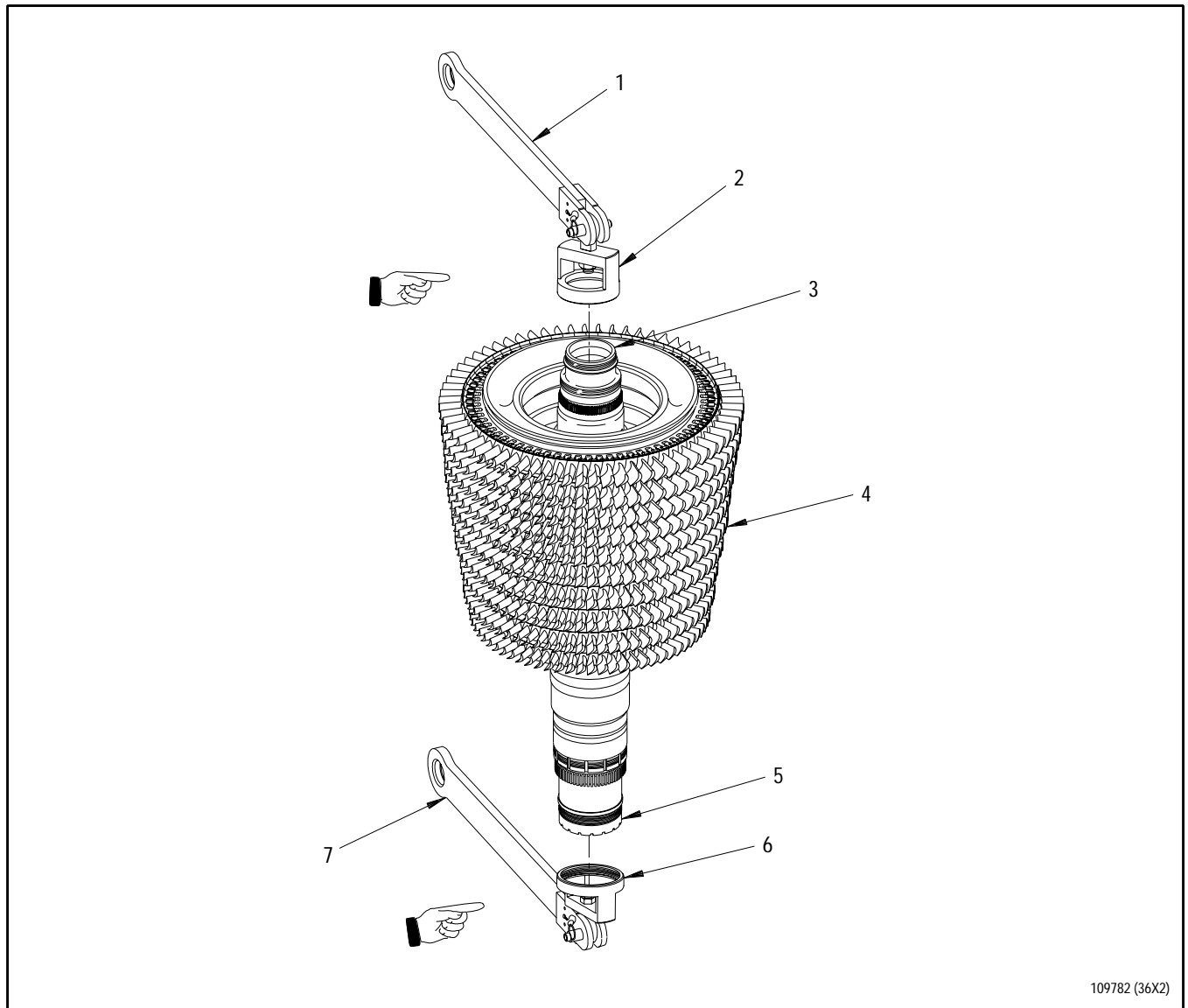
- p. DETERMINE DIMENSION C, DISTANCE FROM REAR END OF REAR HUB TO REAR EDGE OF NO. 4 BEARING FRONT AIR SEAL. TAKE THREE MEASUREMENTS EQUALLY SPACED AND AVERAGE THEM.



- q. SUBTRACT B-A AND COMPARE WITH C. DIMENSIONS SHALL BE EQUAL (± 0.001). IF DIMENSIONS ARE NOT EQUAL, REMOVE AIR SEAL AND REPEAT PROCEDURE.

42464 (24X2)

Figure 3A. No. 4 Bearing Front Air Seal - Installation (Sheet 4 of 4)



1. PWA 26584 arm
2. PWA 57938 fixture
3. Front hub
4. Rear compressor rotor assembly
5. Driveshaft
6. PWA 57937 fixture
7. PWA 26584 arm

Figure 4. Rear Compressor Rotor Assembly - Rotating

- (2) Place PWA 21350-44 balance bearing(3) and PWA 57697, detail-4 spacer(4) in hot oil tank at 225° to 275°F (107° to 135°C) for at least 10 minutes.
- (3) Lightly coat driveshaft(5) bearing journal with MIL-L-7808 lubricating oil. Wipe off excess.

NOTE

Steps (4) through (11) shall be done in rapid succession to minimize heat loss.

- (4) Remove PWA 57697, detail-4 spacer(4) from hot oil tank and install on driveshaft(5).
- (5) Use PWA 50975 drift and mallet to seat spacer(4).
- (6) Remove PWA 21350-44 balance bearing(3) from hot oil tank and install on driveshaft(5).
- (7) Use PWA 50975 drift and mallet to seat balance bearing(3).
- (8) Remove PWA 50966 spacer(2) from oven and install on driveshaft(5) with ID chamfer down.
- (9) Use PWA 50975 drift and mallet to seat spacer(2).

NOTE

No. 4 bearing retaining nut has left-hand threads. Turn nut counterclockwise (left-hand) to tighten it.

- (10) Install No. 4 bearing retaining nut(1) to secure balance bearing(3) and spacers(2) and (4) by turning counterclockwise.
- (11) Use PWA 50985 wrench and PWA 57737, detail-4 immobilizer to torque nut(1) 650 to 750 pound-inches. After assembly has cooled to room temperature, ensure that parts are seated by attempting to insert 0.001 inch feeler stock between mating surfaces. Repeat nut torque of 650 to 750 pound-inches if not seated properly.
- (12) Remove PWA 50985 and PWA 57737, detail-4 immobilizer.

- j. Install PWA 57698 equipment set on balance machine(10, figure 5) as follows:
- (1) Ensure cover(5) of shield assembly(12) is closed and secure with two swing bolts and plastic knobs.
 - (2) Attach hoist and PWA 2388 hook to eyebolt(4) on top of cover(5) and position shield assembly(12) between pedestals of balance machine(10).
 - (3) Secure legs of shield assembly(12) to bed to balance machine(10) with standard T-nuts, washers and bolts(11).
 - (4) Loosen plastic knobs and open cover(5).
 - (5) Remove two detail socket screws(9) and detail-2 clamp(8).
 - (6) Install four standard eyebolts in threaded holes of detail-1 support assembly(13) for lifting.
 - (7) Using hoist and standard lifting straps or PWA 2388 hook, attached to lifting eyebolts, position detail-1 support assembly(13) in shield assembly(12) and on pedestals of balance machine(10).
 - (8) Remove four eyebolts and lifting tools.
- k. Install rear compressor rotor assembly(3) on PWA 57698, detail-1 support assembly(13) as follows:
- (1) Install PWA 57937 fixture(6, figure 4) on driveshaft(5) of rear compressor rotor assembly(4).
 - (2) Attach PWA 26584 arm(7) to hoist.
 - (3) Attach PWA 26584 arm(7) to PWA 57937 fixture(6).
 - (4) Release PWA 57710 base(11, figure 3) detail clamps(9) and work hoist to lift rear compressor rotor assembly(6) from base.
 - (5) Attach PWA 26584 arm(1, figure 4) to hoist.
 - (6) Attach PWA 26584 arm(1) to PWA 57938 fixture(2).
 - (7) Work hoists to rotate rear compressor rotor assembly(4) to horizontal position.

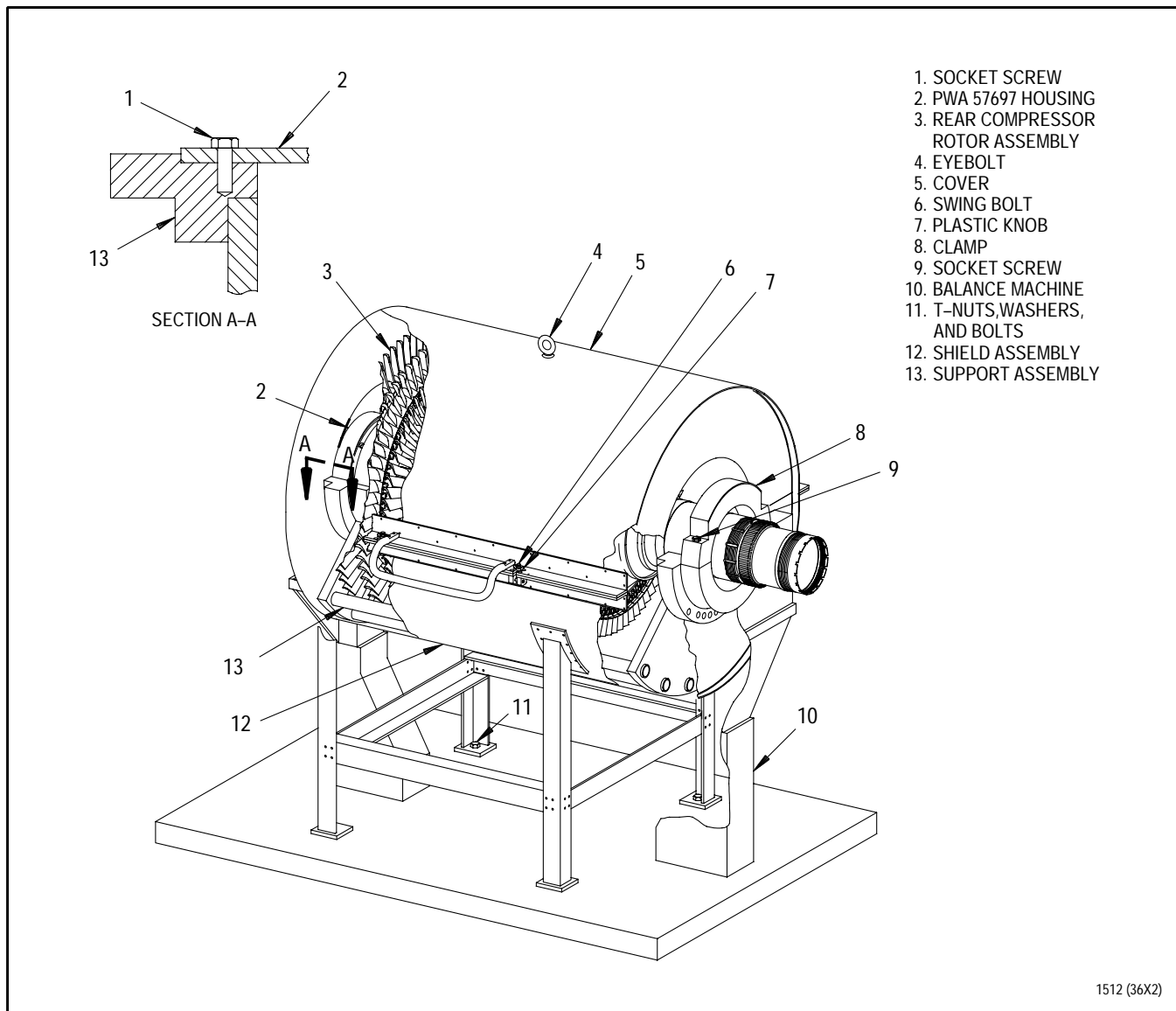


Figure 5. PWA 57698 Equipment Set - Installation

NOTE

- Drive end of rear compressor rotor assembly is the 7th through 13th stage drum rotor shaft.
 - Shaft will be rotated opposite at normal running direction (ccw) during balancing.
- (8) Lower rear compressor rotor assembly(3, figure 5) onto PWA 57698, detail-1 support assembly(13), aligning boltholes of PWA 57697, detail-1 housing(2) with threaded holes in support assembly.
- (9) Secure PWA 57697, detail-1 housing(2) to PWA 57698, detail-1 support assembly(13) with four detail socket screws(1).
- (10) Position PWA 57698, detail-2 clamp(8) over rear compressor rotor assembly(3) driveshaft and secure with two detail socket screws(9).
- (11) Remove PWA 57937 fixture(6, figure 4) and PWA 26584 arm(7) from driveshaft(5).
- (12) Remove PWA 57938 fixture(2) and PWA 26584 arm(1) from front hub(3).

WORK PACKAGE**TECHNICAL PROCEDURES****ROTOR ASSEMBLY, REAR COMPRESSOR -****DYNAMIC BALANCE****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 18

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	8	10A	8	12 - 13	0
3	6	10B Blank	6	14 - 15	8
4 - 10	0	11	8	16	3

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Rotor Assembly, Rear Compressor, Disassembly - - - - -	WP 035 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Coolant, Metal Cutting, Water-type (PMC 9320)	Hocut No. 3210
Filler Metal, Brazing, Silver	AMS 4765
Oil, lubricating	MIL-L-7808
Pencil (crayon), silver, metal marking (hard) (PMC 4059-7)	Colorbrite No. 2101 or Anadel No. 1936
Tape, Masking (Cloth Backing) (PMC 4001)	CC 150-01B Red
Tape, Reflective	#852 Metalized Polyester 3M Co. or #215 Metalized Mylar Tuck Industries, Inc.

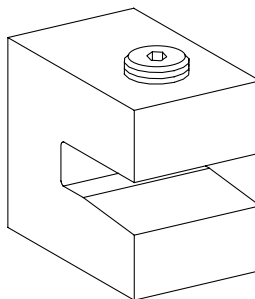
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Counterweight	4068998	As required
Counterweight	4068999	As required
Counterweight	4069002	As required
Counterweight	4069003	As required
Counterweight	4069995	As required
Counterweight	4069996	As required
Counterweight	4071745	As required
Counterweight	4071746	As required
Counterweight	4071747	As required
Counterweight	4071748	As required
Counterweight	4071749	As required

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	Weight, Calibration - Balance, high compressor	PWA 57728

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57728 -C

Figure T1. PWA 57728 Weight

1. INTRODUCTION.

- a. This work package contains instructions for balancing the rear compressor rotor assembly.

2. PRELIMINARY INSTRUCTIONS.

- a. Install rear compressor rotor assembly dynamic balance tooling per WP 623 00

3. REAR COMPRESSOR ROTOR ASSEMBLY - PREPARATION FOR DYNAMIC BALANCE.

- a. Check rear compressor rotor assembly for freedom of rotation.

NOTE

A PWA 57728 calibration weight and metal reflective tape will each produce 4.0 ounce-inches of unbalance.

- b. Calibrate balance machine using a PWA 57728 calibration weight on front side of 4th stage disk and metal reflective tape on front side of 13th stage disk, aft of rear knife edge seal. After calibration, remove weights.

4. REAR COMPRESSOR ROTOR ASSEMBLY - DYNAMIC BALANCE.

(See Figure 1, Figure 2, and Table 1.)

- a. Rotate rear compressor rotor assembly at a minimum speed of 900 rpm and measure initial dynamic unbalance in front and rear balance planes.

- b. If initial dynamic unbalance is more than 8.0 ounce-inches in either front or rear balance plane, perform the following:

NOTE

Runouts may be measured with rotor assembly installed on balance machine.

- (1) Check runout at front of 4th stage disk and at rear of 8th stage disk. (See figure 1.) Runout at 4th stage disk shall not exceed 0.006 inch. Runout at 8th stage disk shall not exceed 0.003 inch. If either runout is exceeded, perform the following:

- (a) Disassemble rear compressor rotor assembly, ensure mating surfaces of 4th/5th stage rotor(2), 6th stage disk and hub(1), and 7th through 13th stage rotor(3), subassemblies are clean and reassemble rear compressor rotor assembly per WP 035 00 and WP 622 00.

NOTE

Recheck of runouts may be accomplished without blades installed in rear compressor rotor assembly.

- (b) Recheck runouts. If either runout is still exceeded, replace 4th/5th stage rotor(2), 6th stage disk and hub(1), or 7th through 13th stage rotor(3) associated with location of greatest initial dynamic unbalance.

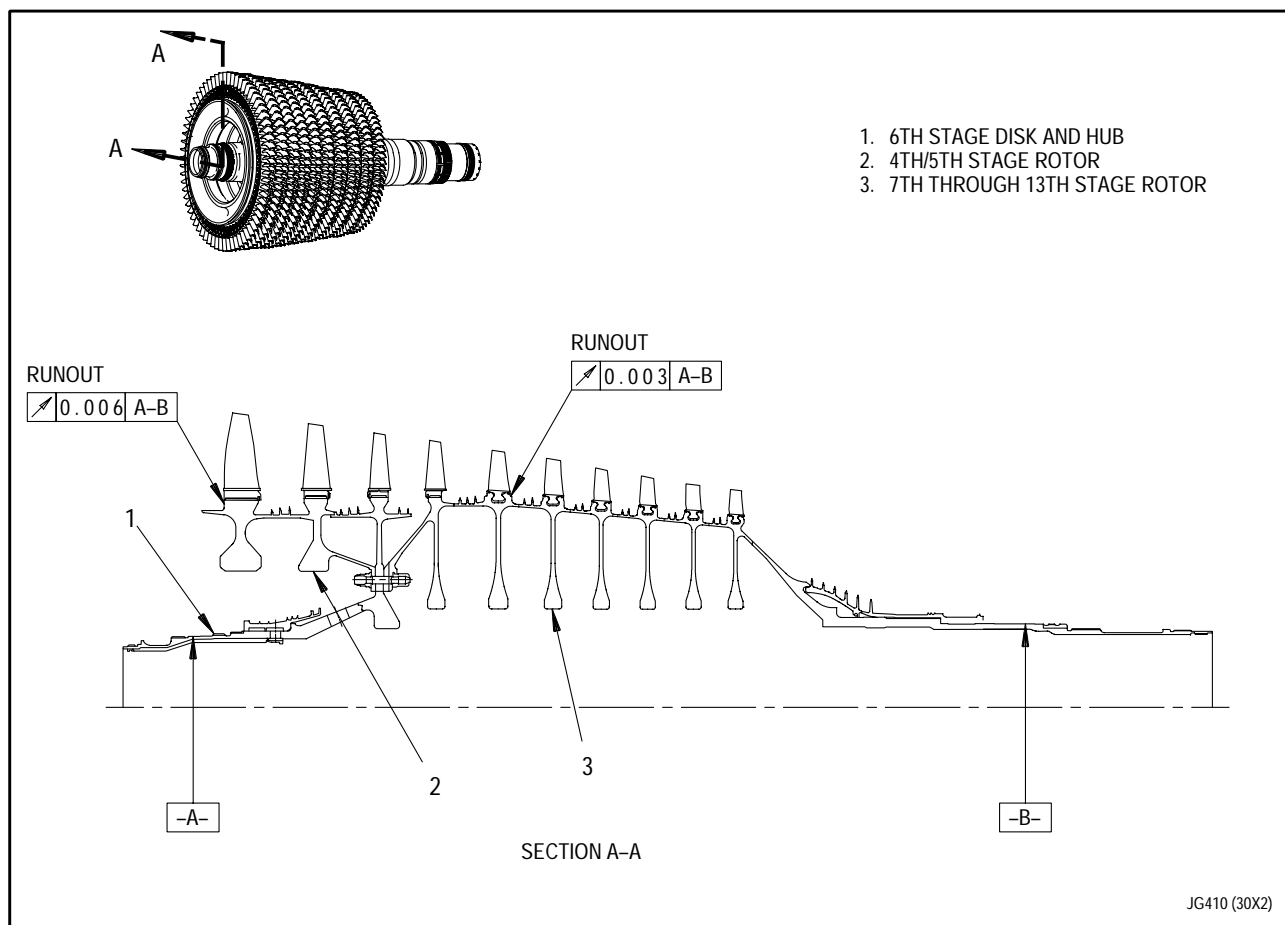


Figure 1. Rear Compressor Rotor Assembly - Balancing

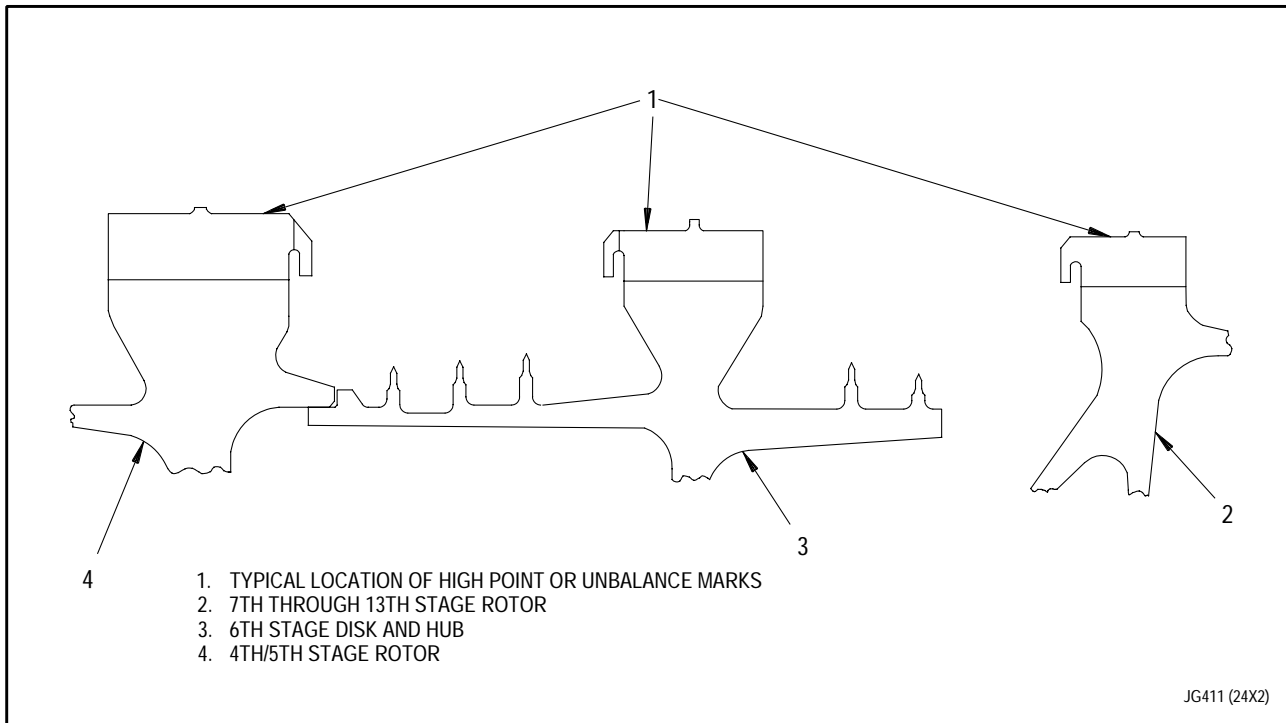


Figure 2. Typical Location of High Point and Unbalance Marks

- (2) Ensure rear compressor rotor assembly was initially assembled with 6th stage disk and hub(1) high point mark (letter D) 180 degrees opposite 7th through 13th stage rotor(3) high point mark (letter C), and 4th/5th stage rotor(2) unbalance mark (letter B) 180 degrees opposite 7th through 13th stage rotor(3) unbalance mark (letter A). (See figure 2 for typical location of high point and unbalance marks.) If marks are not aligned properly, disassemble and assemble rear compressor rotor assembly per WP 035 00 and WP 622 00.

NOTE

- 4th and 5th stage blades may be moved within set to balance front stages.
 - Counterweights cannot be installed at locking blade locations at 8th, 9th, 12th, and 13th stages.
- c. If initial dynamic unbalance is 8.0 ounce-inches or less in both front and rear balance planes, add counterweights as required at 4th, 5th, 8th, 9th, 12th, and 13th stages to meet final dynamic unbalance of 0.20 ounce-inch maximum in both front and rear balance planes. (See table 1.) Refer to paragraphs 6 or 7 for counterweight installation.
- d. If required, perform rear compressor rotor assembly blade tip grinding per T.O. 2J-F100-53-7, WP 626 00.

Table 1. Rear Compressor Rotor Assembly - Counterweights

MAXIMUM COUNTER- WEIGHTS ALLOWED	COUNTER- WEIGHT STAGE	PART NUMBER	WEIGHT OUNCES	EFFECTIVE RADIUS INCHES	CORRECTION OUNCE- INCHES
7	4	4069995	0.1035	9.0180	0.9336
5	4	4071745	0.0582	9.0110	0.5247
7	5	4069996	0.0597	9.1510	0.5462
4	8	4068998	0.2410	9.0360	2.1780
	8	4071746	0.1770	9.0360	1.5980
4	9	4068999	0.1740	8.8840	1.5470
	9	4071747	0.1100	8.8840	0.9770
6	12	4069002	0.1190	8.2490	0.9830
	12	4071748	0.0850	8.2490	0.7070
7	13	4069003	0.0990	8.0500	0.7960
	13	4071749	0.0640	8.0500	0.5150

**5. REAR COMPRESSOR ROTOR ASSEMBLY -
DYNAMIC BALANCE AFTER BLADE TIP
GRINDING.**

(See table 1.)

- a. Rotate rear compressor rotor assembly at a minimum speed of 900 rpm and measure initial dynamic unbalance in front and rear balance planes.



Angular relationship of all blades, disk slots and counterweights is important. Disassembly of blades after grinding is permitted provided all parts are installed with original angular relationship prior to final balancing.

NOTE

Counterweights cannot be installed at locking blade locations.

- b. Add or remove counterweights at 8th, 9th, 12th, and 13th stages as required to meet final dynamic unbalance of 0.20 ounce-inch maximum in both front and rear balance planes. (See table 1.) Refer to paragraph 7 for counterweight installation.

**6. FOURTH AND FIFTH STAGE COMPRESSOR
ROTOR - COUNTERWEIGHT
INSTALLATION.**

(See Figures 3 and 4.)

NOTE

Installation of 4th and 5th stage counterweights is typical.

- a. Compress lockring(2, figure 3) and remove ring from groove in rear face of disk.
- b. Determine which compressor rotor blade(1) is at desired angle where counterweight(4) is to be installed.
- c. Slide compressor rotor blade(1) out of disk.
- d. Position counterweight(4) under compressor rotor blade(1) and slide blade into disk.
- e. Mark, with silver pencil, blades(1) which have counterweights installed under them.
- f. Install lockring(2) into groove in rear of disk to secure all blades to disk.

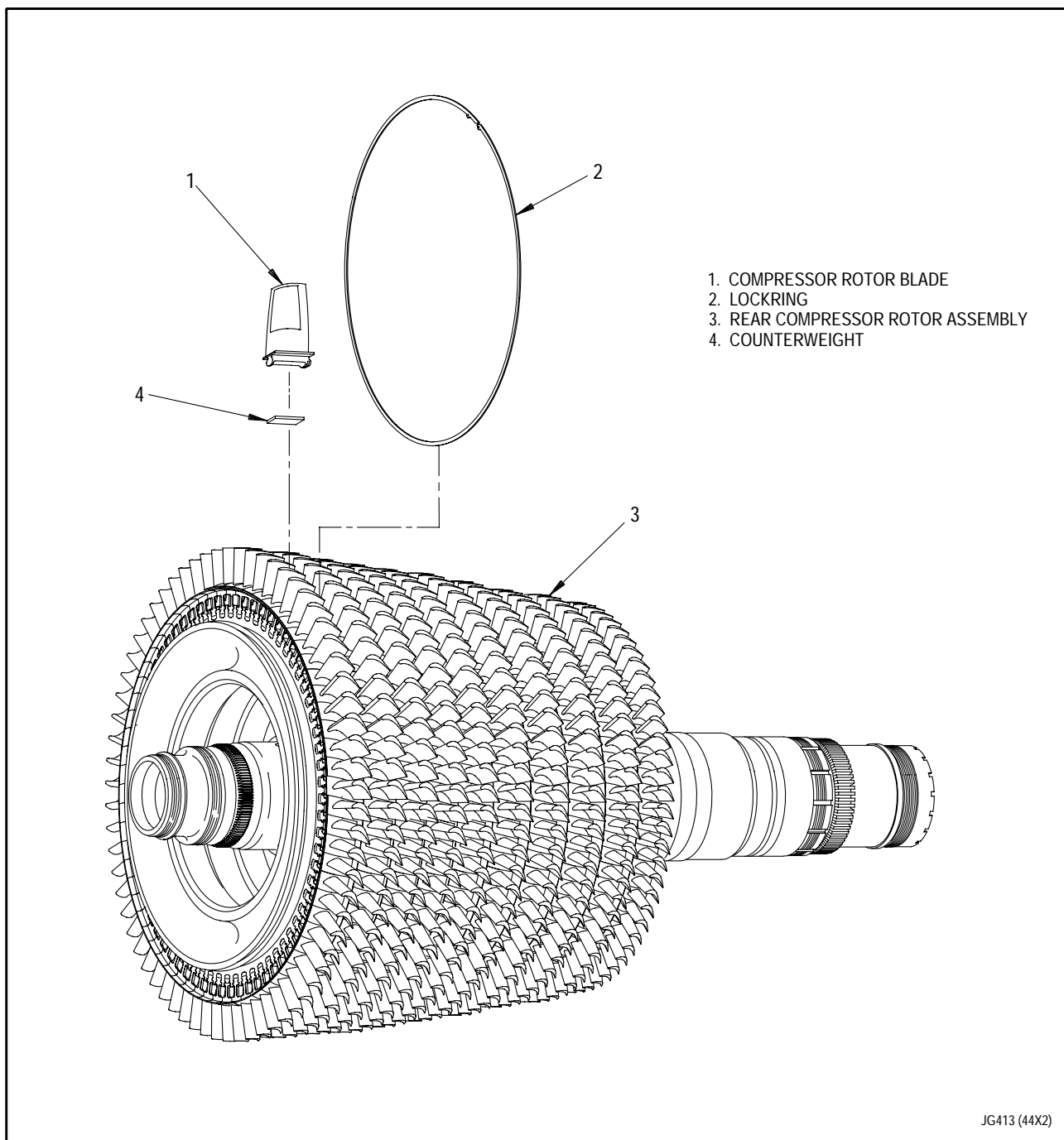


Figure 3. Fourth and Fifth Stage Compressor Rotor - Counterweight Installation (Typical)

g. Measure gap between ends of lockring(3, figure 4). Dimension shall be 0.030 to 0.100 inch.

h. Verify lockring(3) engages tangs of all compressor rotor blades(1).

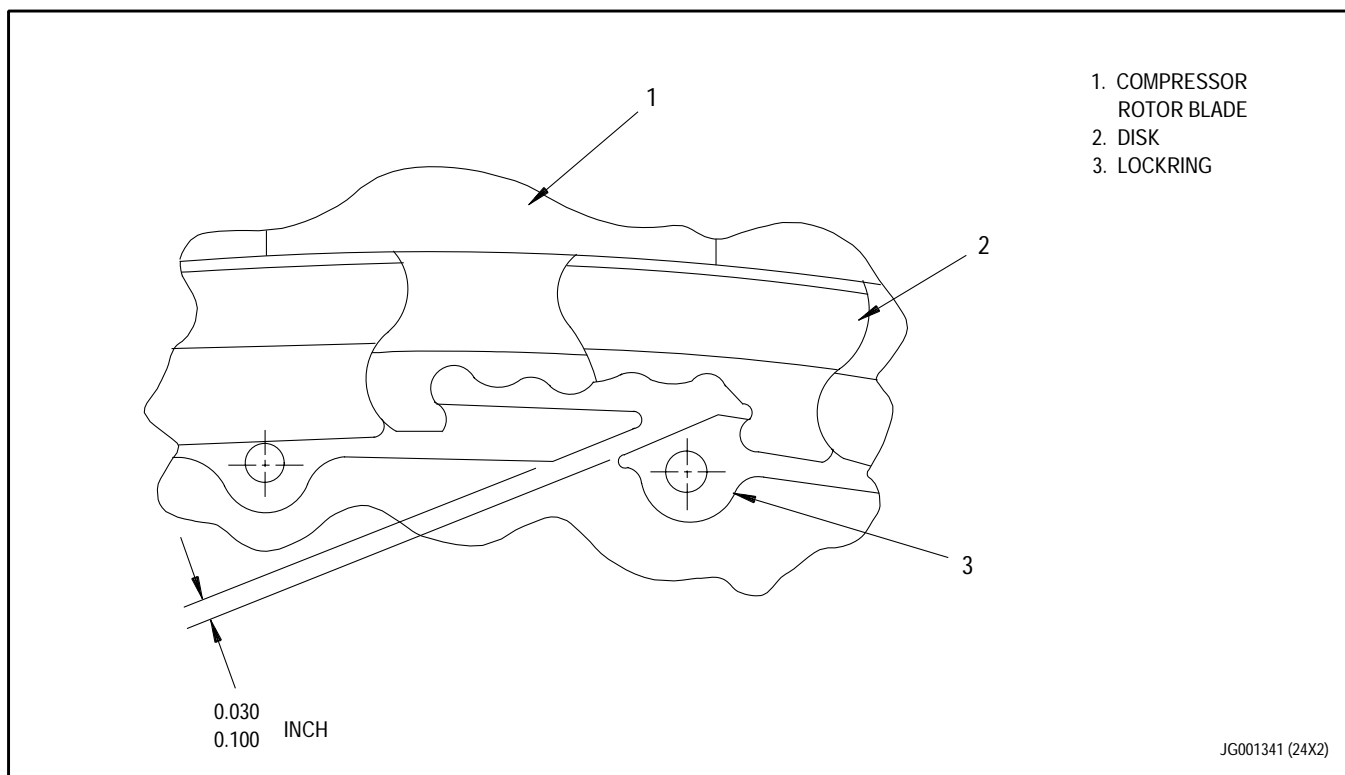


Figure 4. Fourth and Fifth Stage Blades - Lockring Measurement (Typical)

7. EIGHTH, NINTH, TWELFTH, AND THIRTEENTH STAGE COMPRESSOR ROTOR - COUNTERWEIGHT INSTALLATION.

(See Figures 5 and 6.)



Be sure compressor rotor blades and counterweights are installed in original locations.

NOTE

- Counterweights cannot be installed at locking blade locations.
 - Installation of 8th, 9th, 12th, and 13th stage counterweights is typical.
 - For ease of maintenance, blades can be removed from disk in either direction.
- a. Using a silver pencil, mark compressor rotor blades at desired stage as follows
- (1) Mark location of setscrews(3, figure 5) on rear face of disk. Setscrew locations indicate disk loading slots.

(2) Mark blade edge locations of locking blades(2) on front face of disk.

(3) Number locking blades(2) and compressor rotor blades(1), in either direction, starting at disk loading slot to desired angle where counterweight(4) is to be installed. (See figure 5 for starting point for blade marking.)



Extreme care shall be taken in torquing to avoid tool breakage.

- b. Use Allen wrench for hex head screws or equivalent to loosen two bladelock setscrews (1, figure 6.)

NOTE

It may take several rotations around disk to align locking blade with loading slot.

- b1. Using a non-metallic drift and hammer, tap blade set around disk approximately 1/2 blade platform width to align a locking blade(2, figure 5) with disk loading slot.

- c. Remove locking blades(2) and blade locks(5) from disk loading slot.
- d. If bladelock is damaged or unusable and cannot be removed, setscrew can be removed by drilling procedures. Refer to T.O.2J-F100-53-7, WP 035 00.

Figure 5A. Deleted.



- Use care when removing blades to ensure counterweights (if installed) are not dropped.
- Be sure removed blades and counterweights are marked and kept in proper sequence.

NOTE

If blade stage contains previously installed counterweights, counterweights shall be marked with adjacent blade numbers to ensure proper installation at original location.

- e. Slide compressor rotor blades(1) and counterweights(4) (if previously installed) out of disk loading slot to reach desired angle where counterweight(4) is to be installed.
- f. Install counterweight(4) into disk loading slot and slide around to desired angle.



Blade locks are marked with stage number on both sides. Ensure blade locks are installed in proper stage.

- g. Install compressor rotor blades(1), counterweights(4) (if previously installed), locking blades(2) and blade lock(5) into disk loading slot in original locations. Ensure blade lock is installed in proper stages as marked. Do not install final blade lock and locking blade. Be sure setscrew in installed blade lock aligns with mark on rear face of disk.

- h. Measure maximum gap as follows:

NOTE

Blades should be positioned in a radially outward direction while applying circumferential force. This will ensure blade set remains straight during gap measurement.

- (1) Apply a circumferential force to platforms of outermost blades in blade stage. If necessary, a non-metallic drift and hammer can be used.
- (2) While applying force, measure gap at missing locking blade location. Record as dimension A.
- (3) Measure platform width of final locking blade to be installed. Record as dimension B.
- (4) Subtract dimension B from dimension A to obtain dimension C. Dimension C shall be no more than 0.100 inch maximum gap. (See figure 5.)

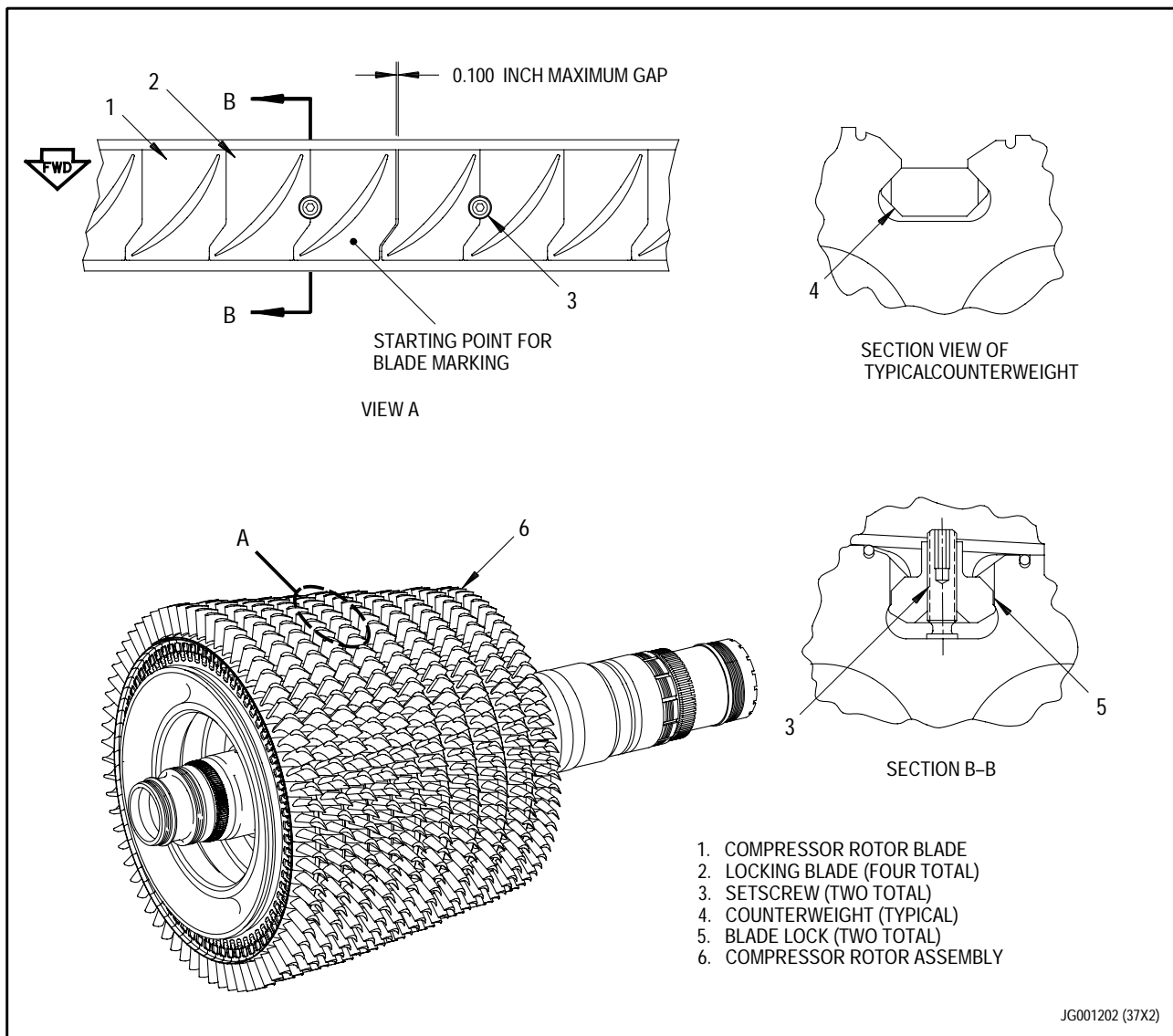


Figure 5. Eighth, Ninth, Twelfth, and Thirteenth Stage Compressor Rotor - Counterweight Installation (Typical)

- i. If dimension C is not within limits, do the following:

- (1) Remove locking blades(2) and blade lock(5) from disk loading slot.

NOTE

Compressor rotor blades have either wide or standard sized blade platforms. The width of a wide blade platform is 0.010 inch greater than the width of a standard blade platform.

- (2) Remove blade(1) adjacent to disk loading slot. Replace blade with a blade having a wide or standard sized blade platform in order to obtain dimension C.

- (3) Install locking blades(2) and blade lock(5) into disk loading slot. Do not install final blade lock and locking blade. Measure gap per step h.

- j. Install final locking blade(2) and blade lock(5) into disk loading slot. Ensure blade lock is installed in proper stage as marked.

- k. Tap blade set around disk approximately 1/2 blade platform width to align setscrews(3) with marks on rear face of disk. Ensure edges of locking blades(2) align with marks on front face of disk.

- l. Deleted

- m. Using CMS-5 NSN5120-00-439-8267 Allen wrench or equivalent for hex head setscrews, tighten two setscrews(1, figure 6) as follows:

- (1) Ensure setscrew of blade locks(4) are backed out completely before tightening.

NOTE

Setscrew must bottom out against disk within 3 1/2 to 6 1/2 turns.

- (2) Tighten setscrew(1) and count number of turns required to bottom out setscrew against disk(5). Number of turns shall be 3 1/2 to 6 1/2. If number of turns is less than 3 1/2 or more than 6 1/2, do the following:

- (a) Loosen setscrew(1).

- (b) If number of turns is less than 3 1/2, realign blade lock(4) to ensure it is properly installed in disk(5).

- (c) If number of turns is greater than 6 1/2, recheck blade lock stage marking for proper stage.

- (d) Retighten setscrew(1) per steps m.(1) and m.(2).

(3) Deleted.

(a) Deleted.

(b) Deleted

(4) Torque two hex head(fluted)
setscrews(1) as follows:

NOTE

While rotating setscrew through 360 degrees, torque will fluctuate from zero to a peak value. Peak value of 1.5 to 11 pound-inches is required.

(a) Tighten setscrew and determine torque value just prior to seating blade lock against drum. Torque value shall be 1.5 to 11 pound-inches. If this requirement is not satisfied, replace blade lock assembly.

(b) Torque setscrews(1)
1 to 3 pound-inches above torque value determined in step m.(4) (a) above.

(5) Ensure top of blade lock shank(2) is flush with or slightly below top of blade platform(3).

(6) Ensure 1/2 to 3 threads of setscrew(1) extend above top of blade lock shank(2). If visible number of threads is outside range, do the following:

(a) Loosen setscrew(1).

(b) Realign blade lock(4) to ensure it is properly installed in disk(5).

(c) Retighten setscrew(1) per step m.

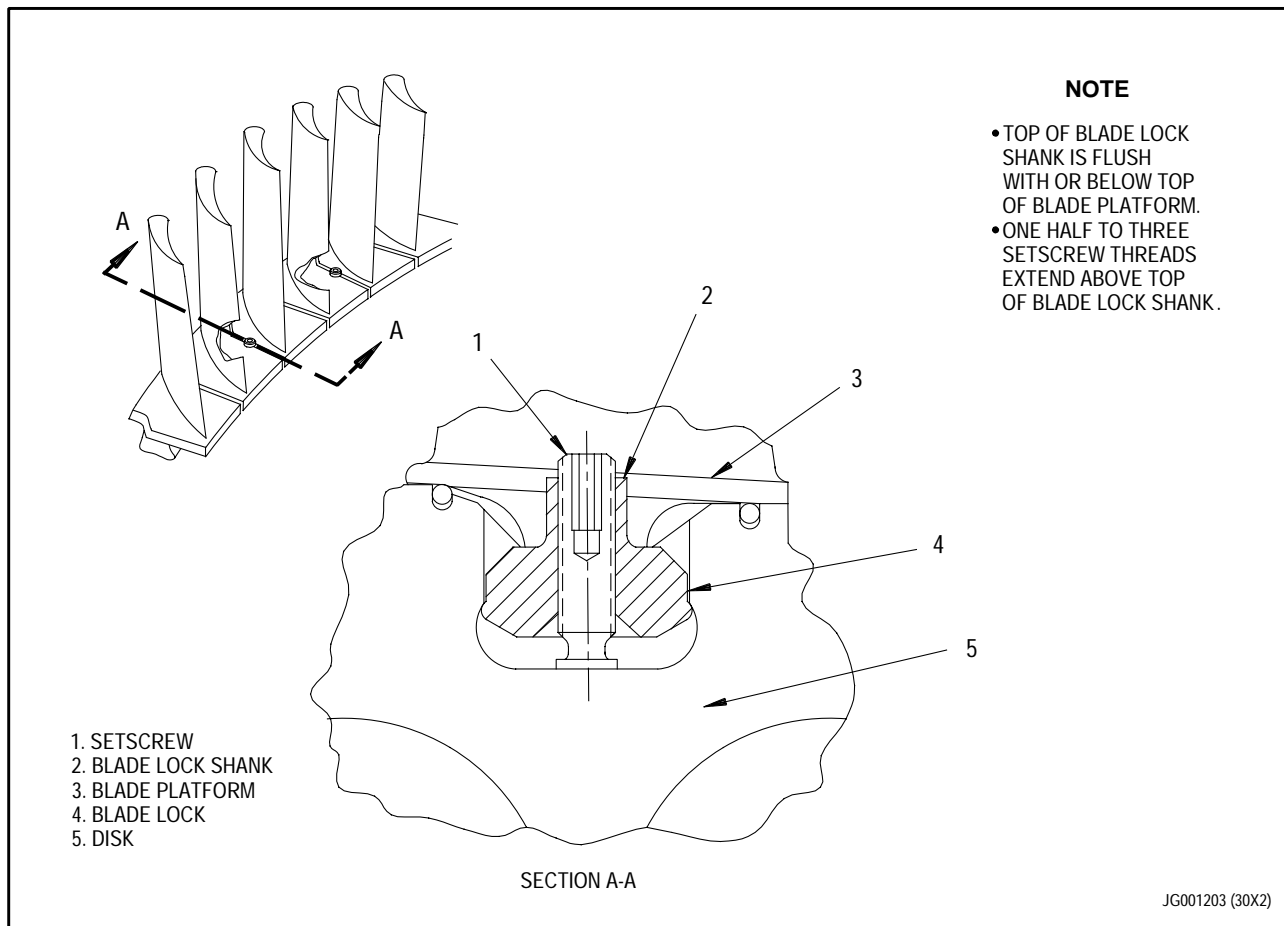


Figure 6. Compressor Rotor Blade Lock - Installation (Typical)

h. FOLLOW-ON MAINTENANCE.

- a. Remove rear compressor rotor assembly dynamic balance tooling per WP 625 00.

WORK PACKAGE**TECHNICAL PROCEDURES****ROTOR ASSEMBLY, REAR COMPRESSOR -****REMOVAL OF DYNAMIC BALANCE TOOLING****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 22

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 6	30	9	0	12 - 13	0
7	0	10 - 11	30	14	30
8	30			15 - 22	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS**Nomenclature****Specification/Vendor Part Number**

GLOVES, LINT-FREE

-

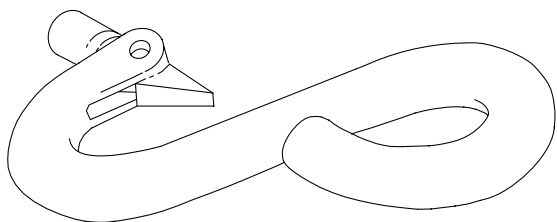
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

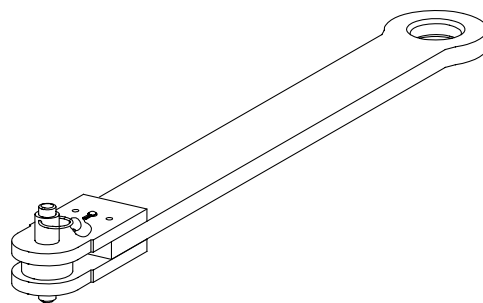
Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR ROTOR ASSEMBLY - DYNAMIC BALANCE TOOLING REMOVAL	
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 57938 OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 57937 OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 51298
	BASE, BALANCE FIXTURE REAR COMPRESSOR - - - - -	PWA 57710
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338 OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - - -	PWA 50775
	WRENCH, REAR COMPRESSOR REAR BALANCE BEARING RETAINING NUT - - - - -	PWA 50985
	EQUIPMENT SET, IMMOBILIZER AND ADAPTER, COMPRESSOR BALANCE BEARING RETAINING NUTS - - - - -	PWA 57737
	PULLER, REAR COMPRESSOR REAR HUB BALANCE BEARING AND SPACER - - - - -	PWA 53877
	STAND, BUILD, REAR COMPRESSOR ROTOR - - - - -	PWA 57722
	SPACER, REAR COMPRESSOR - - - - -	PWA 50993
	PULLER, BALANCE BEARING PACKAGE - - - - -	PWA 50619
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
	BASE, BALANCE HOUSING FROM BEARING - - - - -	PWA 51680
	DRIFT, NO. 3 BALANCE BEARING FROM HOUSING - - - - -	PWA 51679
	PULLER, NO. 3 BALANCE BEARING AND SPACER - - - - -	PWA 50910
	PULLER, NO. 3 BEARING REAR SEAL SEAT - - - - -	PWA 50635
	HOOK, SAFETY - - - - -	PWA 2388

ILLUSTRATED SUPPORT EQUIPMENT



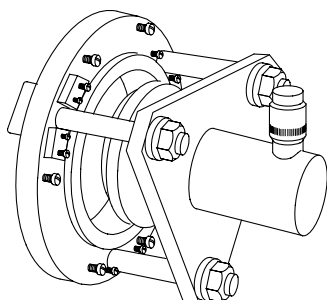
PWA 2388 -C

Figure T1. PWA 2388 HOOK



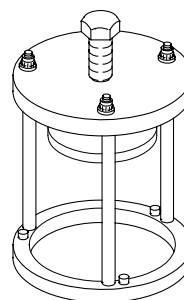
PWA 26584 -C

Figure T2. PWA 26584 ARM



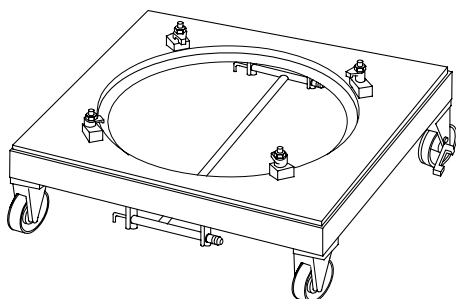
PWA 50619 -C

Figure T3. PWA 50619 PULLER



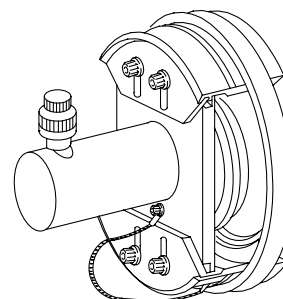
PWA 50635 -C

Figure T4. PWA 50635 PULLER



PWA 50775 -C

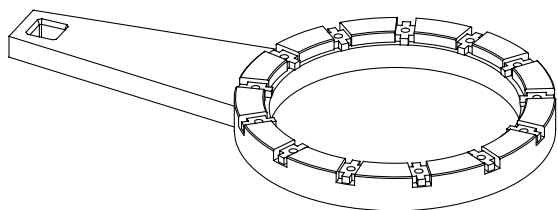
Figure T5. PWA 50775 STAND



PWA 50910 -C

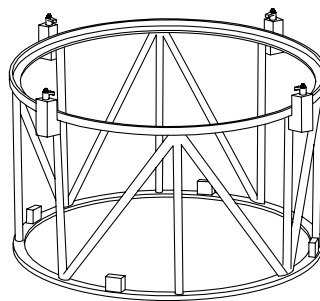
Figure T6. PWA 50910 PULLER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



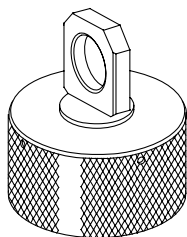
PWA 50985 -C

Figure T7. PWA 50985 WRENCH



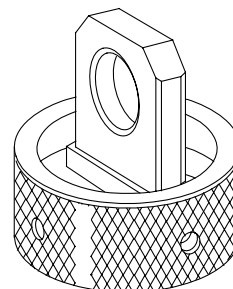
PWA 50993 -C

Figure T8. PWA 50993 SPACER



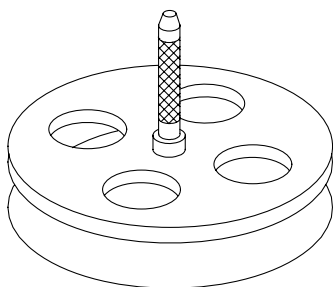
PWA 51298 -C

Figure T9. PWA 51298 EYE



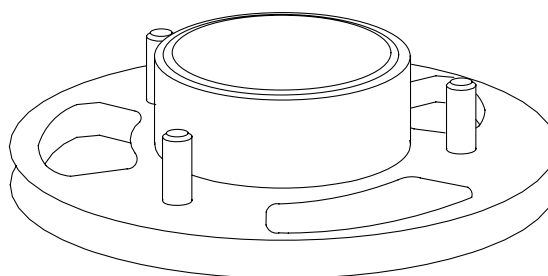
PWA 51371 -C

Figure T10. PWA 51371 EYE



PWA 51679 -C

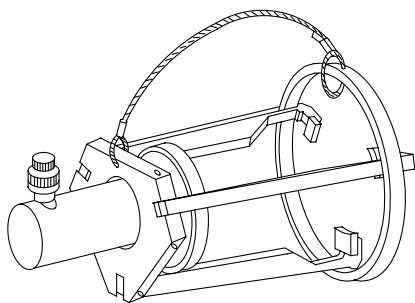
Figure T11. PWA 51679 DRIFT



PWA 51680 -C

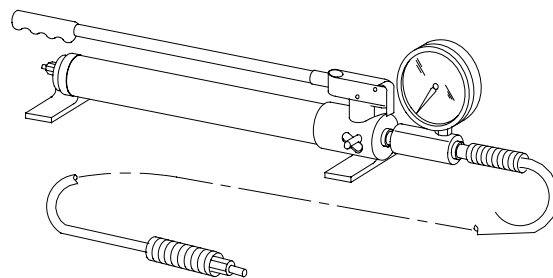
Figure T12. PWA 51680 BASE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



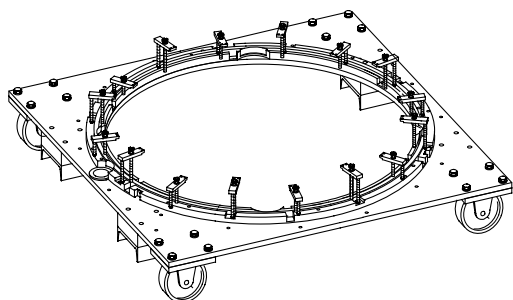
PWA 53877 -C

Figure T13. PWA 53877 PULLER



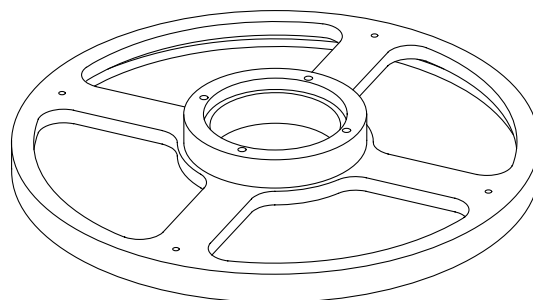
PWA 55380 -C

Figure T14. PWA 55380 PUMP



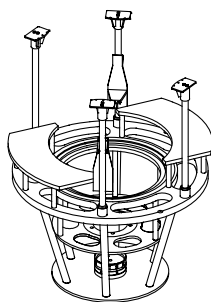
PWA 56338 -C

Figure T15. PWA 56338 STAND



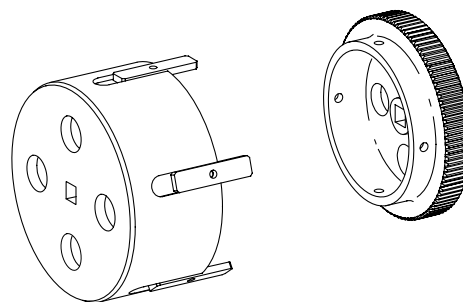
PWA 57710 -C

Figure T16. PWA 57710 BASE



PWA 57722 -C

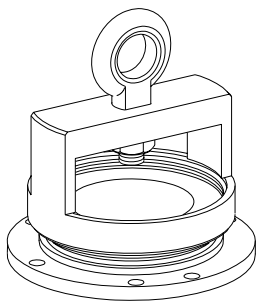
Figure T17. PWA 57722 STAND



PWA 57737 -C

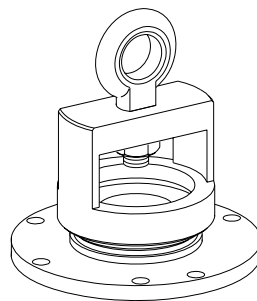
Figure T18. PWA 57737 EQUIPMENT SET

ILLUSTRATED SUPPORT EQUIPMENT (continued)



PWA 57937 -C

Figure T19. PWA 57937 FIXTURE



PWA 57938 -C

Figure T20. PWA 57938 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for removal of rear compressor rotor assembly dynamic balance tooling.

**2. REAR COMPRESSOR ROTOR ASSEMBLY -
DYNAMIC BALANCE TOOLING REMOVAL.**

(See Figures 1 through 8.)

- a. Remove rear compressor rotor assembly(3, figure 1) from PWA 57698, detail-1 support assembly(13) as follows:
 - (1) Loosen plastic knobs(7) and open cover(5).
 - (2) Remove four detail socket screws(1), securing PWA 57697, detail-1 housing(2) to PWA 57698, detail-1 support assembly(13).
 - (3) Remove two detail socket screws(9) and PWA 57698, detail-2 clamp(8).
 - (4) Install PWA 57938 fixture(2, figure 2) on front hub(3) of rear compressor rotor assembly(4).
 - (5) Attach PWA 26584 arm(1) to hoist.
 - (6) Attach PWA 26584 arm(1) to PWA 57938 fixture(2).
 - (7) Install PWA 57937 fixture(6) on drive shaft(5) of rear compressor rotor assembly(4).
 - (8) Attach PWA 26584 arm(7) to hoist.
 - (9) Attach PWA 26584 arm(7) to PWA 57937 fixture(6). Work hoists to raise rear compressor rotor assembly(3, figure 1) from PWA 57698, detail-1 support assembly(13) and rotate to front end down position.

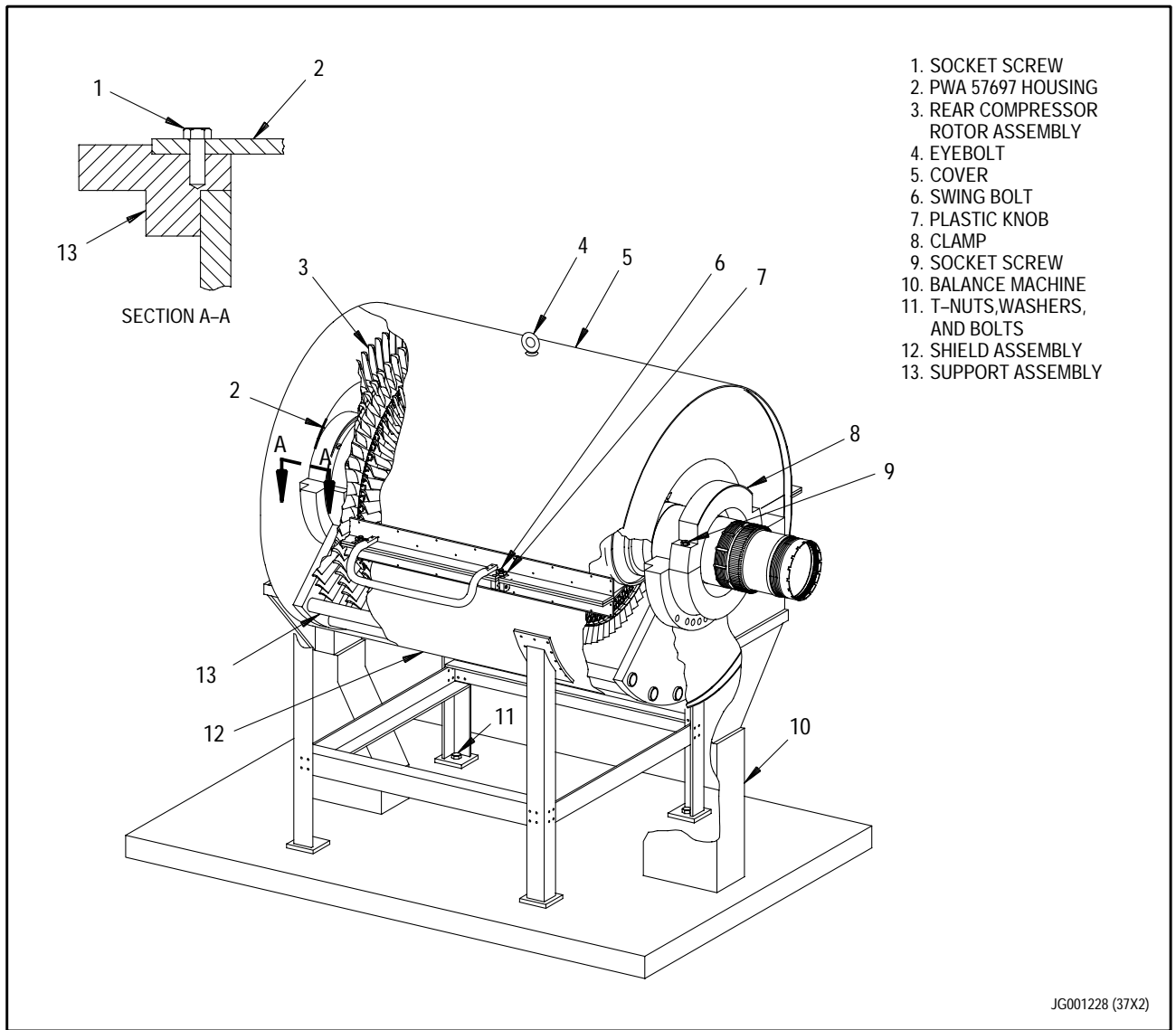
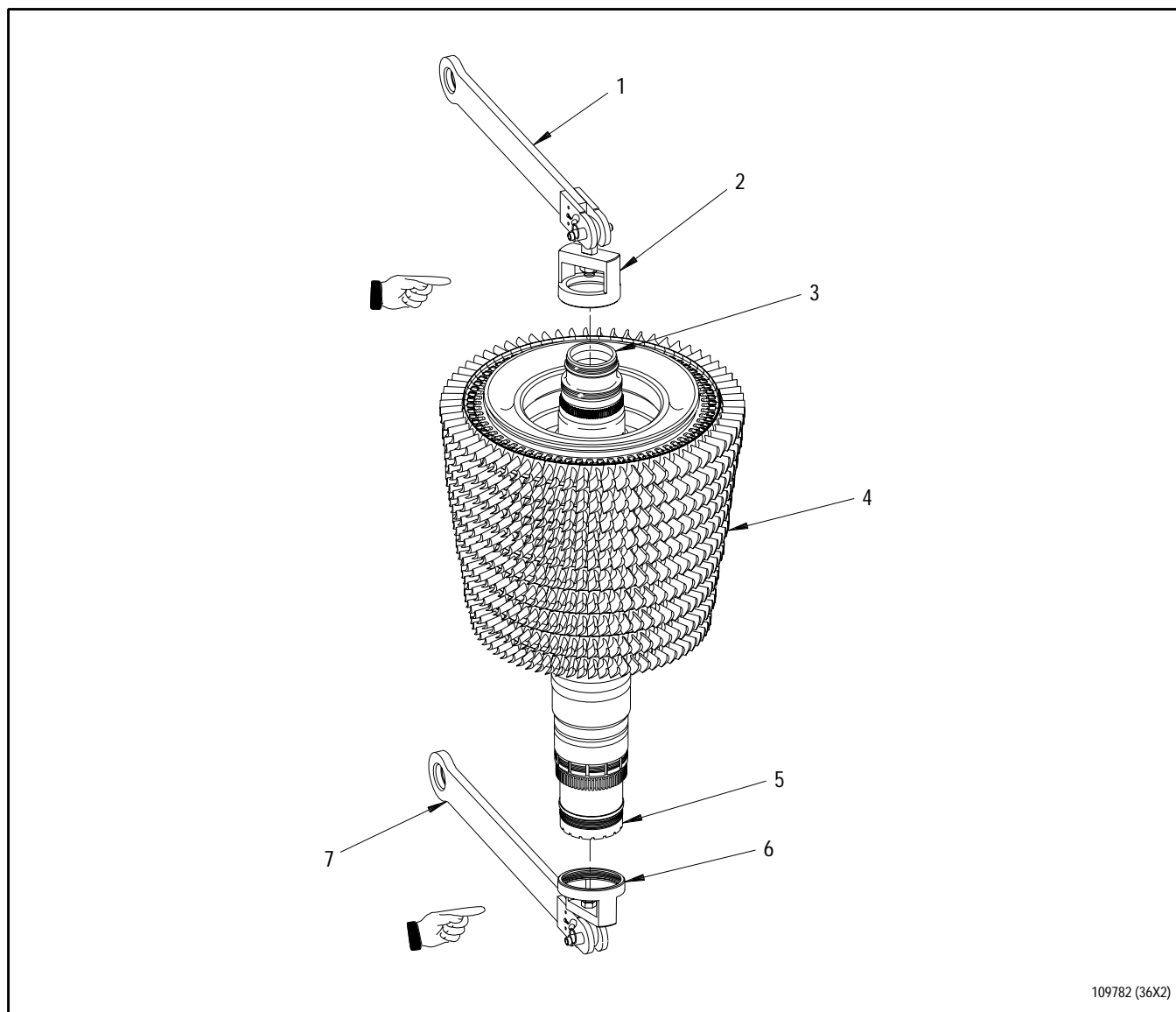


Figure 1. PWA 57698 Equipment Set - Removal

- b. Remove PWA 26584 arm(1,
figure 2).
- b1. Ensure that flat side of
detail-33 ring on PWA 56338
stand is facing up.
- c. Install PWA 57710 base(11,
figure 3) on PWA 56338 stand(7).
Secure base with stand detail
clamps(8).
- d. Lower rear compressor rotor
assembly(6) onto PWA 57710
base(11) and secure
PWA 57697, detail-1 housing(10)
to base with base detail
clamps(9).
- e. Remove PWA 26584 arm(7,
figure 2) and PWA 57937
fixture(6) from driveshaft(5).



1. PWA 26584 arm
2. PWA 57938 fixture
3. Front hub
4. Rear compressor rotor assembly
5. Driveshaft
6. PWA 57937 fixture
7. PWA 26584 arm

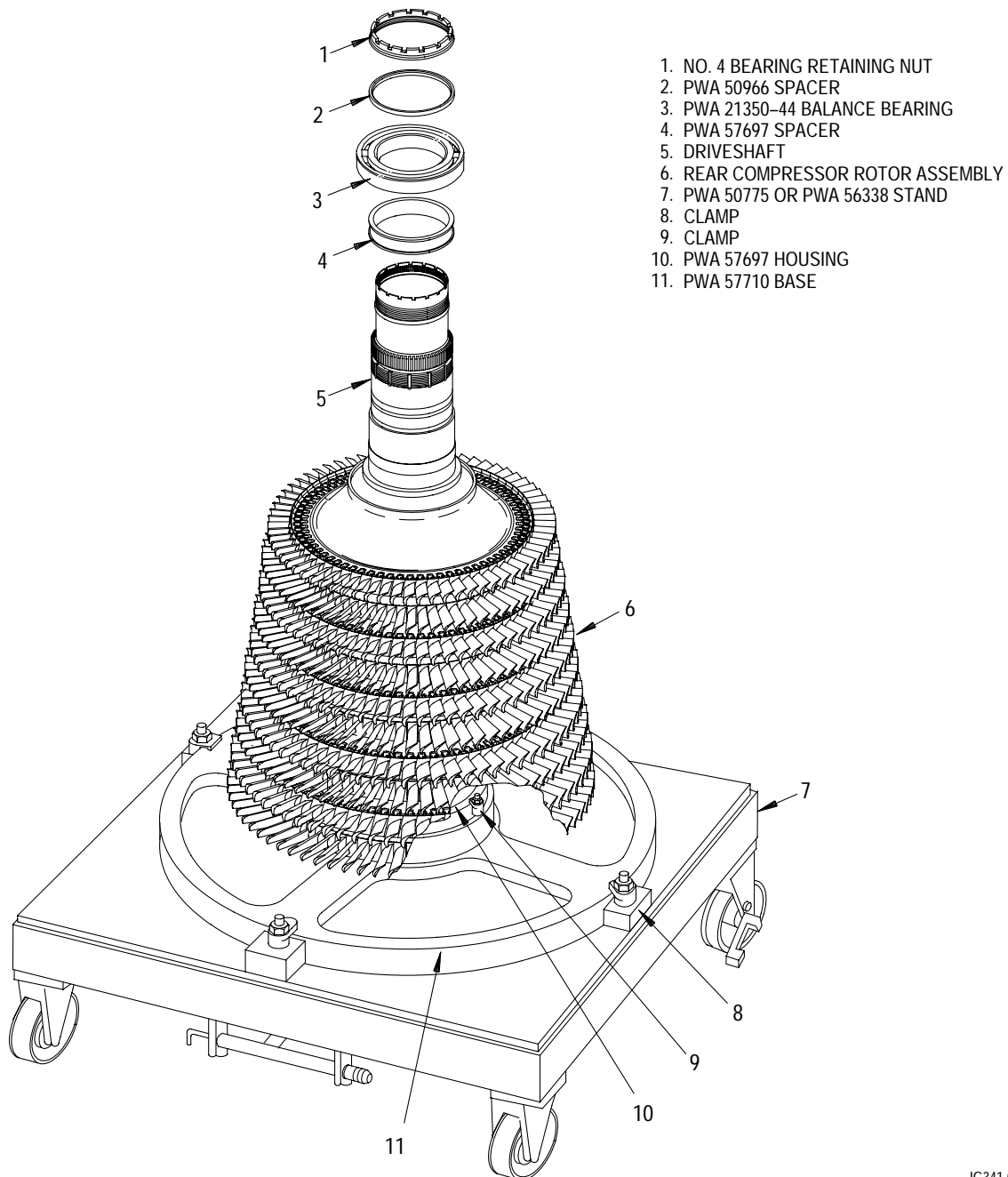
Figure 2. Rear Compressor Rotor Assembly - Rotating

CAUTION

No. 4 bearing retaining nut has left-hand threads. Turn nut clockwise (right-hand) to loosen it.

f. Use PWA 50985 wrench and PWA 57737, detail-4 immobilizer to loosen No. 4 bearing retaining nut(1, figure 3) by turning clockwise.

g. Remove PWA 50985 wrench and PWA 57737, detail-4 immobilizer and nut(1).



JG341 (44X2)

Figure 3. Rear Compressor Rotor Assembly Driveshaft Balance Bearing - Removal

h. Remove PWA 21350-44 balance bearing(3), PWA 57697, detail-4 spacer(4), and PWA 50966 spacer(2) as follows:

(1) Slide PWA 53877, detail-2 ring(4, figure 4) up toward detail-4 body(2).

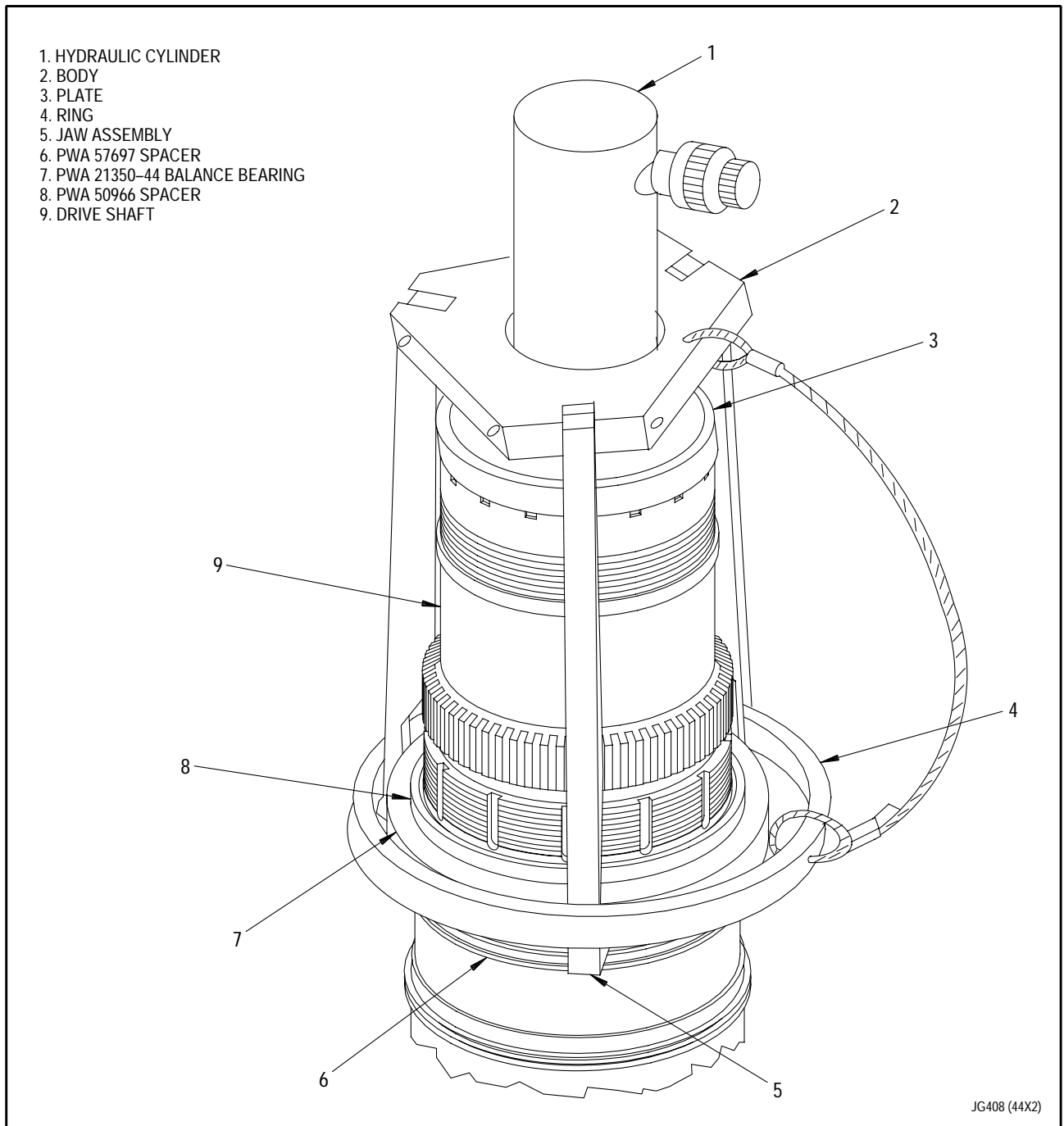


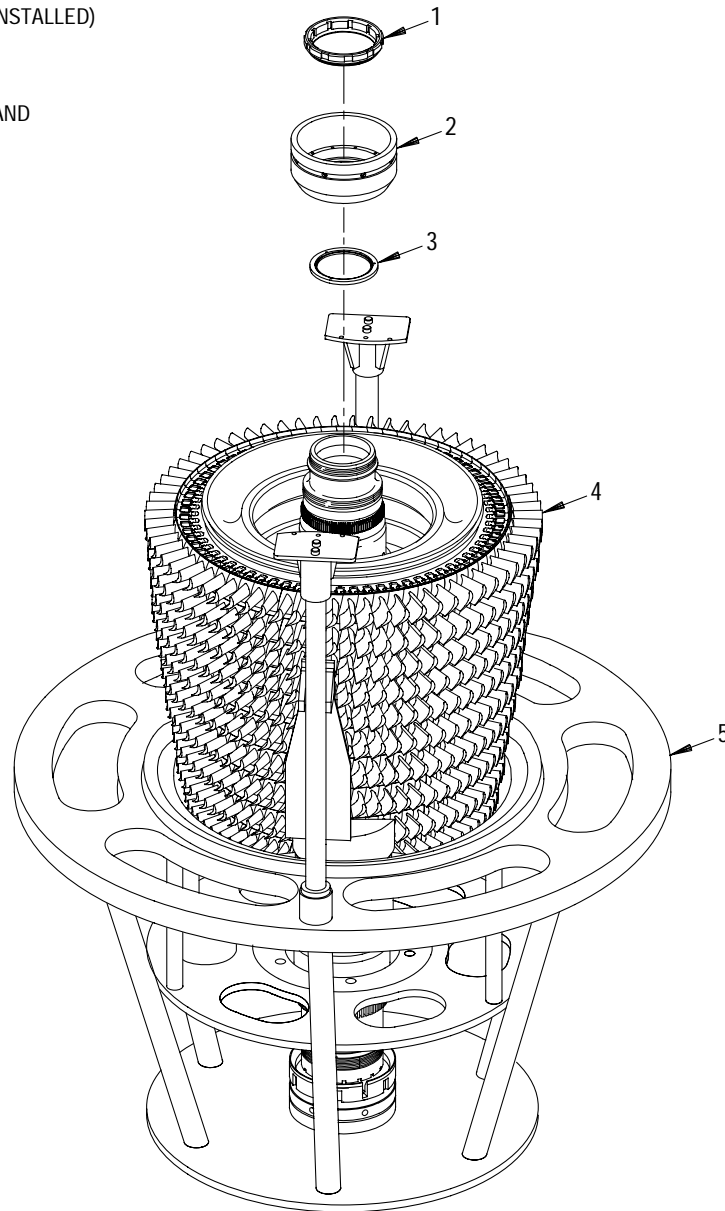
Figure 4. Rear Compressor Rotor Assembly Driveshaft Balance Bearing and Spacers - Removal with PWA 53877 Puller

- (2) Position PWA 53877, detail-1 jaw assembly(5) under lip of PWA 57697, detail-4 spacer(6) with PWA 53877, detail-3 plate(3) in end of driveshaft(9).
- (3) Attach PWA 55380 hydraulic pump to PWA 53877, detail-5 hydraulic cylinder(1). Actuate hydraulic pump to remove PWA 57697, detail-4 spacer(6), PWA 21350-44 balance bearing(7), and PWA 50966 spacer(8).
- i. Install rear compressor rotor assembly(4, figure 5) in PWA 57722 stand(5) as follows:
 - (1) Position PWA 50993 spacer on PWA 56338 stand and secure with stand detail clamps.
 - (2) Position PWA 57722 stand in PWA 50993 spacer and secure stand with spacer detail clamps.
 - (3) Install PWA 57937 fixture(6, figure 2) on driveshaft(5) of rear compressor rotor assembly(4).
 - (4) Attach PWA 26584 arm(7) to hoist.
 - (5) Attach PWA 26584 arm(7) to PWA 57937 fixture(6).
 - (6) Loosen clamps(9, figure 3) securing PWA 57697, detail-4 housing(10) to PWA 57710 base(11).
 - (7) Work hoist to lift rear compressor rotor assembly(6) from PWA 57710 base(11).
 - (8) Attach PWA 26584 arm(1, figure 2) to hoist.
 - (9) Attach PWA 26584 arm(1) to PWA 57938 fixture(2) and work hoists to rotate rear compressor rotor assembly(4) to front end up position.
 - (10) Remove PWA 26584 arm(7) and PWA 57937 fixture(6) from driveshaft(5).
 - (11) Lower rear compressor rotor assembly(4, figure 5) into PWA 57722 stand(5). Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate.
 - (12) Remove PWA 26584 arm(1, figure 2) and PWA 57938 fixture(2).

j. Use PWA 57737, detail-1 adapter to loosen No. 3 bearing retaining nut(1, figure 5).

k. Remove PWA 57737, detail-1 adapter and nut(1).

1. NO. 3 BEARING RETAINING NUT
2. PWA 57697 HOUSING (BALANCE BEARING INSTALLED)
3. PWA 52637 SPACER
4. REAR COMPRESSOR ROTOR ASSEMBLY
5. PWA 57722 BUILD STAND



JG340 (44X2)

Figure 5. Rear Compressor Rotor Assembly Front Hub Balance Bearing and Housing - Removal

- l. Remove front hub balance bearing package using PWA 50619 puller as follows:
 - (1) Position PWA 50619, detail-11 jaw set into grooves in ID of PWA 50940 adapter(2, figure 6) with PWA 50619, detail-3 adapter in end of rear compressor rotor front hub.
 - (2) Attach PWA 55380 hydraulic pump to PWA 50619 puller. Actuate hydraulic pump to remove PWA 57697, detail-1 housing(6), PWA 21350-43 balance bearing(5), PWA 50906 spacer(3), and PWA 50940 adapter(2), as an assembly.
- m. Remove PWA 57697, detail-1 housing(6) from remainder of balance bearing package as follows:
 - (1) Position PWA 51680 base on arbor press.
 - (2) Position PWA 57697, detail-1 housing(6) on PWA 51680 base with large OD up and align three cutouts in bottom of housing with pins in base.
 - (3) Remove 12 PWA 57697 detail socket screws(1) and two detail-2 retainers(4).
 - (4) Position PWA 51679 drift onto OD of PWA 57697, detail-1 housing(6). Using arbor press, separate housing from remainder of balance bearing package.

- (5) Remove PWA 21350-43 balance bearing(5), PWA 50906 spacer(3), and PWA 50940 adapter(2) from PWA 51680 base and position on bench with bearing end up.

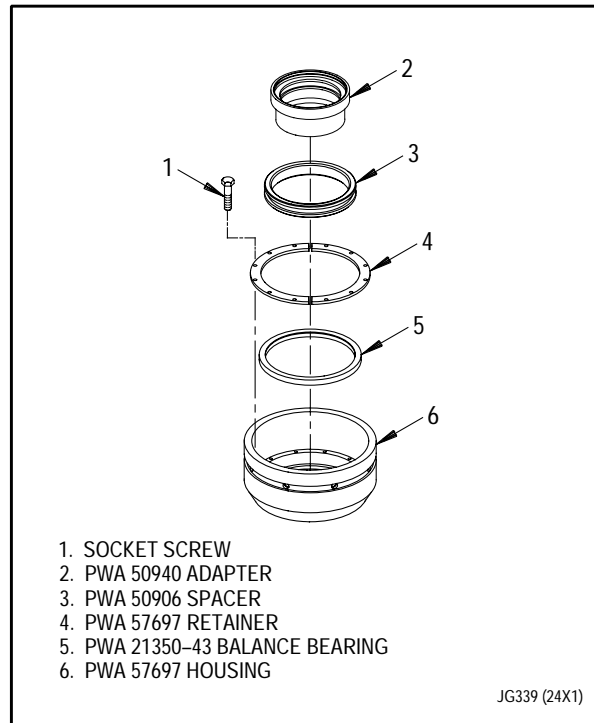


Figure 6. Rear Compressor Rotor Assembly Front Hub Balance Bearing - Removal

- n. Remove PWA 21350-43 balance bearing(5) and PWA 50906 spacer(3) from PWA 50940 adapter(2) using PWA 50910 puller as follows:
- (1) Loosen PWA 50910 puller detail socket screws(2, figure 7) securing detail-10 jaw set(5).
 - (2) Slide PWA 50910, detail-2 ring(8) up toward detail-4 cylinder mount(1) and move detail-10 jaw set(5) outward.
 - (3) Position PWA 50910, detail-3 puck(3) into ID of PWA 50940 adapter(7).
 - (4) Position PWA 50910, detail-10 jaw set(5) into groove of PWA 50906 spacer(6) (under bearing). Secure bottom of jaw set with detail-2 ring(8). Torque four detail socket screws(2) 65 pound-inches.
 - (5) Attach PWA 55380 hydraulic pump to PWA 50910 hydraulic cylinder. Actuate hydraulic pump to separate PWA 21350-43 balance bearing(4) and PWA 50906 spacer(6) from PWA 50940 adapter(7).
 - (6) Remove PWA 50906 spacer(6) and PWA 21350-43 balance bearing(4) from PWA 50910 puller.

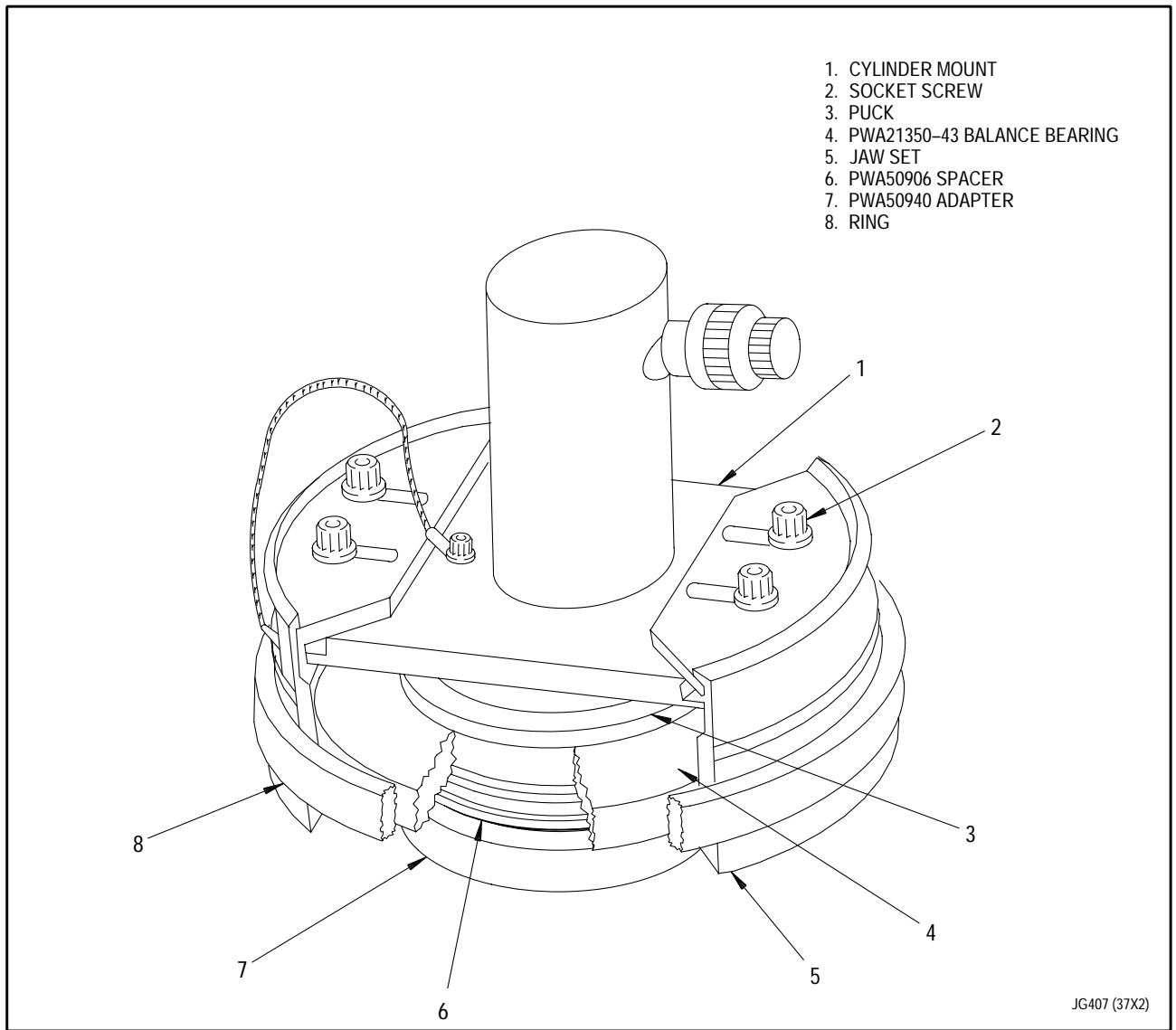
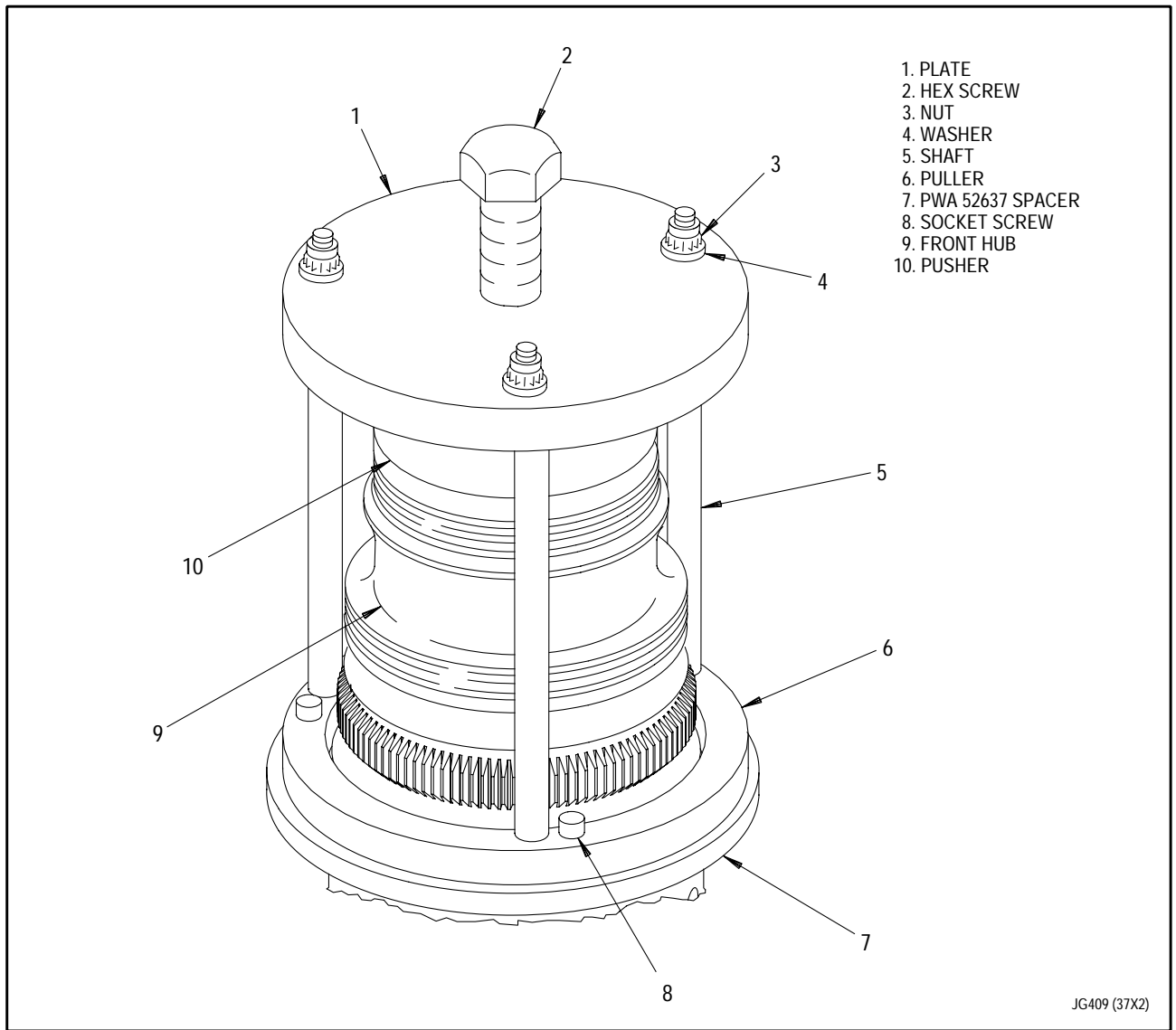


Figure 7. Rear Compressor Rotor Assembly Front Hub Balance Bearing, Spacer, and Adapter - Disassembly With PWA 50910 Puller

- o. Remove PWA 52637 spacer(7, figure 8) with PWA 50635 puller as follows:
 - (1) Position PWA 50635, detail-1 puller(6) on PWA 52637 spacer(7) and secure with three PWA 50635, detail-2 socket screws(8).
 - (2) Thread three detail-8 shafts(5) into detail-1 puller(6).
 - (3) Install detail-4 plate(1) and detail-3 pusher(10) on rear compressor rotor assembly front hub(9).
 - (4) Align holes in detail-4 plate(1) with detail-8 shafts(5).
 - (5) Adjust detail-5 hex screw(2) and detail-3 pusher(10) so detail-8 shafts(5) are through detail-4 plate(1). Install detail washers(4) and nuts(3) on detail-8 shafts(5).
 - (6) Tighten detail-5 hex screw(2) to remove PWA 52637 spacer(7).



JG409 (37X2)

Figure 8. PWA 52637 Spacer - Removal With PWA 50635 Puller

p. Remove PWA 57698 equipment set from balance machine(10, figure 1) as follows:

- (1) Install four standard eyebolts in threaded holes of detail-1 support assembly(13) for lifting.
- (2) Using hoist and standard lifting straps or PWA 2388 safety hook, attached to lifting eyebolts, remove detail-1 support assembly(13) from shield assembly(12).
- (3) Remove four eyebolts and lifting tools.

- (4) Close cover(5) of shield assembly(12) and secure with two swing bolts(6) and plastic knobs(7).
- (5) Remove T-nuts, washers and bolts(11) securing legs of shield assembly(12) to bed of balance machine(10).
- (6) Attach hoist and PWA 2388 safety hook to eyebolt(4) on top of cover(5) and remove shield assembly(12) from balance machine.

WORK PACKAGE

TECHNICAL PROCEDURES

BLADES, REAR COMPRESSOR ROTOR ASSEMBLY, FOURTH AND FIFTH STAGE -

APPLICATION OF ADHESIVE SEALANT PWA 36056

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	6	5	0	8 - 9	6
2 - 3	0	6	1	10 Blank	0
4	1	7	0		

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Adhesive Sealant (PWA 36056)	RTV-106
Butyl Alcohol	TT-B-848
Methyl ethyl ketone	TT-M-261
Propyl Alcohol (1 - Propanol)	Fisher Scientific

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains instructions for application of adhesive sealant (PWA 36056) on 4th and 5th stage rear compressor rotor blades.

**2. FOURTH AND FIFTH STAGE REAR
COMPRESSOR ROTOR BLADES - APPLICATION
OF PWA 36056 ADHESIVE SEALANT.**

(See Figures 1 through 3.)

NOTE

Sealing of 4th and 5th stage
compressor rotor blades is the
same.

- a. Retain all blades(1, figure 1)
in stage by loading blades
against blade slots and secure
to each other in pairs with
rubber bands.
- b. Compress lockring(2) and remove
from groove in rear face of
disk. Do not remove lockring
from rotor; lower onto next
lower stage.
- c. Remove rubber bands and slide
compressor rotor blades(1) and
counterweights(4) (from marked
locations where installed) out
of disk.

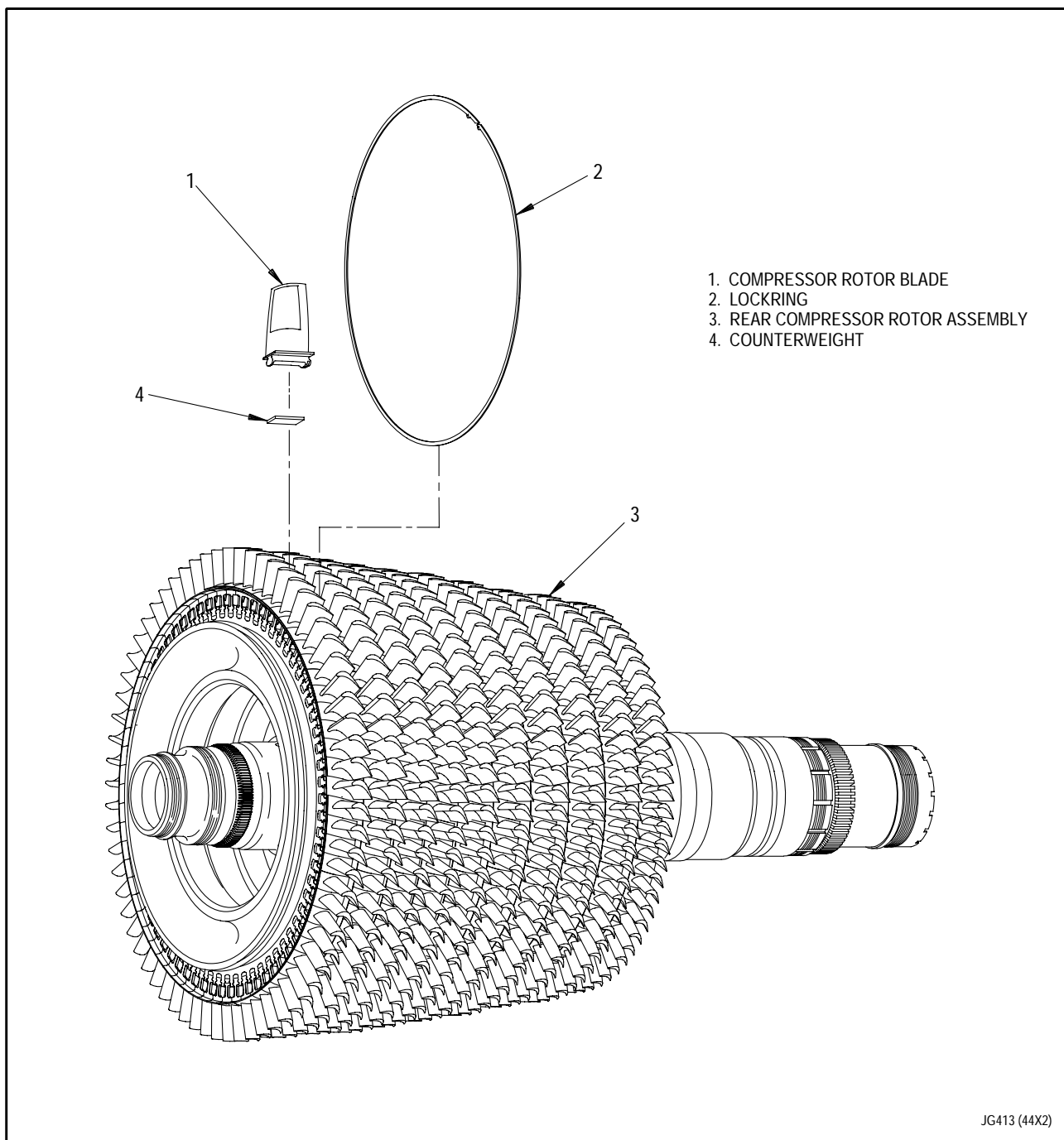


Figure 1. Fourth and Fifth Stage Blades - Removal and Installation (Typical)

T.O. 2J-F100-53-7

WP 627 00

- d. Clean blade roots, blade platforms, and disk slots of blades with butyl alcohol, methyl ethyl ketone, or propyl alcohol per PWA 83-B2. Do not touch cleaned areas with bare hands and wear clean gloves when handling disk and blades. Refer to T.O. 2-1-111.
- e. Apply PWA 36056 adhesive sealant to compressor rotor blades in areas as shown in figure 2.

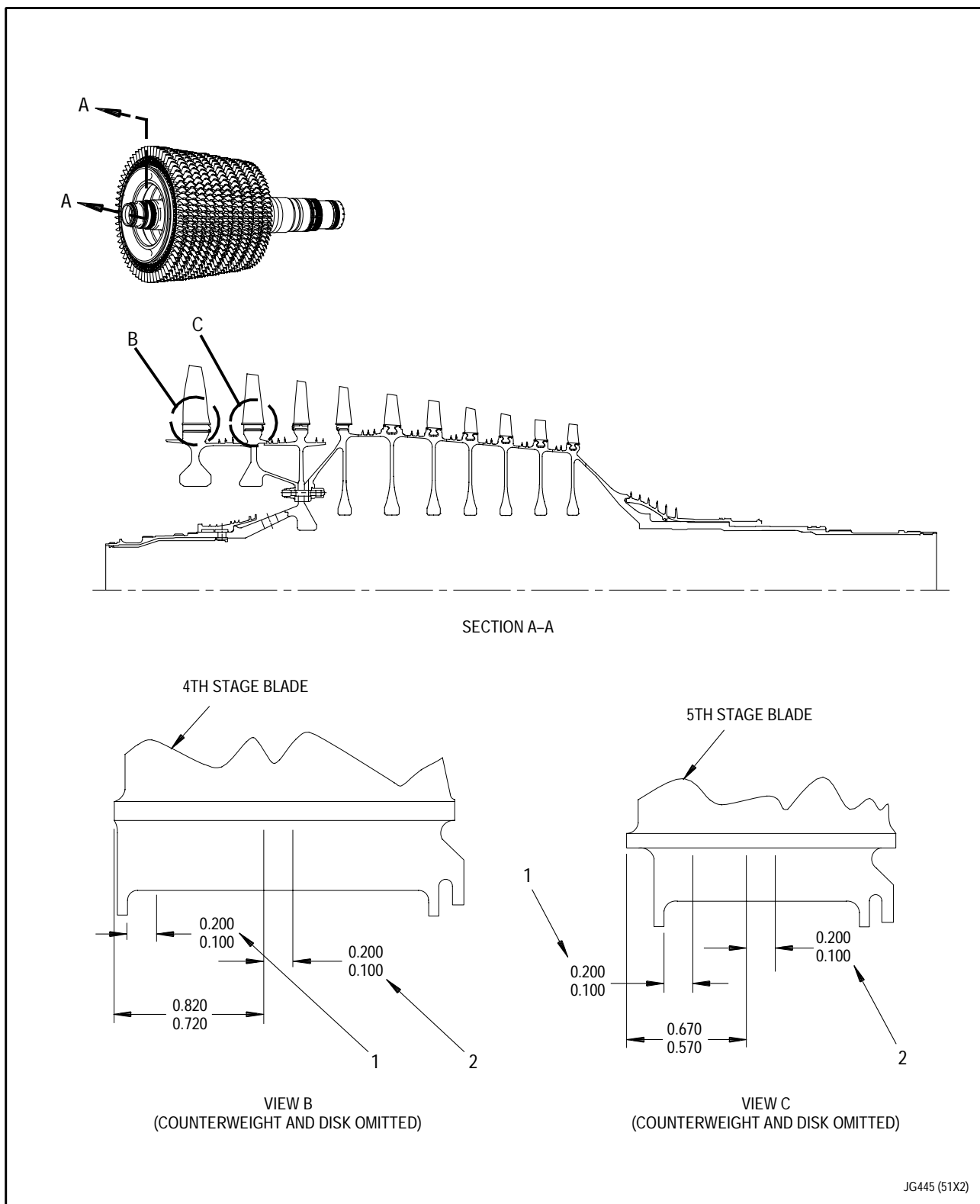
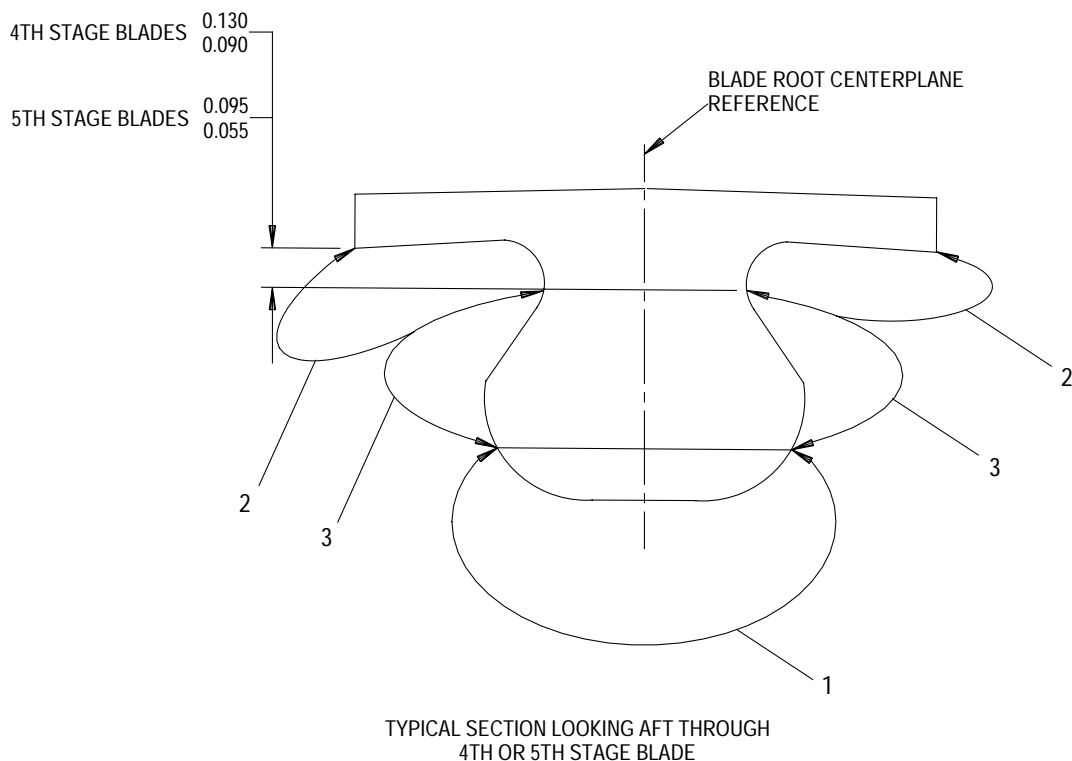


Figure 2. Fourth and Fifth Stage Blades - Application of PWA 36056 Adhesive Sealant (Sheet 1 of 2)



1. APPLY PWA 36056 ADHESIVE SEALANT TO THIS AREA OF BLADE. COAT BLADE THICK ENOUGH TO FILL VOIDS BETWEEN BLADE AND DISK WHEN ASSEMBLED. DO NOT APPLY SEALANT TO THIS AREA AT COUNTERWEIGHT LOCATIONS.
2. APPLY PWA 36056 ADHESIVE SEALANT TO THIS AREA ON BOTH SIDES OF BLADE. COAT BLADE THICK ENOUGH TO FILL VOIDS BETWEEN BLADE AND DISK WHEN ASSEMBLED.
3. DO NOT APPLY SEALANT TO THIS AREA OF BLADE. TRACES OF SEALANT ARE PERMISSIBLE IN THIS AREA AFTER ASSEMBLY OF BLADE INTO DISK.

JG001263 (36X2)

Figure 2. Fourth and Fifth Stage Blades - Application of PWA 36056 Adhesive Sealant (Sheet 2 of 2)

CAUTION

Compressor rotor blades and counterweights shall be installed at the same location from which they were removed.

NOTE

Immediately after applying sealant, assemble blades into disk. Blades shall be held radially outward against bearing surface of disk during assembly.

- f. Slide compressor rotor blades(1, figure 1) into disk from front to rear (at same location from which they were removed, as marked) with counterweights(4) (at marked locations) under blades. Load blades against blade slots and secure to each other in pairs with tape. Remove excess sealant.

- g. Install lockring(2) into groove in rear of disk, positioning lockring split under blade lug(1, figure 3) as shown. Secure all blades to disk.
- h. Measure gap between ends of lockring(3) or alternately, measure distance between lockring holes. Gap dimension shall be 0.030 to 0.100 inch or distance between holes shall be 1.090 to 1.230 inches as shown in figure 3.
- i. Verify lockring(3) engages tangs of all compressor rotor blades(1).
- j. Remove rubber bands securing blades.
- k. Allow PWA 36056 adhesive sealant to cure for 30 minutes at room temperature.

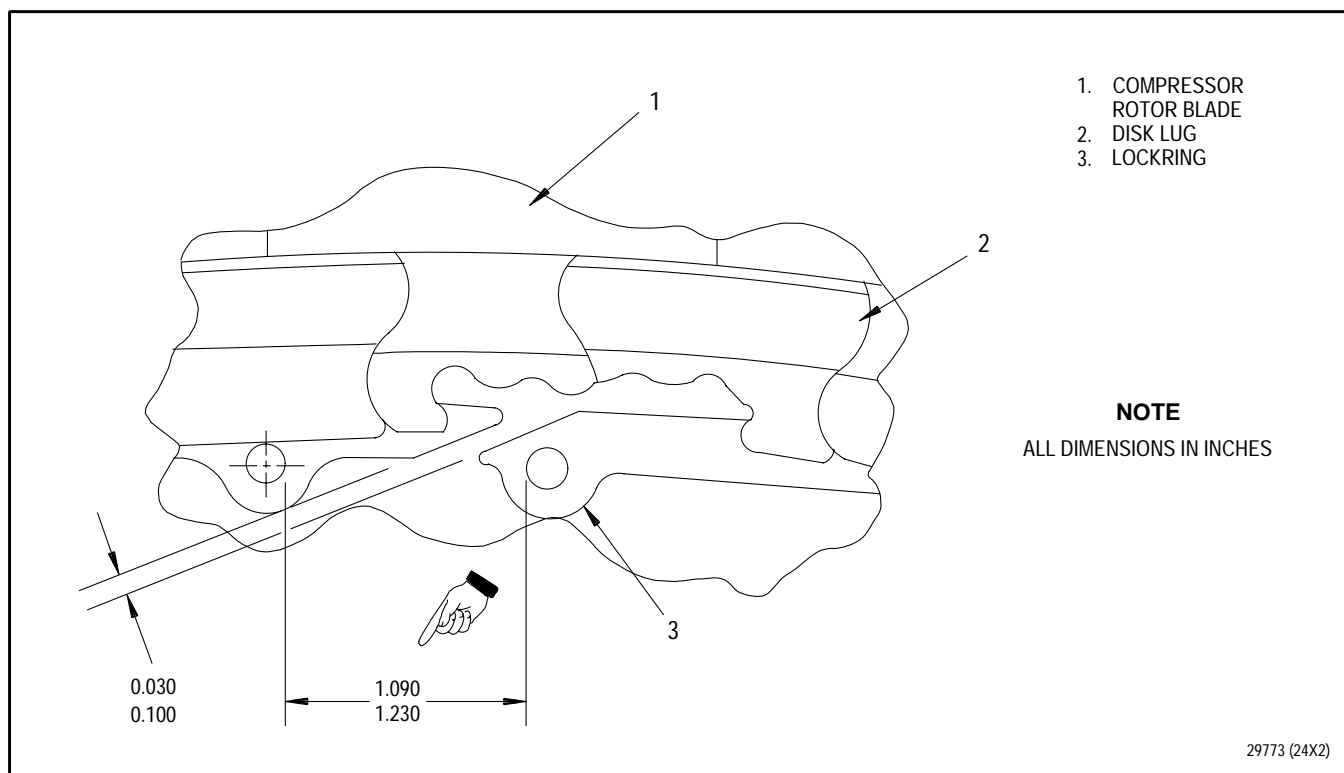


Figure 3. Fourth and Fifth Stage Blades - Lockring Measurement (Typical)

WORK PACKAGE**TECHNICAL PROCEDURES****BLADES, REAR COMPRESSOR ROTOR ASSEMBLY,
FOURTH AND FIFTH STAGE -****REPLACEMENT****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	28	6	28	10 - 12	28
3	0	7	2	13	1
4	19	8 - 9	0	14 Blank	1
5	0				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Adhesive Sealant (PWA 36056)	RTV-106
Butyl Alcohol	TT-B-848
Methyl ethyl ketone	TT-M-261
Pencil (crayon), silver metal marking (hard) (PMC 4059-7)	Colorbrite No. 2101, or Anadel No. 1936
Propyl Alcohol (1 - Propanol)	Fisher Scientific

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Ring-compressor blade lock, 4th stage	4069092	1
Ring-compressor blade lock, 5th stage	4069093	1

APPLICABLE SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package provides instructions for replacing fourth and fifth stage compressor rotor blades.

- b. If fourth stage blades are being replaced, remove fourth stage compressor duct segments per T.O. 2J-F100-53-7, WP 014 00, paragraph titled Intermediate Case - Removal.

2. PRELIMINARY INSTRUCTIONS.

- a. Remove rear compressor fourth through ninth stage upper and lower cases per T.O. 2J-F100-53-7, WP 014 00.

**3. FOURTH OR FIFTH STAGE COMPRESSOR
ROTOR BLADES - PARTIAL REPLACEMENT.**

(See Figures 1 through 3.)

NOTE

- Maximum number of blades replaced in stages 4 through 13 per incident is 65 blades total.
- Fourth or fifth stage blades shall be replaced in pan weighed pairs. A pan weighed pair consists of two blades having the same pan weight within 0.020 ounce. Each pair counts as one toward the per incident total of 65 blades.
- Fourth or fifth stage blades may be entirely replaced in pan weighed and plotted sets. Fourth and fifth stage blades totally replaced in entire sets are excluded from the 65 blade total.
- For total blade replacement, refer to paragraph 3A.
- If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.

- a. Determine which blades need to be replaced.
- b. Using a silver pencil, number each compressor rotor blade(1, figure 1) to indicate position in disk.

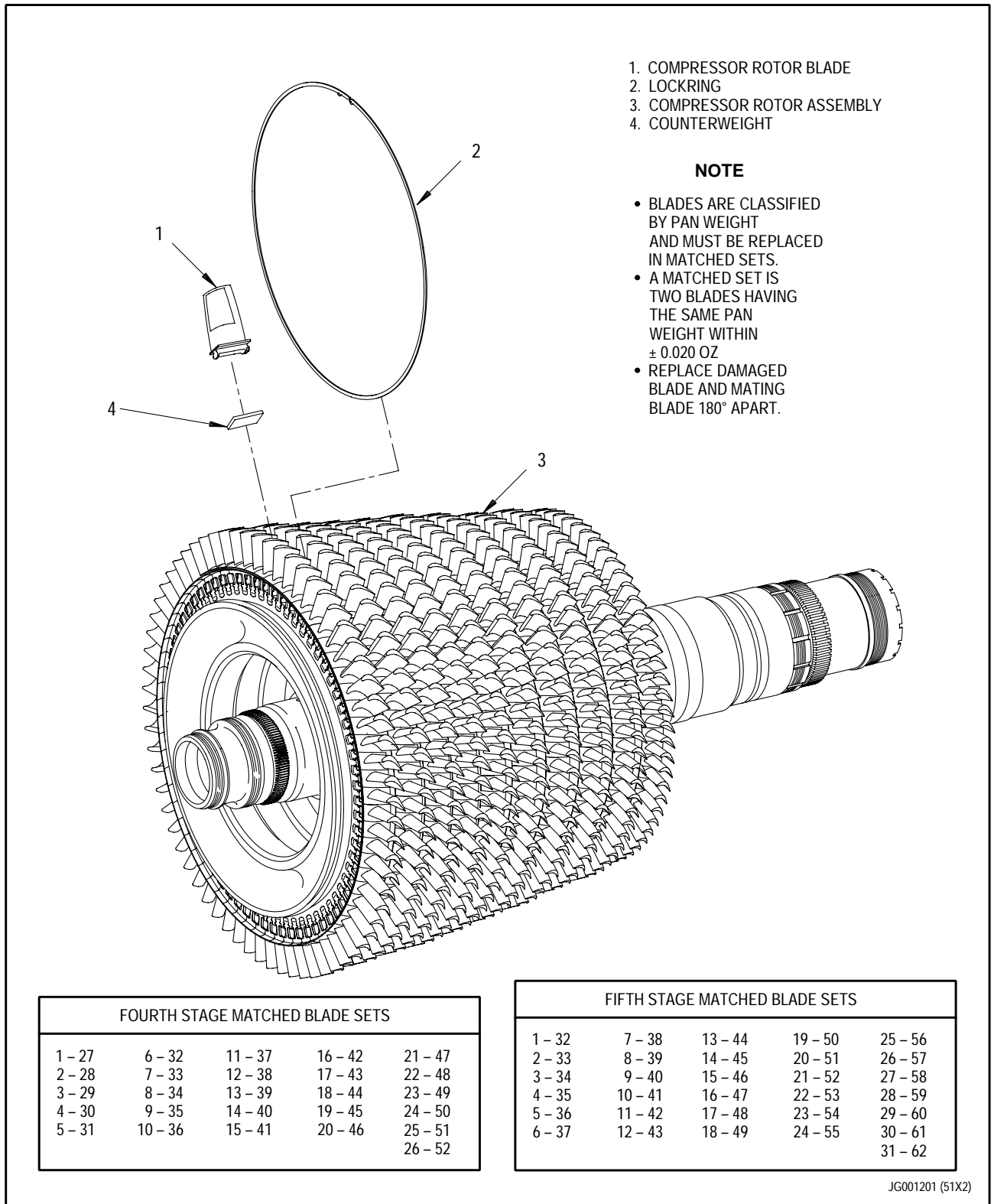


Figure 1. Fourth and Fifth Stage Blades - Replacement (Typical)

- c. Retain all blades(1) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.

NOTE

Blade lockrings shall not be re-used.

- d. Compress lockring(2) and remove from groove in rear face of disk. Discard lockring.

NOTE

If blade contains previously installed counterweight, counterweight shall be marked with blade number to ensure proper installation at original location.

- e. Remove rubber band from blade to be replaced and slide blade(1) out of disk and if installed, remove and mark counterweight(4).
- f. Arrange blades on bench by pan weight, heaviest to lightest.
- g. Arrange blades in two rows and mark installation sequence numbers as follows:

- (1) Select heaviest pan weighed pair.
- (2) Place heavier blade from pair to start first row of blades.
- (3) Place lighter blade from same pair to start second row of blades.
- (4) Place heavier blade from second pair in position just below lighter blade from first pair.
- (5) Continue alternating light and heavy blades until all blades have been positioned into two rows.

- (6) Mark heavier blade from first pair as Number 1.
- (7) Mark lighter blade from second pair as Number 2. Number remaining blades in that row.
- (8) After first row has been marked, assign next higher number to lighter blade from original pair and continue marking second row in sequence.



Do not apply PWA 36056 adhesive sealant to blades with counterweights.

- h. If location of replacement blade(1) has counterweight(4), position counterweight under blade platform and slide into disk. Load blade against blade slot and secure with rubber bands.

- i. If location of replacement blade(1) does not have counterweight(4), apply PWA 36056 adhesive sealant and install blade as follows:

- (1) Clean blade roots, blade platforms, and disk slots of blades with butyl alcohol, methyl ethyl ketone, or propyl alcohol per PWA 83-B2. Do not touch cleaned areas with bare hands and wear clean gloves when handling disk and blades. Refer to T.O. 2-1-111.

NOTE

Blade shall be installed into disk immediately after sealant has been applied.

- (2) Apply PWA 36056 adhesive sealant to replacement blade in areas as shown in figure 2.

NOTE

If intermediate case is installed, fourth stage blades must be installed from rear to front.

- (3) Locate disk detail part number on disk lug. (For example: PN xxxxxxxx-02 for fourth stage and PN xxxxxxxx-03 for fifth stage.)
- (4) Place number 1 blade on either side of above marked lug.
- (5) Slide blade(1, figure 1) into disk from front to rear, if possible.
- (6) Load blade(1) against blade slot and secure with rubber bands.
- (7) If fourth stage blades were installed from rear to front, ensure any excess sealant is removed from lockring groove.

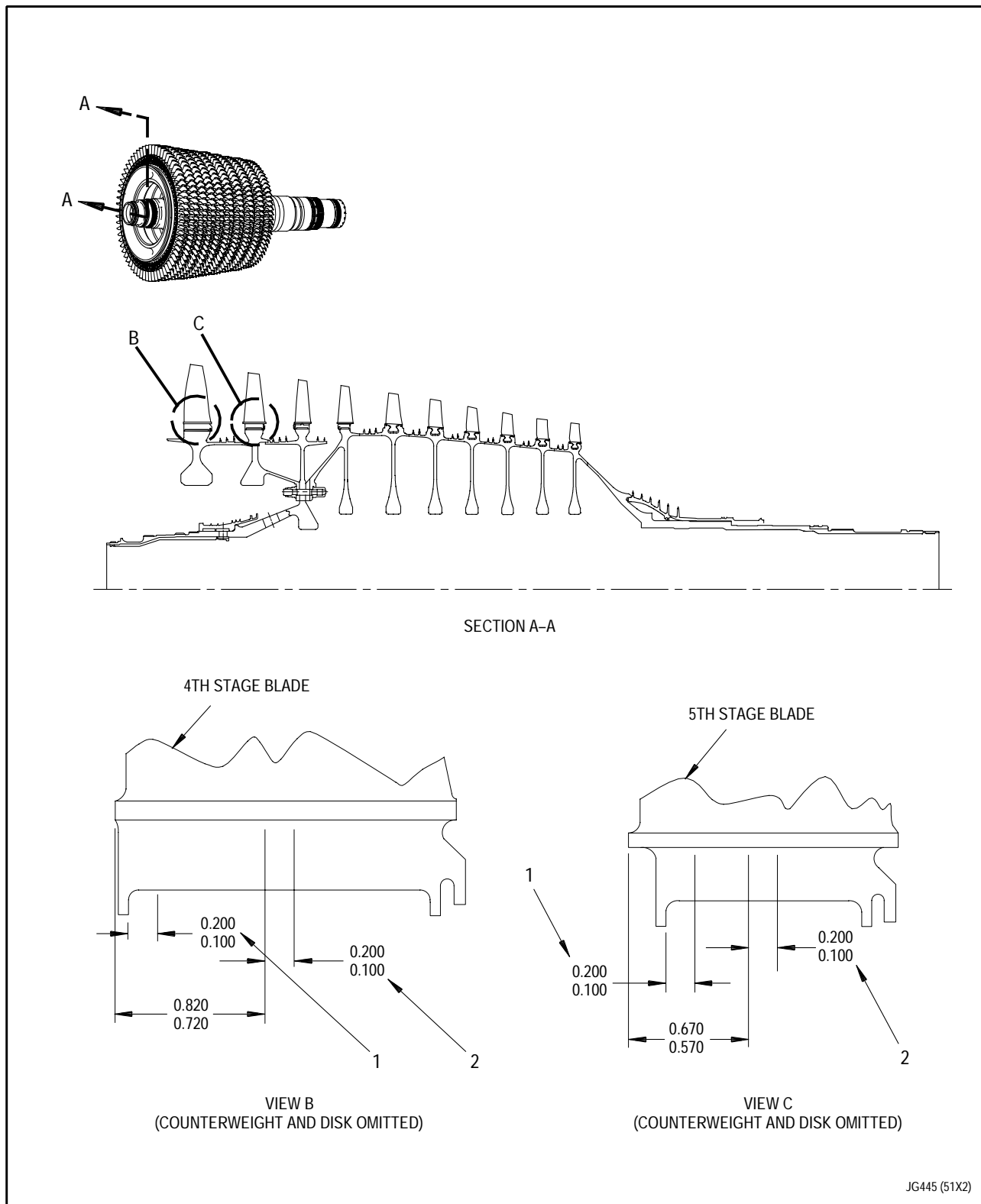


Figure 2. Fourth and Fifth Stage Blades - Application of PWA 36056 Adhesive Sealant (Sheet 1 of 2)

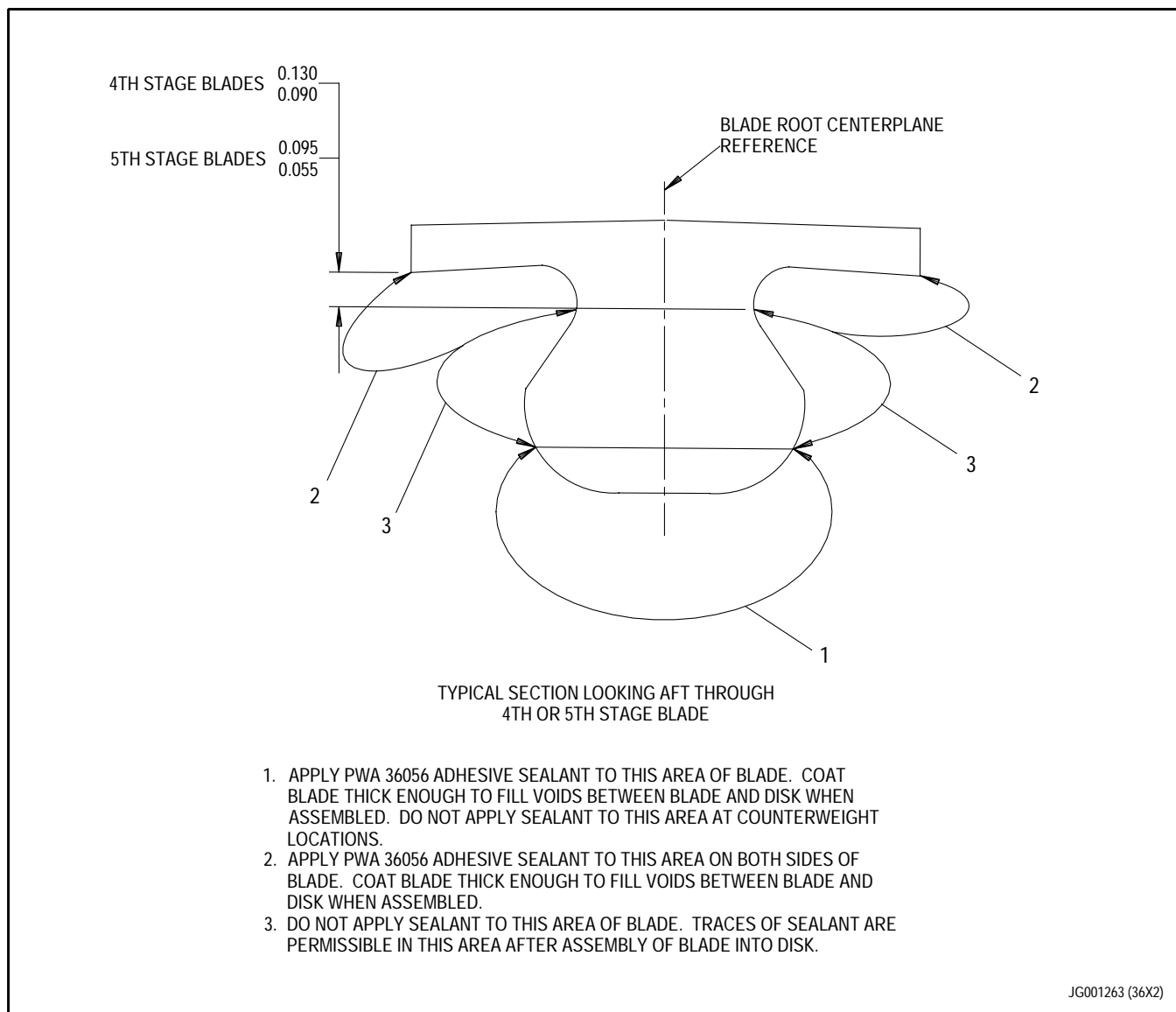
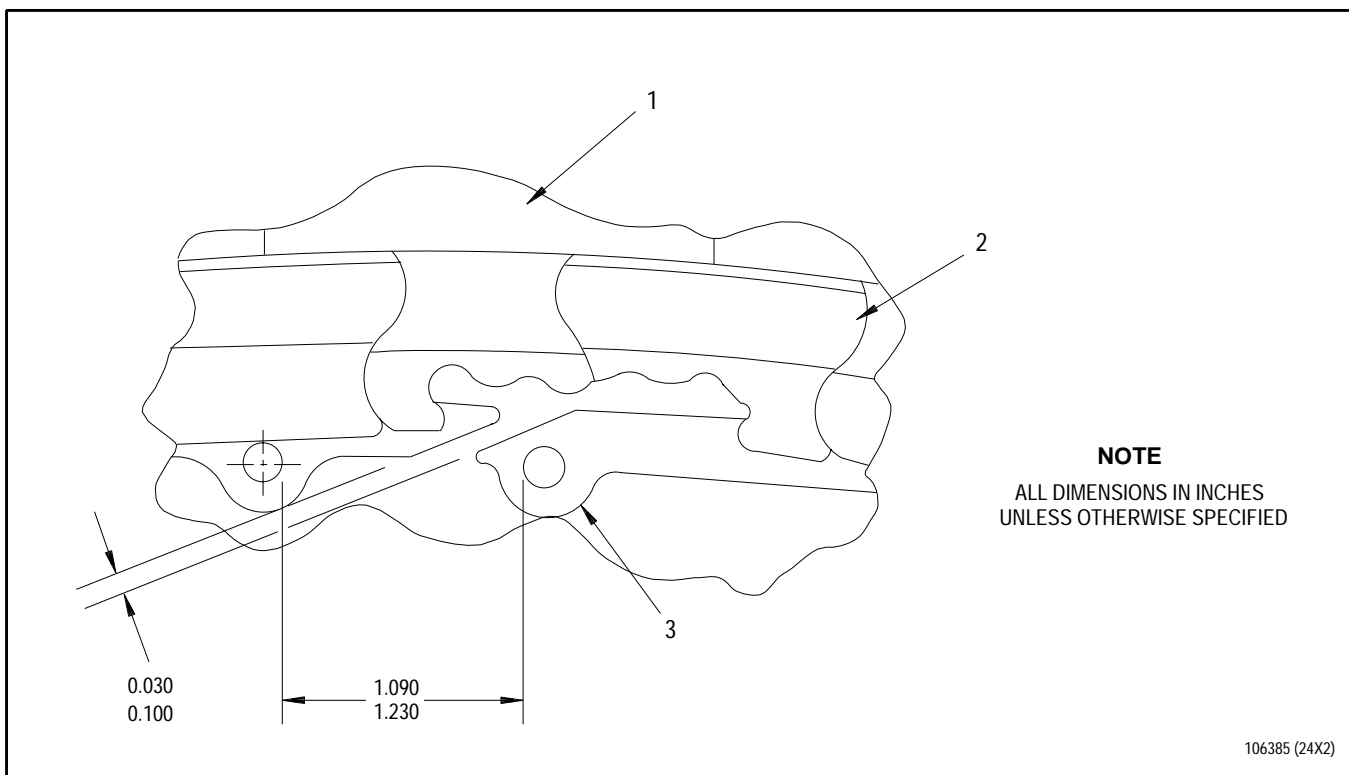


Figure 2. Fourth and Fifth Stage Blades - Application of PWA 36056 Adhesive Sealant (Sheet 2 of 2)



New 4th and 5th stage blade lockrings are required.

- j. Install new lockring(2) into groove in rear face of disk, positioning lockring split under blade lug(1, figure 3) as shown. Secure blades to disk.
- k. Measure gap between ends of lockring(3) or alternately, measure distance between lockring holes. Gap dimension shall be 0.030 to 0.100 inch or distance between holes shall be 1.090 to 1.230 inches as shown in figure 3.
- l. Verify lockring(3) engages tangs of all compressor rotor blades(1).
- m. Remove rubber bands securing blades.
- n. Allow PWA 36056 adhesive sealant to cure for 30 minutes at room temperature.



1. Compressor rotor blade
2. Disk lug
3. Lockring

Figure 3. Fourth and Fifth Stage Blades - Lockring Measurement (Typical)

3A. FOURTH OR FIFTH STAGE COMPRESSOR ROTOR BLADES - TOTAL REPLACEMENT.

(See figures 1 through 3.)

NOTE

- Maximum number of blades replaced in stages 4 through 13 per incident is 65 blades total.
 - Fourth or fifth stage blades may be totally replaced in pan weighed pairs. A pan weighed pair consists of two blades having the same pan weight within 0.020 ounces. Each pair counts as one toward the per incident total of 65 blades.
 - Fourth or fifth stage blades may be entirely replaced in pan weighed and plotted sets. Fourth and fifth stage blades totally replaced in entire sets are excluded from the 65 blade total.
 - If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.
- a. Retain all blades(1, figure 1) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.

NOTE

Blade lockrings shall not be re-used.

- b. Compress lockring(2) and remove from groove in rear face of disk. Discard lockring.

NOTE

Some blades may contain previously installed counterweights.

- c. Remove rubber band from blade(1) to be replaced and slide blade out of disk. If blade contains previously installed counterweight, remove and mark counterweight(4) with blade number to ensure proper installation at original location.
- d. Determine correct part number and quantity of blades needed for specific disk to be bladed.
- e. Arrange blades on bench by pan weight, heaviest to lightest.
- f. Arrange blades in two rows and mark installation sequence numbers as follows:
- (1) Select heaviest pan weighed pair.
 - (2) Place heavier blade from pair to start first row of blades.
 - (3) Place lighter blade from same pair to start second row of blades.
 - (4) Place heavier blade from second pair in position just below lighter blade from first pair.
 - (5) Continue alternating light and heavy blades until all blades have been positioned into two rows.
 - (6) Mark heavier blade from first pair as Number 1.

- (7) Mark lighter blade from second pair as Number 2. Number remaining blades in that row.
- (8) After first row has been marked, assign next higher number to lighter blade from original pair and continue marking second row in sequence.

NOTE

Do not apply PWA 36056 adhesive sealant to blades with counterweights.

- g. If location of replacement blade(1) has counterweight(4), position counterweight under blade platform and slide into disk. Load blade against blade slot and secure with rubber bands.
- h. If location of replacement blade(1) does not have counterweight(4), apply PWA 36056 adhesive sealant and install blade as follows:



Do not touch cleaned areas with bare hands. Wear clean gloves when handling disk and blades.

- (1) Clean blade roots, blade platforms, and disk slots of blades with butyl alcohol, methyl ethyl ketone, or propyl alcohol per PWA 83-B2. Refer to T.O. 2-1-111.

NOTE

Blade shall be installed into disk immediately after sealant has been applied.

- (2) Apply PWA 36056 adhesive sealant to replacement blade in areas as shown in figure 2.

NOTE

If intermediate case is installed, fourth stage blades must be installed from rear to front.

- (3) Slide blade(1, figure 1) into disk from front to rear, if possible.
- (4) Load blade(1) against blade slot and secure with rubber bands.
- (5) If fourth stage blades were installed from rear to front, ensure any excess sealant is removed from lockring groove.



New 4th and 5th stage blade lockrings are required.

- i. Install new lockring(2) into groove in rear face of disk, positioning lockring split under blade lug(1, figure 3) as shown. Secure blades to disk.
- j. Measure gap between ends of lockring(3). Dimension shall be 0.030 to 0.100 inch.

- k. Verify lockring(3) engages tangs of all compressor rotor blades(1).
- l. Remove rubber bands securing blades.
- m. Allow PWA 36056 adhesive sealant to cure for 30 minutes at room temperature.

4. FOLLOW-ON MAINTENANCE.

- a. If fourth stage blades were replaced, install fourth stage compressor duct segments per WP 701 00, paragraph titled Intermediate Case - Installation.
- b. Install rear compressor fourth through ninth stage upper and lower cases per WP 701 00.

WORK PACKAGE

TECHNICAL PROCEDURES

BLADES, REAR COMPRESSOR ROTOR ASSEMBLY, SIXTH AND SEVENTH STAGE -

REPLACEMENT

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	28	4	28	5	6
3	19			6 Blank	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
Ring-compressor blade lock, 6th and 7th stage	4069094	2
Seal	4077107	As required
Seal	4077108	As required

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package provides instructions for replacing sixth or seventh stage compressor rotor blades.

2. PRELIMINARY INSTRUCTIONS.

- a. Remove rear compressor fourth through ninth stage upper and lower cases per WP 014 00.

3. SIXTH OR SEVENTH STAGE COMPRESSOR ROTOR BLADES - REPLACEMENT.

(See Figures 1 and 2.)

- a. Determine which sixth or seventh stage blades need to be replaced.

NOTE

Following instructions apply to both sixth and seventh stage blades.

- b. Retain all blades(2, figure 1) in stage by loading blades against blade slots and secure to each other in pairs with rubber bands.

NOTE

- Maximum number of blades replaced in stages 4 through 13 per incident is 65 blades total.
- Fourth and fifth stage blades shall be replaced in pan weighed pairs. A pan weighed pair consists of two blades having the same pan weight within 0.020 ounce. Each pair counts as one toward the per incident total of 65 blades.
- Fourth and fifth stage blades may be entirely replaced in pan weighed and plotted sets. Fourth and fifth stage blades totally replaced in entire sets are excluded from the 65 blade total.
- Sixth and seventh stage compressor rotor blades are replaced as individual blades.
- If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.

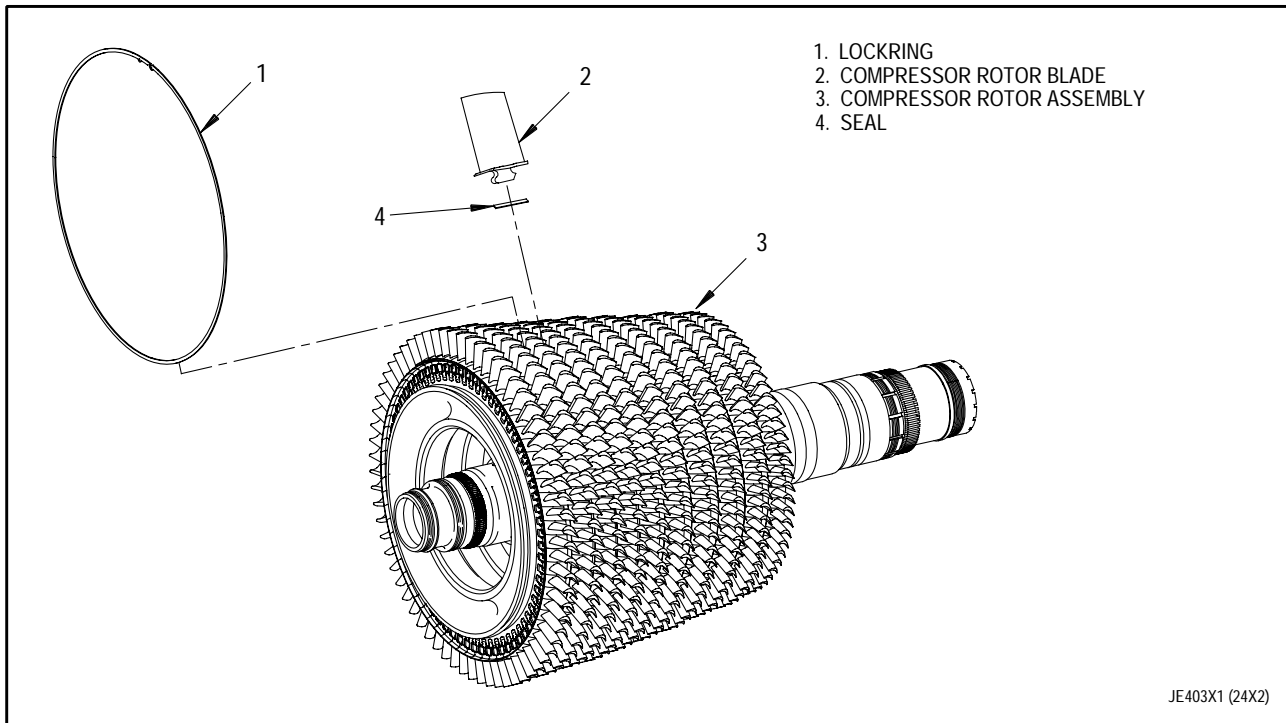


Figure 1. Sixth and Seventh Stage Blades - Replacement (Typical)

NOTE

Blade lockrings shall not be re-used.

- c. Compress lockring(1) and remove from groove in forward face of disk. Discard lockring.

CAUTION

Seal under blades can come loose and fall into engine during removal of blades.

- d. Remove rubber bands from blade to be replaced and slide blade(2) out of disk using care not to drop seal(4).
- e. Apply adhesive backed seal(4), (PN 4077107 sixth stage, PN 4077108 seventh stage), under root of replacement blade(2).

- f. Slide replacement blade(2) and seal assembly into disk, while pulling radially outboard and shearing minimum possible amount of seal to form to disk slot. Load blade against blade slot and secure with rubber bands.

- f1. If seals are damaged beyond shear forming, proceed as follows:

- (1) Slide blade and seal assembly out of disk.
- (2) Remove damaged seal from blade.
- (3) Repeat steps e. and f.

CAUTION

New 6th and 7th stage blade lockrings are required.

- g. Install new lockring(1) into groove in forward face of disk, positioning lockring split under blade lug(1, figure 2) as shown. Secure blades to disk.

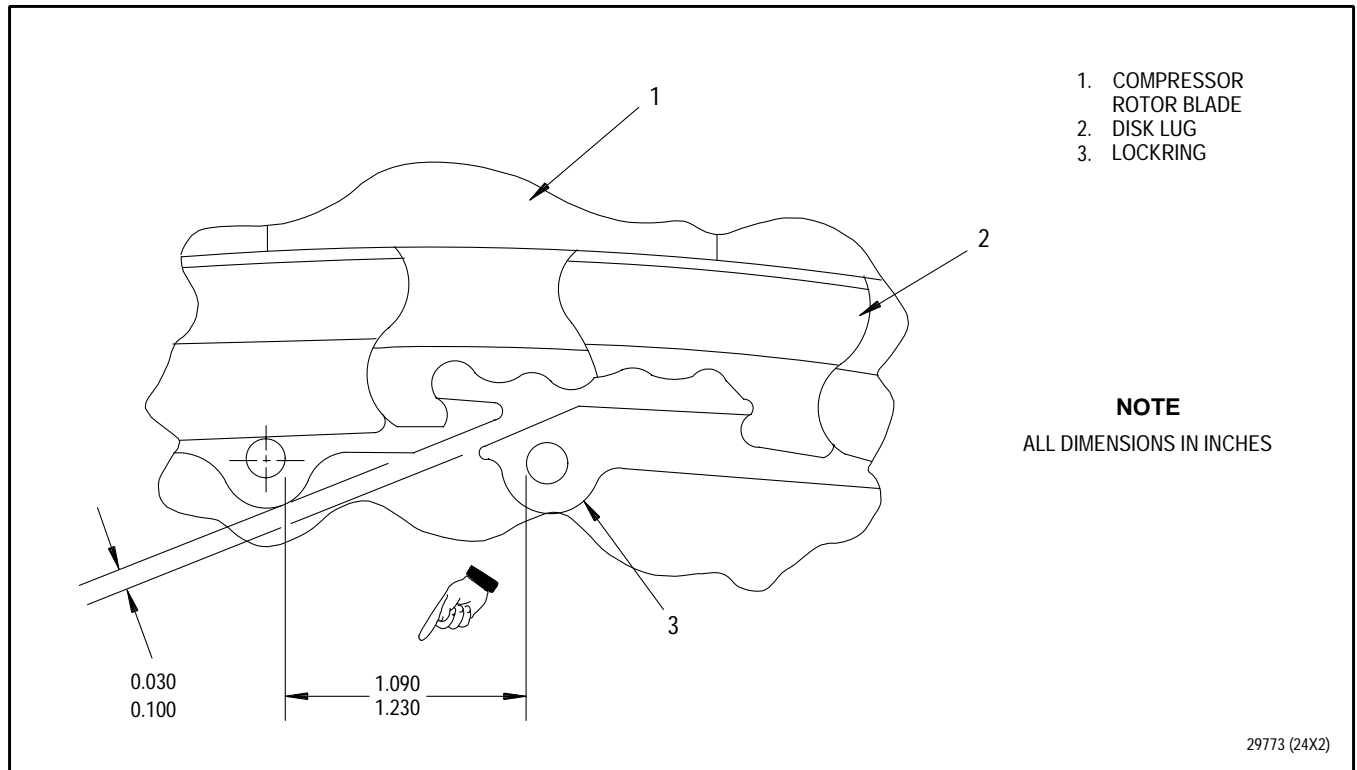


Figure 2. Sixth and Seventh Stage Blades - Lockring Measurement (Typical)

h. Measure gap between ends of lockring(3, figure 2) or alternately, measure distance between lockring holes. Gap dimension shall be 0.030 to 0.100 inch or distance between holes shall be 1.090 to 1.230 inches as shown in figure 3.

i. Verify lockring(3) engages tangs of all compressor rotor blades(1).

j. Remove rubber bands securing blades.

4. FOLLOW-ON MAINTENANCE.

a. Install rear compressor fourth through ninth stage upper and lower cases per WP 701 00.

WORK PACKAGE**TECHNICAL PROCEDURES****BLADES, REAR COMPRESSOR ROTOR ASSEMBLY,
EIGHTH THROUGH THIRTEENTH STAGE -****REPLACEMENT****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 14

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	29	3	5	6 Blank	1
2	11	4 - 4A	19	7 - 8	29
2A	9	4B	29	9	2
2B Blank	5	5	29	10 Blank	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
Pencil (crayon), silver, metal marking (hard) (PMC 4059-7)	Colorbrite No. 2101 or Anadel No. 1936
Penetrant	Aerokroil, NSN9150-00-800-7997
Tape, Masking (Cloth Backing) (PMC 4001)	CC 150-01B Red

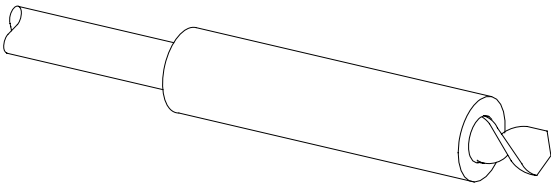
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

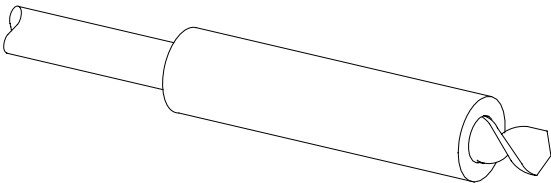
Paragraph	Function - Tool Nomenclature	Tool Number
3	Eighth Through Thirteenth Stage Compressor Rotor Blades - Replacement	
	Set, Pilot Drill - - - - -	LM 1023
	Set, Pilot Drill - - - - -	LM 1024

ILLUSTRATED SUPPORT EQUIPMENT



LM 1023 -C

Figure T1. LM 1023 Drift



LM 1024 -C

Figure T2. LM 1024 Drift

1. INTRODUCTION.

This work package provides instructions for replacing 8th through 13th stage compressor rotor blades.

2. PRELIMINARY INSTRUCTIONS.

- a. Remove rear compressor 4th through 9th stage upper and lower cases per WP 014 00.
- b. If 11th through 13th stage blades are to be replaced, remove 10th through 12th stage stator segments per WP 014 00.

3. EIGHTH THROUGH THIRTEENTH STAGE COMPRESSOR ROTOR BLADES - REPLACEMENT.

(See Table 1 and Figures 1 and 2.)



If one or more new 7th through 12th stage stator segments (PN 4077877, 4077878, 4077879, 4077880) with hard smooth abradable coating will be installed, 8th through 13th stage blades shall meet blade requirements in Table 1 to prevent blade damage.

NOTE

- The maximum number of blades replaced in stages 4 through 13 per incident is 65 blades total.
- Fourth and fifth stage blades must be replaced in pan weighed pairs. A pan weighed pair consists of two blades having the same pan weight within 0.020 ounces. Each pair counts as one toward the per incident total of 65 blades.
- Fourth and fifth stage blades may be entirely replaced in pan weighed and plotted sets. Fourth and fifth stage blades totally replaced in entire sets are excluded from the 65 blade total.
- Eighth through 13th stage compressor rotor blades are replaced as individual blades.

- a. Inspect blades per table 1 to determine which blades need to be replaced.

Table 1. Eighth Through Thirteenth Stage Blade Requirements

Blades	Allowable Blade Tip Coating Loss
8th - 10th Stage	A minimum of 10 serviceable coated tip blades (PN 4079308, 4079309, 4079310) with tip coating loss not more than 0.300 inch from the leading edge and 10 coated tip blades with coating loss not more than 0.300 inch from the trailing edge is required per stage.
11th - 13th Stage	A minimum of 10 serviceable coated tip blades (PN 4079411, 4079412, 4079413) with tip loss not more than 0.200 inch from the leading edge and 10 coated tip blades with coating loss not more than 0.200 inch from the trailing edge is required per stage.

NOTE

If above requirements are not met for 8th through 13th stage blades, then a maximum of 10 new coated tip blades per stage shall be installed. These replacement blades will count toward the existing 65 blades per incident maximum replacement limit.

- b. Ensure protective wrappings are installed on rotor air seals. Ensure that blades and counterweights (if installed at stages eight, nine, twelve, or thirteen) are reinstalled in original locations.

NOTE

- Replacement of 8th through 13th stage compressor rotor blades is the same.
- For ease of maintenance, blades can be removed from either direction starting at disk loading slot.
- c. Deleted.
- d. Using a silver pencil, mark compressor rotor blades at desired stage as follows:
 - (1) Mark location of setscrews(3) on rear face of disk. Setscrew locations indicate disk loading slots.
 - (2) Mark blade edge locations of locking blades(2) on front face of disk.
 - (3) Number blades, in either direction, starting at disk loading slot. (See figure 1 for starting point for blade marking.)
- e. Deleted.
- e1. Deleted.
- e2. Deleted.
- e3. Deleted.
- e4. Deleted.
- e5. Deleted.
- e6. Deleted.
- e7. Deleted.

NOTE

The two internal head configurations for setscrews in bladelock assemblies are the fluted screw with internal hex drive and the conventional screw with six spline drive. For the conventional screw proceed to step i.

- f. Apply Aerokroil to bladelock assembly and allow to stand for 24 hours.
- g. Insert hex drive wrench into screw head and apply load to remove lock. If seizing occurs, torque screw clockwise, not exceeding 15 pound-inches, and try to loosen counterclockwise.
- h. Discard bladelock assembly.
- i. If bladelock is damaged, remove bladelock setscrew with drill as follows:



Failure to ensure blade lock is fully and properly installed prior to drilling out setscrew can result in damage to drum rotor.

- (1) Place masking tape on blade tips and airfoils on either side of bladelock.
- (2) Tape blades together with masking tape to ensure blade platforms are contacting during drill out procedure.

NOTE

Setscrew material is AMS 5662 nickel alloy.

- (3) Use sharp drill, low drill speed.



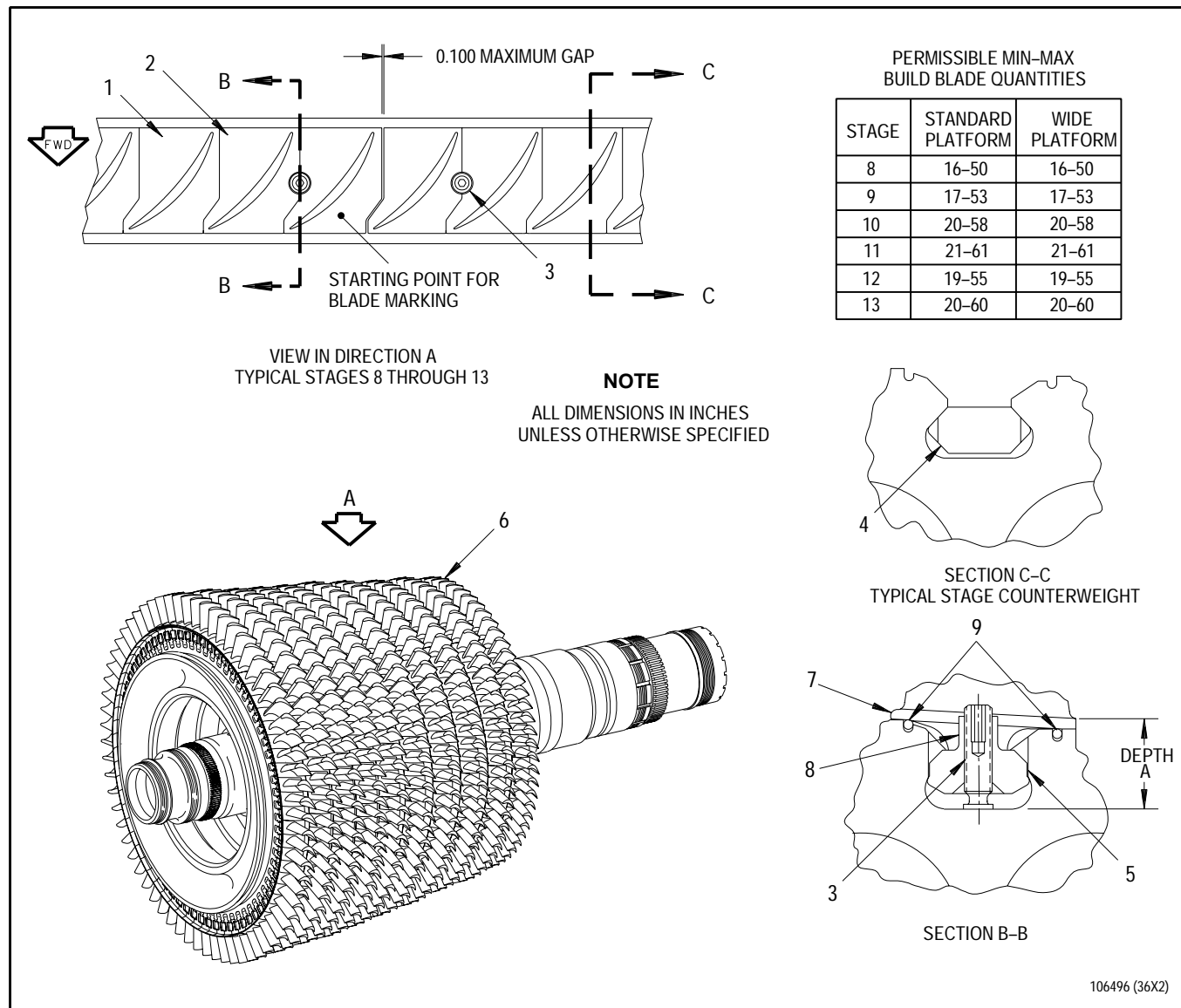
Drilling deeper than depth A will damage drum rotor.

- (4) Drill pilot hole using LM 1023 drill bit. Ensure drill bit diameter of 0.125 inch and correct stage marked on stop sleeve.
- (5) Drill set screw until stop sleeve contacts blade platform. Ensure drill stop sleeve does not go below blade platform. See figure 1.



Drilling deeper than depth A will damage drum rotor.

- (6) Follow pilot hole using LM 1024 drill bit. Ensure drill bit diameter of 0.180 inch and correct stage marked on stop sleeve.
- (7) Drill set screw until stop sleeve contacts blade platform. Ensure drill stop sleeve does not go below blade platform. See figure 1.
- (8) If required, tap bladelock inward to loosen bladelock.
- (9) Remove and discard bladelock.



- | | |
|--------------------------------|------------------------------|
| 1. Compressor rotor blade | 6. Compressor rotor assembly |
| 2. Locking blade (4 per stage) | 7. Blade platform |
| 3. Setscrew (2 per stage) | 8. Blade lock shank |
| 4. Counterweight (typical) | 9. Compressor rotor seal |
| 5. Blade lock (2 per stage) | |

Figure 1. Eighth Through Thirteenth Stage Compressor Rotor Blades - Replacement (Typical)

Figure 1A. deleted.

NOTE

It may take several rotations around disk to align locking blade with loading slot.

- j. Using a non-metallic drift and hammer, tap blade set around disk approximately 1/2 blade platform width to align a locking blade(2) with disk loading slot.
- k. Remove locking blades(2) and blade locks(5) from disk loading slot.
- l. Counterweights may be installed underneath 8th, 9th, 12th or 13th stage blade platforms. Use care when removing blades to ensure counterweights (if installed) are not dropped.
- n. Inspect compressor rotor seal(9) for wear of any kind. Replace seal if any wear is found.
- o. Install replacement blade(1) and counterweight(4) (if previously installed) into disk loading slot.
- p. Install remaining blades(1), counterweights(4) (if previously installed), and blade lock(5) into disk loading slot in original locations. Ensure blade lock is installed in proper stage as marked. Do not install final blade lock and locking blade. Be sure setscrew in installed blade lock aligns with mark on rear face of disk.

NOTE

If blade stage contains previously installed counterweights, counterweights shall be marked with adjacent blade numbers to ensure proper reinstallation at original location.

- m. Slide remaining compressor rotor blades(1) and counterweights(4) (if installed at stages 8th, 9th, 12th or 13th) out of loading slot until damaged blade is removed. Be sure removed blades and counterweights are marked and kept in proper sequence.

- q. Install final locking blade(2) and blade lock(5) into disk loading slot. Ensure blade lock is installed in proper stage as marked.
- r. Tap blade set around disk approximately 1/2 blade platform width to align setscrews(3) with marks on rear face of disk. Ensure edges of locking blades(2) align with marks on front face of disk.
- s. Deleted.
- t. Using CMS-5 NSN5120-00-439-8267 Allen wrench or equivalent for hex head setscrews, tighten two blade lock setscrews(1, figure 2) as follows:
 - (1) Ensure setscrew of blade locks(4) are backed out completely before tightening.

NOTE

Setscrew must bottom out against disk within 3 1/2 to 6 1/2 turns.

- (2) Tighten setscrew(1) and count number of turns required to bottom out setscrew against disk(5). Number of turns shall be 3 1/2 to 6 1/2. If number of turns is less than 3 1/2 or more than 6 1/2, do the following:

- (a) Loosen setscrew(1).
- (b) If number of turns is less than 3 1/2, realign blade lock(4) to ensure it is properly installed in disk(5).
- (c) If number of turns is greater than 6 1/2, recheck blade lock stage marking for proper stage.
- (d) Retighten setscrew(1) per steps t.(1) and t.(2).

(3) Deleted.

(a) Deleted.

(b) Deleted.

(4) Torque two hex head (fluted) setscrews(1) as follows:

NOTE

While rotating setscrew through 360 degrees, torque will fluctuate from zero to a peak value. Peak value of 1.5 to 11 pound-inches is required.

(a) Tighten setscrew and determine torque value just prior to seating blade lock against drum. Torque value shall be 1.5 to 11 pound-inches. If this requirement is not satisfied, replace blade lock assembly.

(b) Torque setscrews(1) 1 to 3 pound-inches above torque value determined in step t.(4)(a) above.

(5) Ensure top of blade lock shank(2) is flush with or slightly below top of blade platform(3).

(6) Ensure 1/2 to 3 threads of setscrew(1) extend above top of blade lock shank(2), except for 11th stage. Eleventh stage blade lock shall have 1/2 to 4 1/2 threads visible above top of blade lock shank(2). If visible number of threads is outside range, do the following:

(a) Loosen setscrew(1).

(b) Realign blade lock(4) to ensure it is properly installed in disk(5).

(c) Retighten setscrew(1) per step t.

u. Record total number of blades replaced in each stage, and cumulative number of blades replaced in entire rotor in compressor rotor AFTO Form 95.

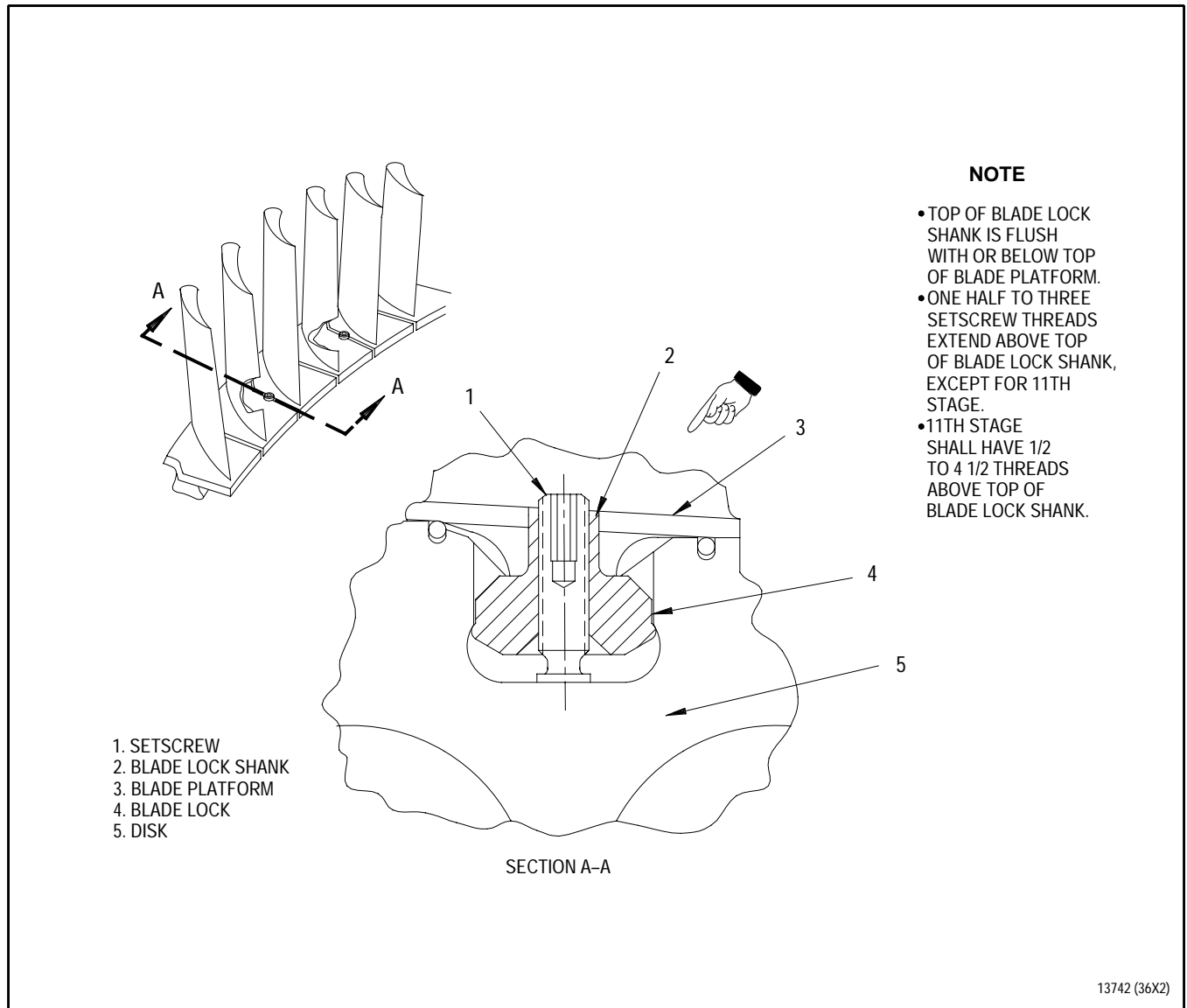


Figure 2. Compressor Rotor Blade Lock - Installation (Typical)

4. FOLLOW-ON MAINTENANCE.

a. If 11th, 12th or 13th stage blades were replaced, install 10th through 12th stage stator segments per WP 701 00.

b. Install rear compressor 4th through 9th stage upper and lower cases per WP 701 00.

WP 631 00 Deleted

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

FINAL ASSEMBLY

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2					
					29

1. INTRODUCTION.

- a. This work package introduces the 700 00 through 799 00 series of work packages for final assembly of core engine module.

WP No.	Title
701 00	Core Engine Module - Final Assembly (Front)
702 00	Actuation System, Rear Compressor Variable Stator Vane - Setting Angular Travel and Actuation Torque Check
703 00	Oil Nozzles, No. 2 and 3 Bearing - Airflow Check
704 00	Compartment, No. 2 and 3 Bearing - Vacuum Check
705 00	Core Engine Module - Rotating To Front End Down Position (Fully Assembled Module)
706 00	Core Engine Module - Final Assembly (Rear)
707 00	Manifolds, Left and Right Fuel Supply - Pressure Leak Check and Preservation
708 00	Compartment, No. 4 Bearing - Vacuum Check
709 00	Core Engine Module - Rotating To Front End Down Position (Diffuser Case Removed)
710 00 through 799 00	Open

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****FINAL ASSEMBLY (FRONT)****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 98

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	31	39	13	58	2
2A	28	40	29	59	0
2B	29	40A Added	9	60	5
3 - 10B	31	40B Blank Added	9	61 - 62	1
11	31	41	9	63	0
12 - 14	30	42	2	64	5
15	0	43	0	65	31
16	19	44	1	66	5
17 - 22	0	45	29	66A - 66B	25
22A - 22B Added	31	46	0	67 - 68	25
23	1	47 - 48	9	68A Added	2
24 - 25	0	49 - 50D	31	68B Blank Added	2
26	1	51 - 52 Deleted	11	69	13
27	0	53	29	70 - 71	0
28 - 31	29	54 Blank	11	72	17
32 - 32B	26	54A	29	73	2
33 - 34	26	54B Added	2	74 - 77	29
35	0	55	29	78 Added	2
36	29	56 Blank	29	79	13
37 - 38	0	57	0	80 Added	2

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Vacuum Leak Check Using PWA 50003 Carbon Seal Tester - General Procedures - - - - -	WP 024 00
Vacuum Leak Check Using Habco 1543003 Vacuum Air Flow Cart - General Procedures - - - - -	SWP 024 01
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Oil Nozzles, No. 2 and 3 Bearing - Air Flow Check - - - -	WP 703 00
Compartment, No. 2 and 3 Bearing - Vacuum Check - - - - -	WP 704 00
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-509	15 APR 92	O/I	Retrofit of 4th Through 9th Stage Compressor Stator Assembly Featuring Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engine, F15/ F16 Aircraft (ECP 90QA096)
2J-F100229(II)-510	30 AUG 93	O/I	Reoperation of Hardware for Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engine, F15/ F16 Aircraft (ECP 90QA096)
2J-F100229(II)-538	15 MAR 96	O/I	Retrofit of No. 2/3 Bearing Crossover Housing Aft Flange Bolts PN ST5001-12 Featuring Increased Strength and Torque, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 92QA295C1)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
COMPOUND, ANTIGALLING (PWA 550)	HI-T 650 OR LUBRI-BOND HT
COMPOUND, SEALING (PWA 36000-2)(PWA 36000-3)	HYLOMAR P1-32 OR SQ32
LOCKWIRE	MS9226-03
LOCKWIRE	MS9226-04
LUBRICANT, O-RING (PWA 36500)	ULTRACHEM ASSEMBLY FLUID NO. 1
MARKER	BRUSHPEN NO. 57
OIL, LUBRICATING (AERO KROIL)	NSN 9150-00-905-1387
OIL, LUBRICATING OR PETROLATUM	MIL-L-7808 OR VV-P-236
TAPE, MASKING (CLOTH BACKING) (PMC 4001)	F.O.S. 57-2 RED OR TUCK 90-W RED OR 222 OR TB-30-113

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
COLLAR	ST2185-06	24
DAMPER-COMPRESSOR STATOR, 10TH STAGE	4079320	4
DAMPER-COMPRESSOR STATOR, 10TH STAGE	4079321	8
DAMPER-COMPRESSOR STATOR, 11TH STAGE	4079322	4
DAMPER-COMPRESSOR STATOR, 11TH STAGE	4079323	8
DAMPER-COMPRESSOR STATOR, 12TH STAGE	4079324	12
DAMPING SPRING	4077110	4
DAMPING SPRING	4077111	4
DAMPING SPRING	4077842	4
GASKET	4002824	1
GASKET	4070093	2
GASKET	4077235	2
GASKET	ST2284-04	1
KEY WASHER	4039918	3
KEY WASHER	4074457	36
KEY WASHER	4074496	12
KEY WASHER	MS9276-10	8
PACKING, PREFORMED, O-RING	4084174	2
PACKING, PREFORMED	AS3209-010	1
PACKING, PREFORMED	AS3209-012	4
PACKING, PREFORMED	AS3209-177	2
PACKING, PREFORMED	ST1000-010	1
PACKING, PREFORMED	ST1000-014	1
PIN, COTTER	MS9245-23	3
PIN, COTTER	MS9245-24	18
PIN, COTTER	MS9245-27	4
SEAL-COMPRESSOR STATOR	4079137	12
SEAL	4076384	12

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	TENTH THROUGH TWELFTH STAGE CASE AND COMPRESSOR STATOR SUPPORT - INSTALLATION	
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 57938 OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR FRONT HUB - - - - -	PWA 51371
	ARM, LIFT AND TURN - - - - -	PWA 26584
	PIN, ALIGNMENT, DIFFUSER CASE TO HPC REAR SUPPORT, -229 ONLY - - - - -	LM 1106
3	INTERMEDIATE CASE - INSTALLATION	
	GUIDE, INTERMEDIATE CASE INSTALLATION/REMOVAL - - - -	PWA 57726
	TRUNNION, LIFT INTERMEDIATE CASE FRONT FLANGE - - - -	PWA 57601
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, ADJUSTABLE MODULE HANDLING - - - - -	PWA 56336
	HOOK, SAFETY - - - - -	PWA 2388
5	NO. 3 BEARING REAR CARBON FACE SEAL ASSEMBLY - INSTALLATION	
	COMPRESSOR, RING - - - - -	PWA 52843
5A	NO. 3 BEARING REAR SEAL ASSEMBLY - AIR LEAKAGE CHECK	
	FIXTURE, LEAK TEST, NO. 3 BEARING CARBON SEAL - - - -	PWA 57190
	TESTER, CARBON SEAL - - - - -	PWA 50003 OR
	TESTER, CARBON SEAL - - - - -	HABCO 1543003
7	NO. 3 BEARING REAR SEAL SEAT - INSTALLATION	
	DRIFT, NO. 3 BEARING AIR SEAL AND SEAT - - - - -	PWA 51673

APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
8	NO. 3 BEARING PACKAGE - INSTALLATION	
	HEATER, MANIFOLD, TURBINE HUB/GBX DRIVE BEVEL GEAR -	PWA 56326
		OR
	HEATER, GEARBOX DRIVE, BEVEL GEAR SHAFT - - - - -	PWA 52665
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
	HEATER, NO. 3 BEARING SUPPORT AND INTERMEDIATE CASE	
	INNER FLANGE - - - - -	PWA 52756
	CONTAINER, DRY ICE - - - - -	LM 1090
	PIN, ALIGNING NO. 3 BEARING SUPPORT - - - - -	PWA 52353
	PUSHER, NO. 3 BEARING AND GEAR ASSEMBLY - - - - -	PWA 53875
	PUMP, HYDRAULIC HAND - - - - -	PWA 55380
9	NO. 3 BEARING RETAINING NUT - INSTALLATION	
	ADAPTER, TORQUE, NO. 3 BEARING AND GEAR ASSY, RETAINING NUT - - - - -	PWA 56586
		OR
	WRENCH, NO. 3 BEARING AND GEAR ASSY RETAINING NUT -	PWA 50628
	ADAPTER, ASSY/DISASSY, NO. 3 BEARING INNER RACE NUT	PWA 56688
	ADAPTER, NO. 3 BEARING AND GEAR ASSY RETAINING NUT -	PWA 56585
	ADAPTER SET, HYD WRENCH TO WRENCH - - - - -	PWA 57806
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200
		OR
	WRENCH, HYDRAULIC, 120,000 IN.-LBS - - - - -	PWA 50308
	ADAPTER SET, HYD WRENCH TO WRENCH - - - - -	PWA 57806
	SLING - - - - -	SWE 81001/81002
11	NO. 3 BEARING FRONT SEAL SEAT - INSTALLATION	
	ADAPTER, NO. 3 BEARING FRONT SEAL SEAT RETAINING NUT - - - - -	PWA 56677
		OR
	ADAPTER, NO. 3 BEARING FRONT SEAL RETAINING NUT - - -	PWA 53859
	WRENCH, NO. 3 BEARING FRONT SEAL RETAINING NUT - - -	PWA 53858

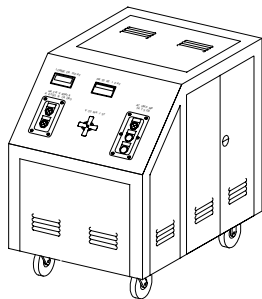
APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
13	NO. 2 BEARING PACKAGE - INSTALLATION	
	HEATER, NO. 2 BEARING HOUSING REAR FLANGE - - - - -	PWA 56324
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
	PIN, ALIGNING - - - - -	PWA 52353
	ROTATOR, REAR COMPRESSOR ROTOR - - - - -	PWA 57538
		OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852
14	GEARBOX DRIVE BEVEL GEARSHAFT AND GEARBOX DRIVE BEVEL GEAR - BACKLASH CHECK	
	GAGE, GEARBOX DRIVE BEVEL GEARSHAFT BACKLASH - - - - -	PWA 51154
17	NO. 2 BEARING SEAL AND SUPPORT ASSEMBLY - INSTALLATION	
	HEATER, NO. 2 BEARING SEAL AND SUPPORT - - - - -	PWA 56325
	CONTROL, HEATER - - - - -	PWA 61685
		OR
	CONTROL, HEATER - - - - -	PWA 25672
	PIN, ALIGNING - - - - -	PWA 14383
	PIN, ALIGNING - - - - -	PWA 50611
17A	TENTH THROUGH TWELFTH STAGE STATOR SEGMENTS (TYPICAL PN 4077920) - ASSEMBLY	
	FIXTURE, INSTALLATION, 10TH, 11TH, 12TH STG CPRSR STATOR SEGMENT, -229 - - - - -	PWA 57910
		OR
	FIXTURE, HOLDING, SHROUD INSTALLATION 10TH-12TH STAGE COMPRESSOR - - - - -	PWA 57739
18	TENTH THROUGH TWELFTH STAGE STATOR SEGMENTS - INSTALLATION	
	ROTATOR, REAR COMPRESSOR ROTOR - - - - -	PWA 57538
		OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852

APPLICABLE SUPPORT EQUIPMENT (continued)

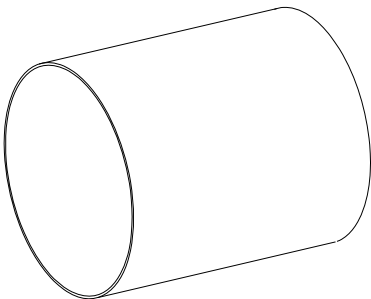
Paragraph	Function - Tool Nomenclature	Tool Number
19	FOURTH THROUGH NINTH STAGE CASE - INSTALLATION	
	SLING, THREE CABLE - - - - -	PWA 14175
	ROTATOR, REAR COMPRESSOR ROTOR - - - - -	PWA 57538
		OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852

ILLUSTRATED SUPPORT EQUIPMENT



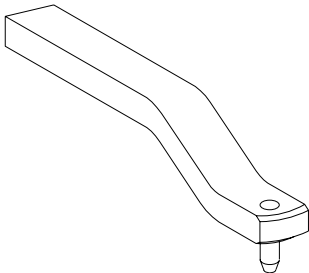
HABCO 1543003 -C

Figure T1. HABCO 1543003 TESTER



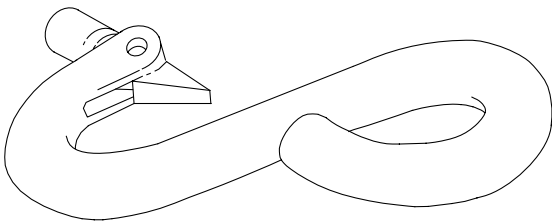
LM 1090 -C

Figure T2. LM 1090 CONTAINER



LM 1106 -C

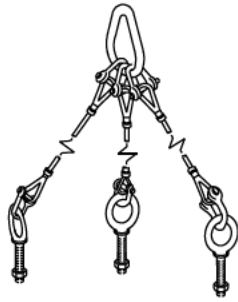
Figure T3. LM 1106 PIN



PWA 2388 -C

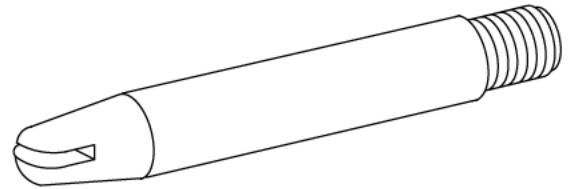
Figure T4. PWA 2388 HOOK

ILLUSTRATED SUPPORT EQUIPMENT (continued)



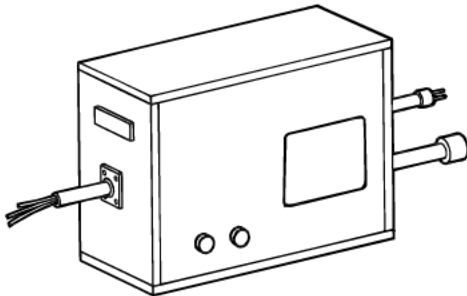
PWA14175-C

Figure T5. PWA 14175 SLING



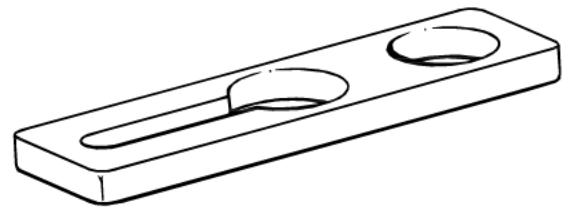
PWA 14383 -C

Figure T6. PWA 14383 PIN



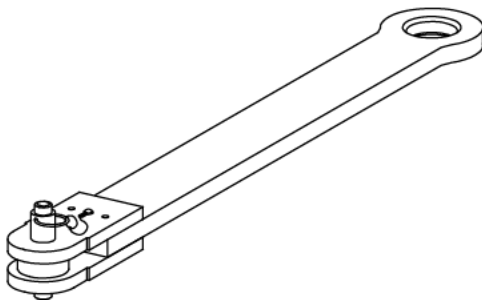
PWA 25672 -C

Figure T7. PWA 25672 CONTROL



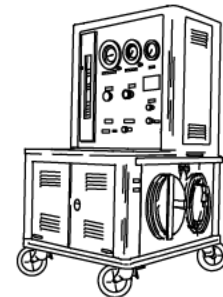
PWA 26147 -C

Figure T8. PWA 26147 ADAPTER



PWA 26584 -C

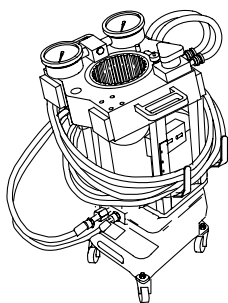
Figure T9. PWA 26584 ARM



PWA 50003 -C

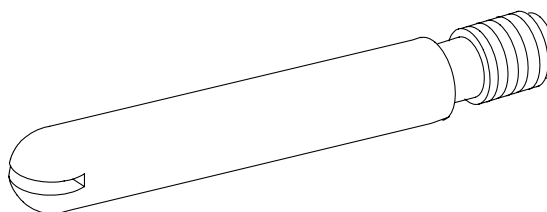
Figure T10. PWA 50003 TESTER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



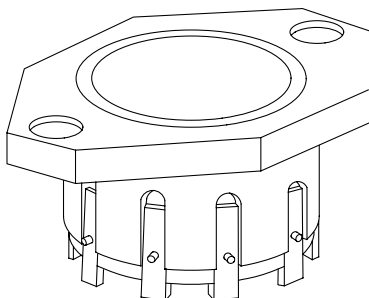
PWA 50308 -C

Figure T11. PWA 50308 WRENCH



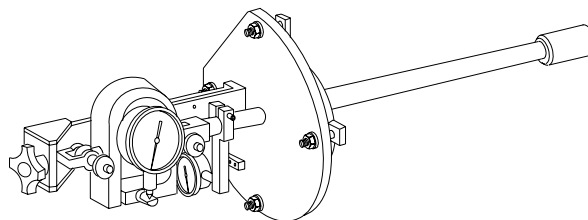
PWA 50611 -C

Figure T12. PWA 50611 PIN



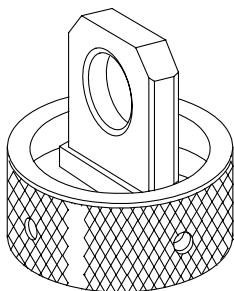
PWA 50628 -C

Figure T13. PWA 50628 WRENCH



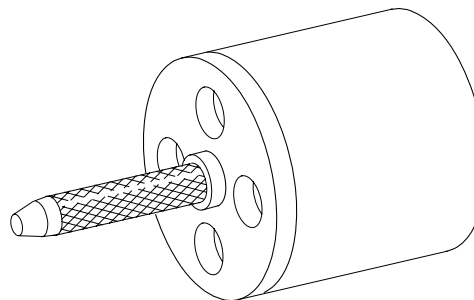
PWA 51154 -C

Figure T14. PWA 51154 GAGE



PWA 51371 -C

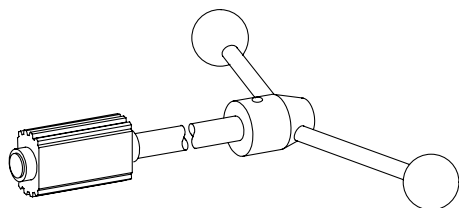
Figure T15. PWA 51371 EYE



PWA 51673 -C

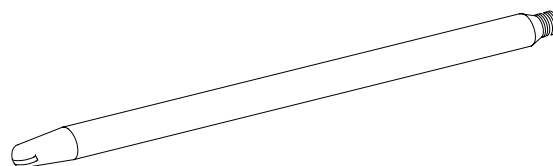
Figure T16. PWA 51673 DRIFT

ILLUSTRATED SUPPORT EQUIPMENT (continued)



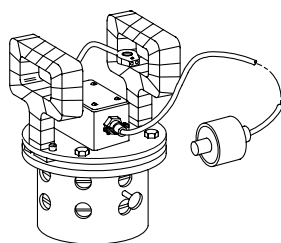
PWA 51852 -C

Figure T17. PWA 51852 ADAPTER



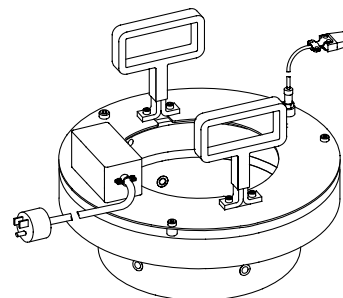
PWA 52353 -C

Figure T18. PWA 52353 PIN



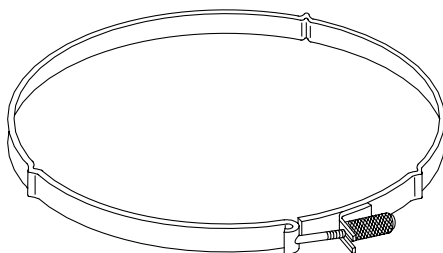
PWA 52665 -C

Figure T19. PWA 52665 HEATER



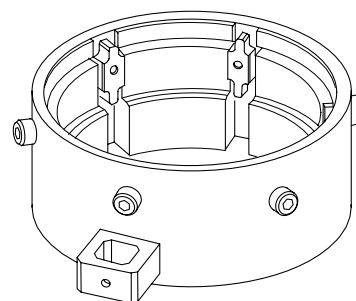
PWA 52756 -C

Figure T20. PWA 52756 HEATER



PWA 52843 -C

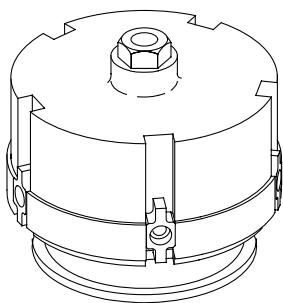
Figure T21. PWA 52843 COMPRESSOR



PWA 53858 -C

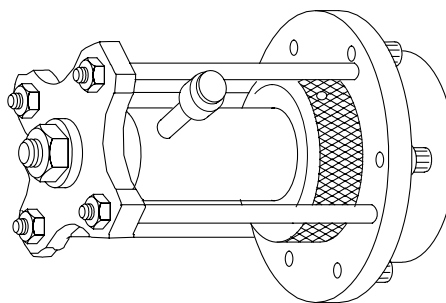
Figure T22. PWA 53858 WRENCH

ILLUSTRATED SUPPORT EQUIPMENT (continued)



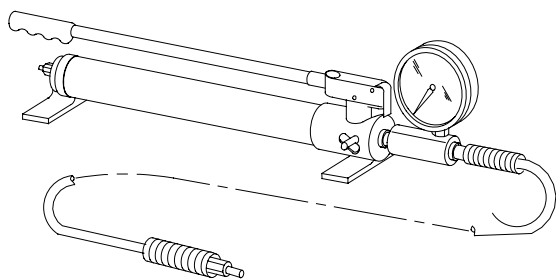
PWA 53859 -C

Figure T23. PWA 53859 ADAPTER



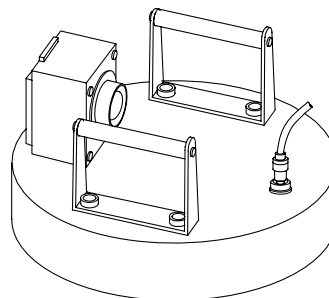
PWA 53875 -C

Figure T24. PWA 53875 PUSHER



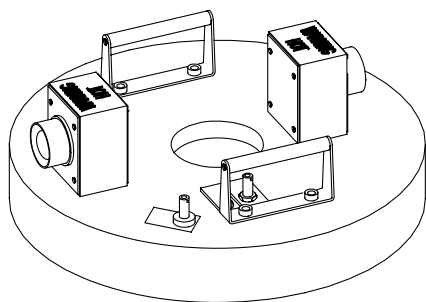
PWA 55380 -C

Figure T25. PWA 55380 PUMP



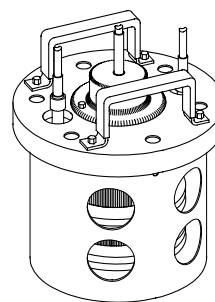
PWA 56324 -C

Figure T26. PWA 56324 HEATER



PWA 56325 -C

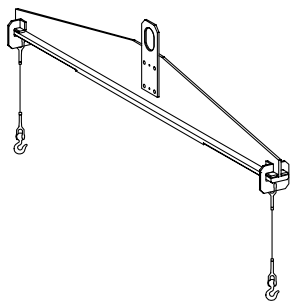
Figure T27. PWA 56325 HEATER



PWA 56326 -C

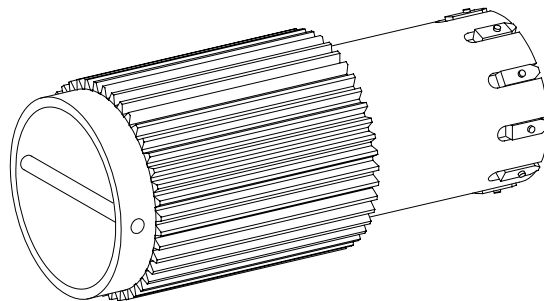
Figure T28. PWA 56326 HEATER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



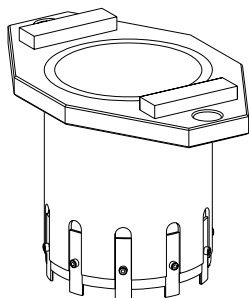
PWA 56336 -C

Figure T29. PWA 56336 SLING



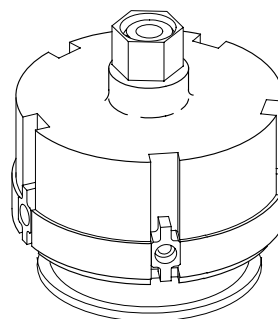
PWA 56585 -C

Figure T30. PWA 56585 ADAPTER



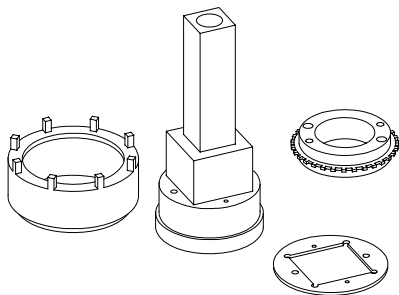
PWA 56586 -C

Figure T31. PWA 56586 ADAPTER



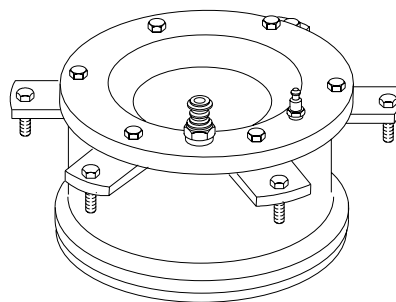
PWA 56677 -C

Figure T32. PWA 56677 ADAPTER



PWA 56688 -C

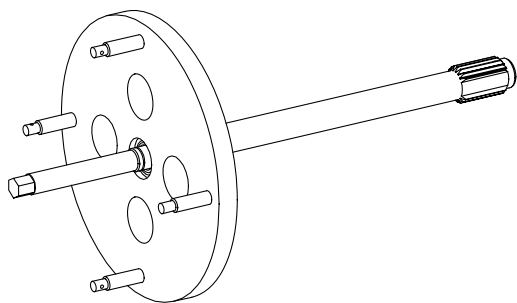
Figure T33. PWA 56688 ADAPTER



PWA 57190 -C

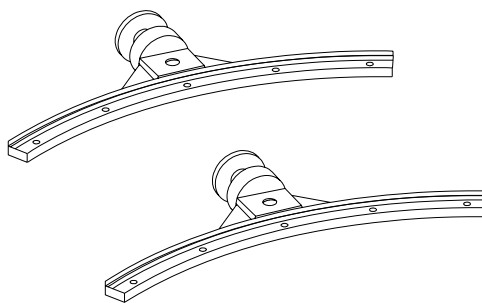
Figure T34. PWA 57190 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



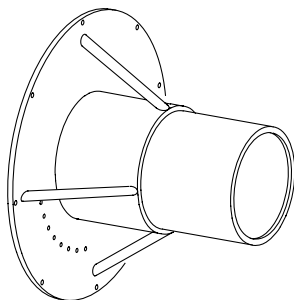
PWA 57538 -C

Figure T35. PWA 57538 ROTATOR



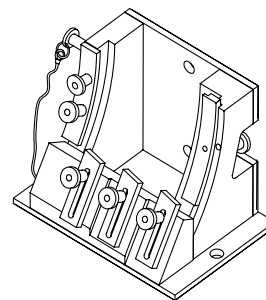
PWA 57601 -C

Figure T36. PWA 57601 TRUNNION



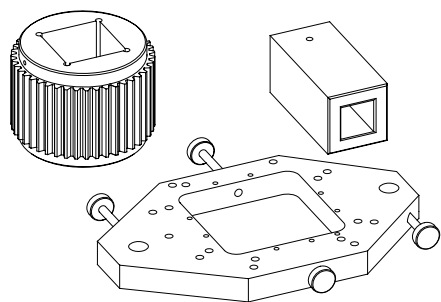
PWA 57726 -C

Figure T37. PWA 57726 GUIDE



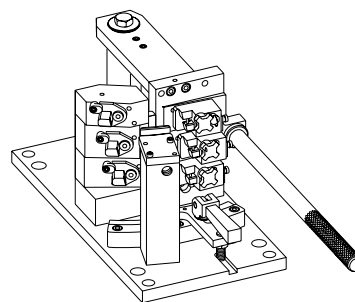
PWA 57739 -C

Figure T38. PWA 57739 FIXTURE



PWA 57806 -C

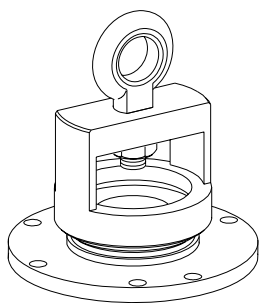
Figure T39. PWA 57806 ADAPTER SET



PWA 57910 -C

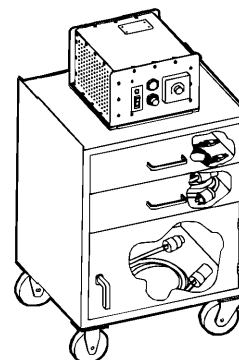
Figure T40. PWA 57910 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



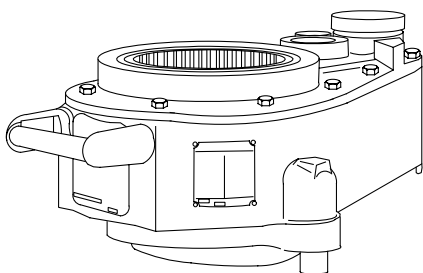
PWA 57938 -C

Figure T41. PWA 57938 FIXTURE



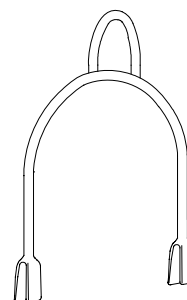
PWA 61685 -C

Figure T42. PWA 61685 CONTROL



SWE 8200 -C

Figure T43. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T44. SWE 81001/81002 SLING

1. INTRODUCTION.

a. This work package contains instructions for vertical assembly of the front end of the core engine module. The following major components and sections are installed:

- Tenth through 12th stage case and compressor stator support
- No. 3 bearing rear air seal
- Intermediate case
- No. 3 bearing rear carbon face seal assembly
- No. 3 bearing rear seal seat
- No. 3 bearing package
- No. 3 bearing front seal seat
- No. 2 bearing package
- No. 2 and 3 bearing inner oil pressure tubes
- No. 2 and 3 bearing internal oil pressure tubes
- No. 2 bearing seal and support assembly
- Tenth through 12th stage stator segments
- Fourth through 9th stage case
- Fourth, 5th, and 6th stage synchronizing ring brackets
- Variable vanes synchronizing arm and linkage
- Bleed valve strap and actuating linkage

2. TENTH THROUGH TWELFTH STAGE CASE AND COMPRESSOR STATOR SUPPORT - INSTALLATION.

(See Figures 1 and 2.)

- a. Install PWA 57938 fixture(2, figure 1) on front hub(3) of rear compressor rotor assembly(4).
- b. Attach PWA 26584 arm(1) to hoist.
- c. Attach PWA 26584 arm(1) to PWA 57938 fixture(2). Lift rear compressor rotor assembly(4) from PWA 57722 stand(7).
- cl. Install bolts into compressor stator support clinch nuts and verify a run on torque of 3.5 to 30 pound-inches prior to seating. Fasteners not meeting this requirement shall be replaced per WP 437 00. Refer to WP 801 00, Reference No. 3770.

NOTE

Compressor stator support outer flange clocking feature (hole or pin) is just left of bottom center when viewed from front to rear. Clocking pin was installed in stator support when originally delivered but may have been removed during prior maintenance.

- d. Install compressor stator support(6) on PWA 57722 stand(7) aligning clocking feature (hole or pin) of stator support with hole in stand. If clocking pin is not installed in stator support, use LM 1106 pin to align hole in stator support with hole in stand.

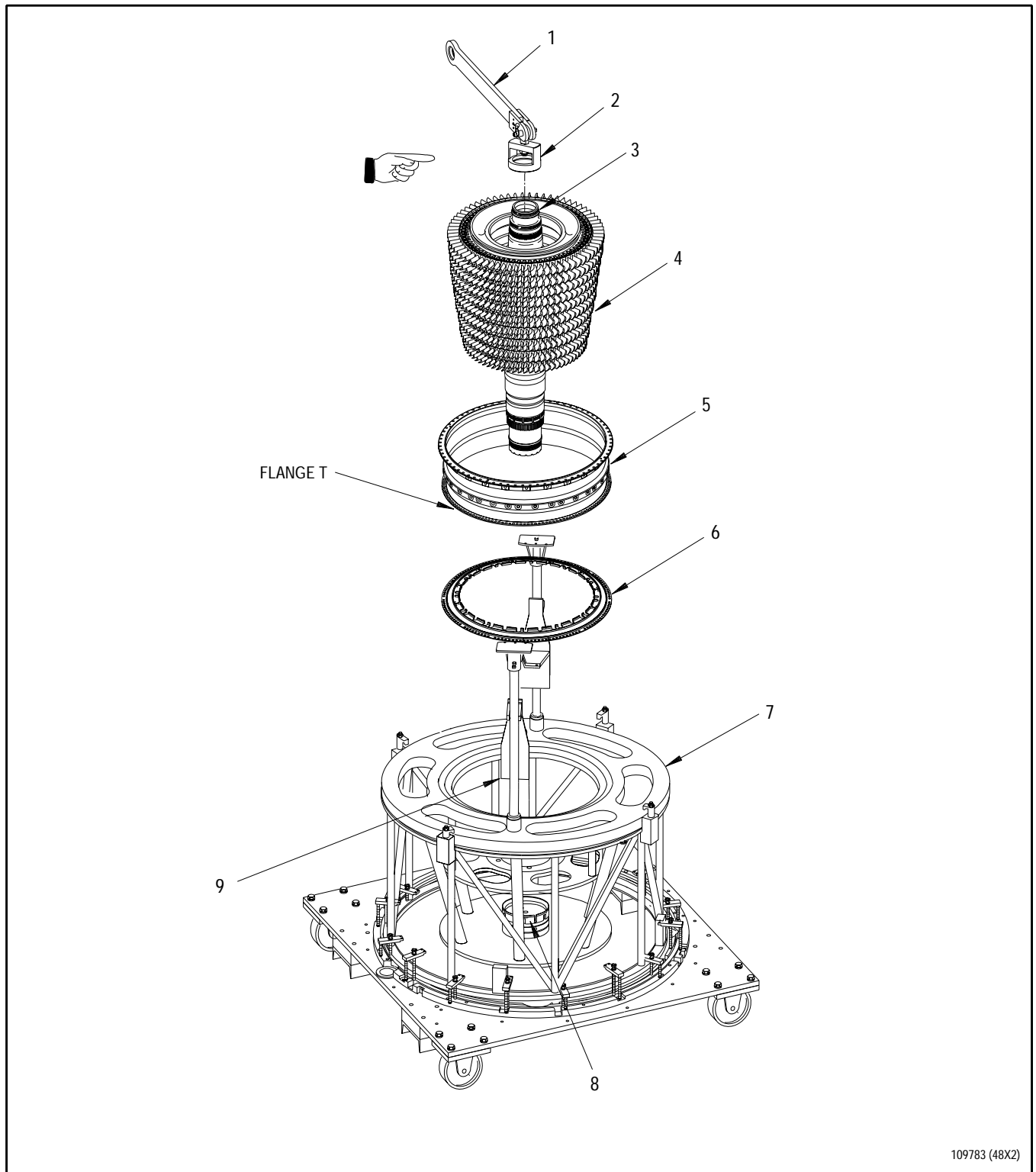


Figure 1. Tenth Through Twelfth Stage Case and Compressor Stator Support - Installation In PWA 57722 Stand

Legend for figure 1

1. PWA 26584 arm
2. PWA 57938 fixture
3. Front hub
4. Rear compressor rotor assembly
5. 10th through 12th stage case
6. Compressor stator support
7. PWA 57722 stand
8. Plate
9. Bracket assembly

d1. Install bolts into 10th through 12th stage case(5) clinch nuts and verify a run on torque of 3.5 to 30 pound-inches prior to seating. Fasteners not meeting this requirement shall be replaced. Refer to WP 801 00, Reference No. 3770.

NOTE

Tenth through 12th stage case, Flange T clocking pin hole and compressor stator support clocking feature (hole or pin) are just left of bottom center when viewed from front to rear. Clocking pin was installed in stator support when originally delivered but may have been removed during prior maintenance.

e. Position 10th through 12th stage case(5) onto compressor stator support(6) aligning Flange T clocking pin hole on case with clocking feature (hole or pin) in support. If clocking pin is not installed in stator support, use LM 1106 pin to align hole in case with hole in support.

f. Install PWA 57722 stand details-25 and 26 bracket assemblies(9).

g. Secure PWA 57722 stand, details-25 and 26 bracket assemblies(4, figure 2) to Flange S of 10th through 12th stage case(3) at 3 and 9 o'clock positions with detail hex head cap screws(1).

h. Lower rear compressor rotor assembly(4, figure 1) into PWA 57722 stand(7). Turn rotor to align detail-36 key with slots in end of rotor driveshaft and lower until rotor bottoms out on detail-10 plate(8).

i. Remove PWA 26584 arm(1) and PWA 57938 fixture(2).

j. Remove PWA 57722 stand, detail ball lock pins(2, figure 2) and raise 10th through 12th stage case(3) by lifting detail-25 bracket assemblies(4) and secure in upmost position with detail ball lock pins.

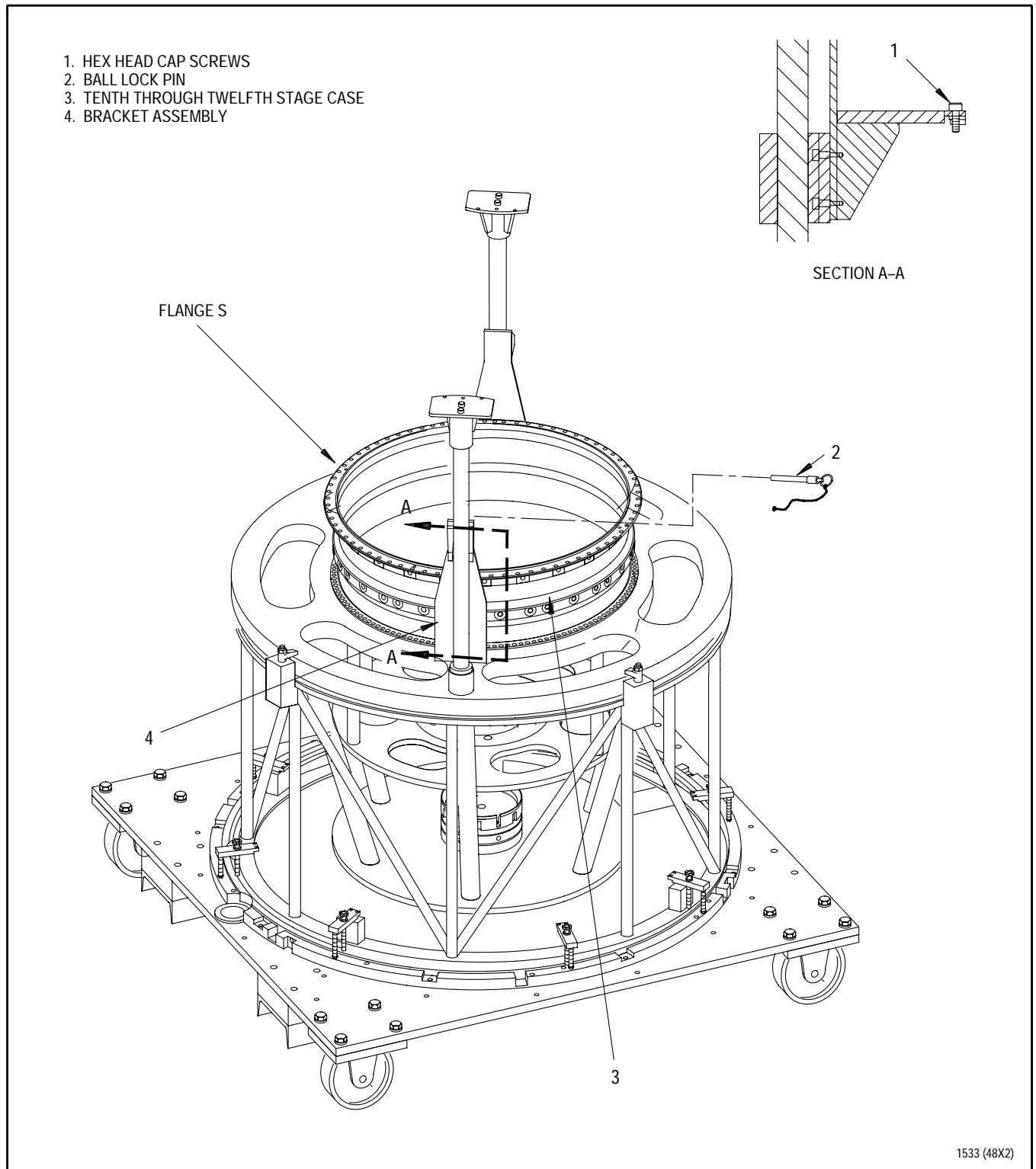


Figure 2. Tenth Through Twelfth Stage Case - Installation

3. INTERMEDIATE CASE - INSTALLATION.

(See Figure 3.)

- a. Install PWA 57726 intermediate case guide as follows:
 - (1) Thread detail-1 guide tube(3, figure 3) onto front hub of rear compressor rotor.
 - (2) Position detail-2 support(2) on flange in intermediate case(7) and secure with eight detail socket head cap screws(1).

NOTE

Two technicians, 180 degrees apart, can install intermediate case by hand, otherwise, lift tooling shall be used.

- b. Install intermediate case lift tooling as follows:
 - (1) Position PWA 57601 lift trunnions(8) on front side of third stage stator(6). Secure with 10 detail washers(11) and socket head cap screws(10) through intermediate case(7) and third stage stators(6).
 - (2) Install PWA 26147 adapters on PWA 57601 lift trunnions(8).
 - (3) Attach PWA 56336 sling to hoist with PWA 2388 hook.
 - (4) Attach PWA 56336 sling to PWA 26147 adapters and raise intermediate case(7).



Failure to use care when installing intermediate case can result in damage to No. 3 bearing air seal knife-edges.

- c. Carefully lower intermediate case(7) over detail-1 guide tube(3) onto PWA 57722 detail-29 build stand posts(9) with tower shaft opening aligned with clocking pin on compressor stator support.
- d. Secure rear flange of intermediate case(7) to PWA 57722 detail-29 build stand posts(9) with detail socket head cap screws(12).
- e. Remove PWA 57726 intermediate case guide.
- f. Remove PWA 56336 sling, PWA 2388 hook, PWA 26147 adapters and PWA 57601 lift trunnions(8).

NOTE

If any duct segments were replaced or require replacement, blade tips shall meet requirements of WP 374 00.

- g. Install fourth stage compressor duct segments(5), PN 4076124-02 at 4, 8, and 12 o'clock positions by pushing upwards into fourth stage case(4).
- h. Install duct segments(5), PN 4076124-01 at 2, 6, and 10 o'clock positions by pushing upwards into fourth stage case(4).

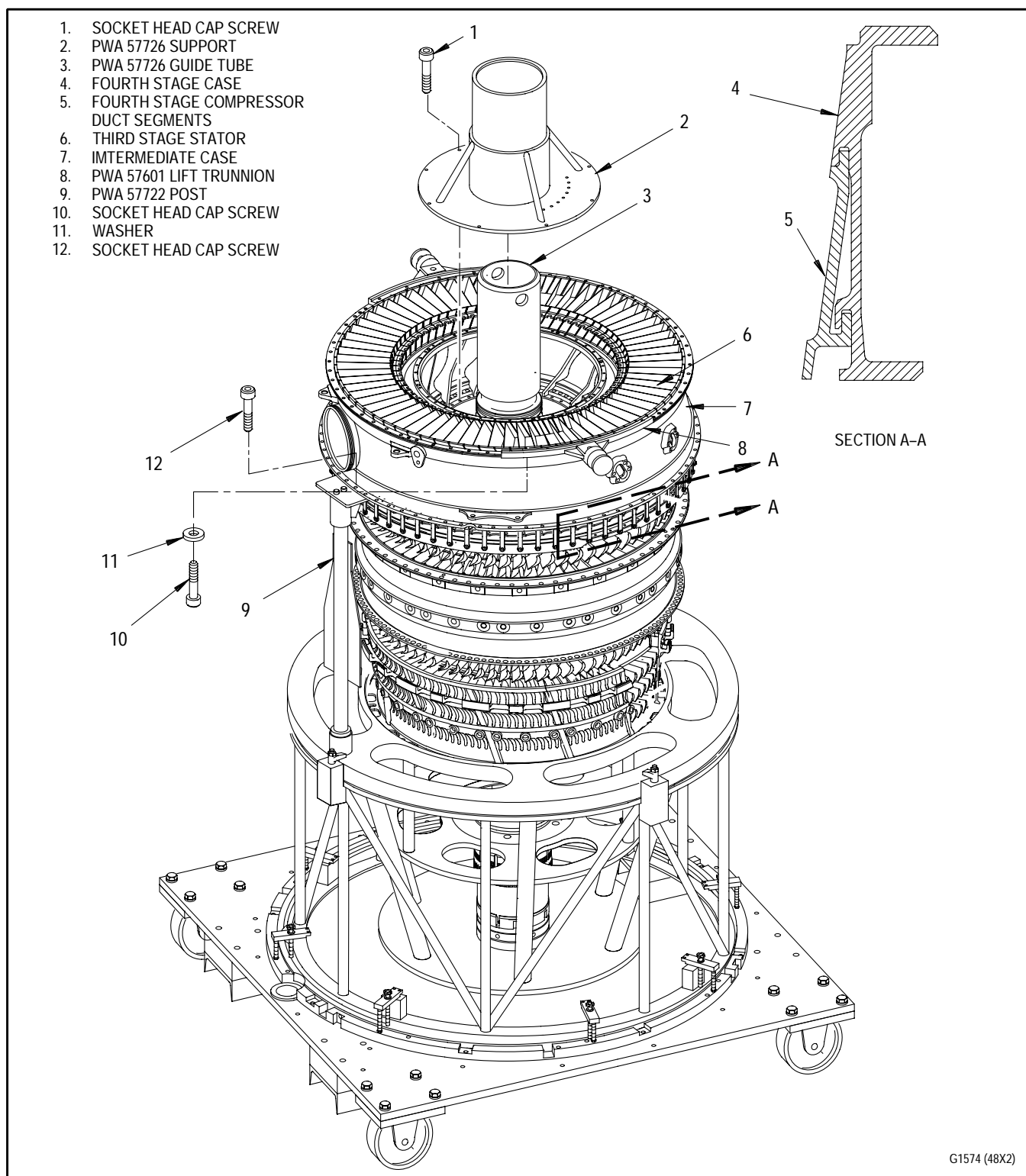


Figure 3. Intermediate Case - Installation

**4. REAR COMPRESSOR ROTOR ASSEMBLY -
SETTING RUNNING POSITION.**

(See Figure 4.)



No. 3 bearing support can be damaged if rear compressor rotor assembly is not set in proper running position.

NOTE

Set running position of rear compressor rotor assembly if rear of core engine module is disassembled. This paragraph does not apply if rear of core engine module is not disassembled.

- a. Set running position of rear compressor rotor assembly as shown in figure 4.

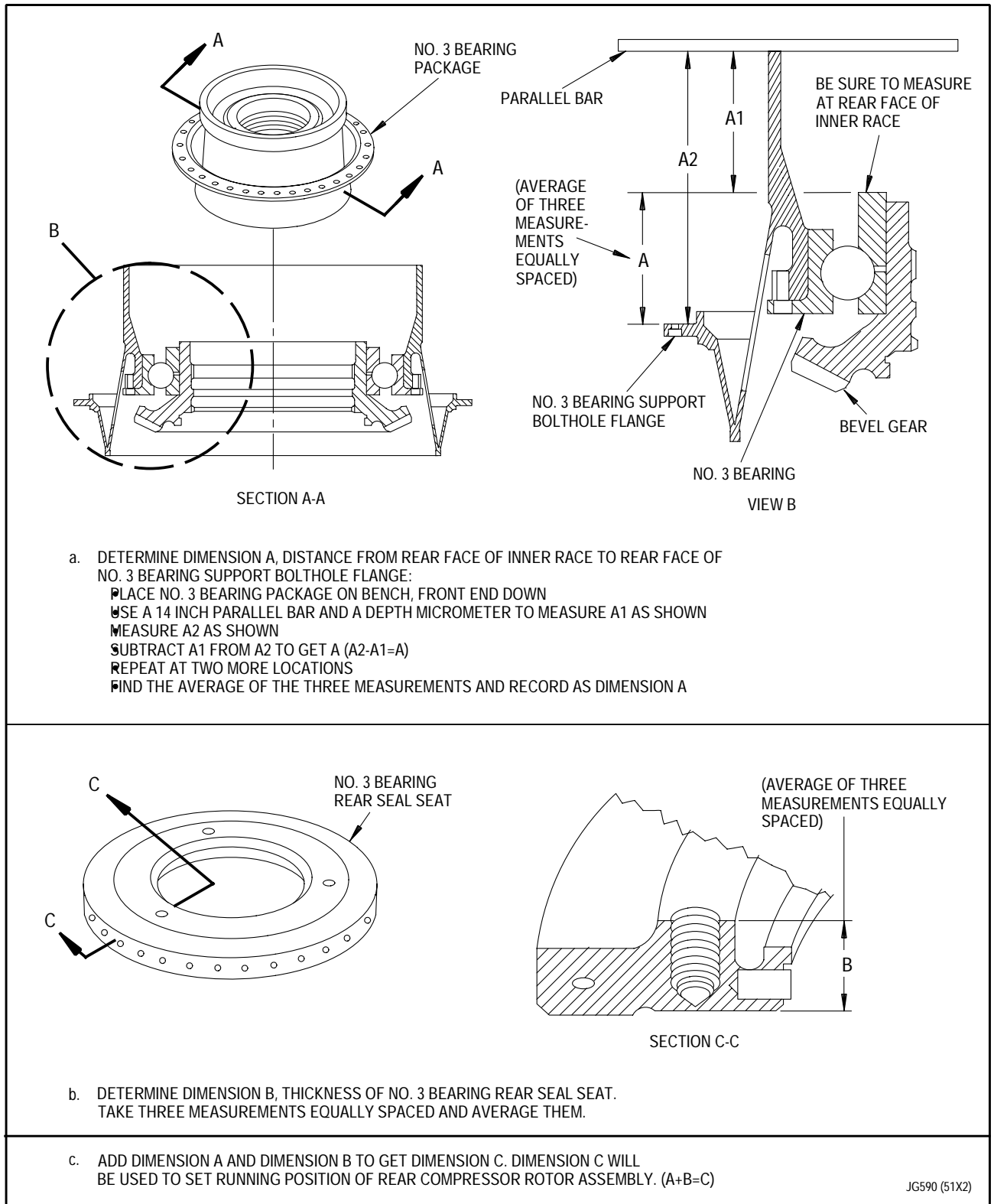
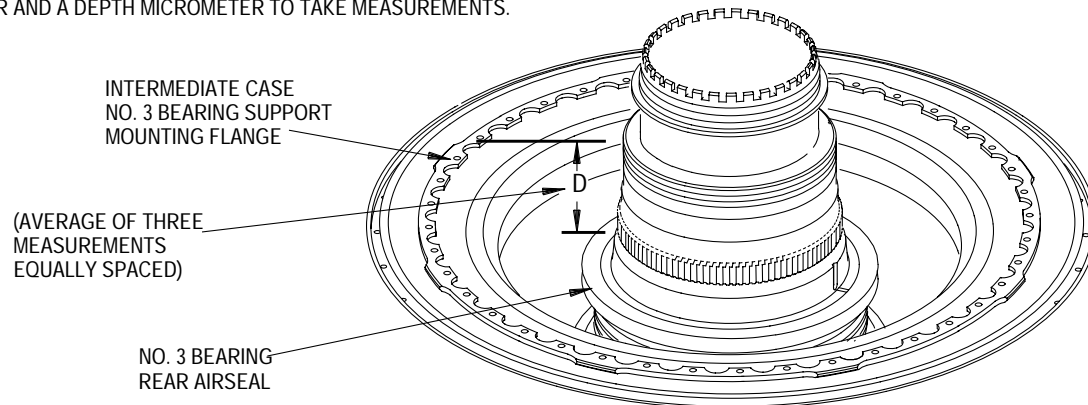


Figure 4. Rear Compressor Rotor Assembly - Setting Running Position (Sheet 1 of 2)

- d. DETERMINE DIMENSION D, DISTANCE FROM NO. 3 BEARING SUPPORT MOUNTING FLANGE IN INTERMEDIATE CASE TO FRONT FACE OF NO. 3 BEARING REAR AIRSEAL. TAKE THREE MEASUREMENTS EQUALLY SPACED AND AVERAGE THEM. USE A 14 INCH PARALLEL BAR AND A DEPTH MICROMETER TO TAKE MEASUREMENTS.



- e. COMPARE DIMENSION C WITH DIMENSION D. ADJUST PWA 57722 BUILD STAND, DETAIL-10 PLATE TO RAISE OR LOWER REAR COMPRESSOR ROTOR ASSEMBLY SO THAT DIMENSION D IS EQUAL TO DIMENSION C.

G1575 (24X2)

Figure 4. Rear Compressor Rotor Assembly - Setting Running Position (Sheet 2 of 2)

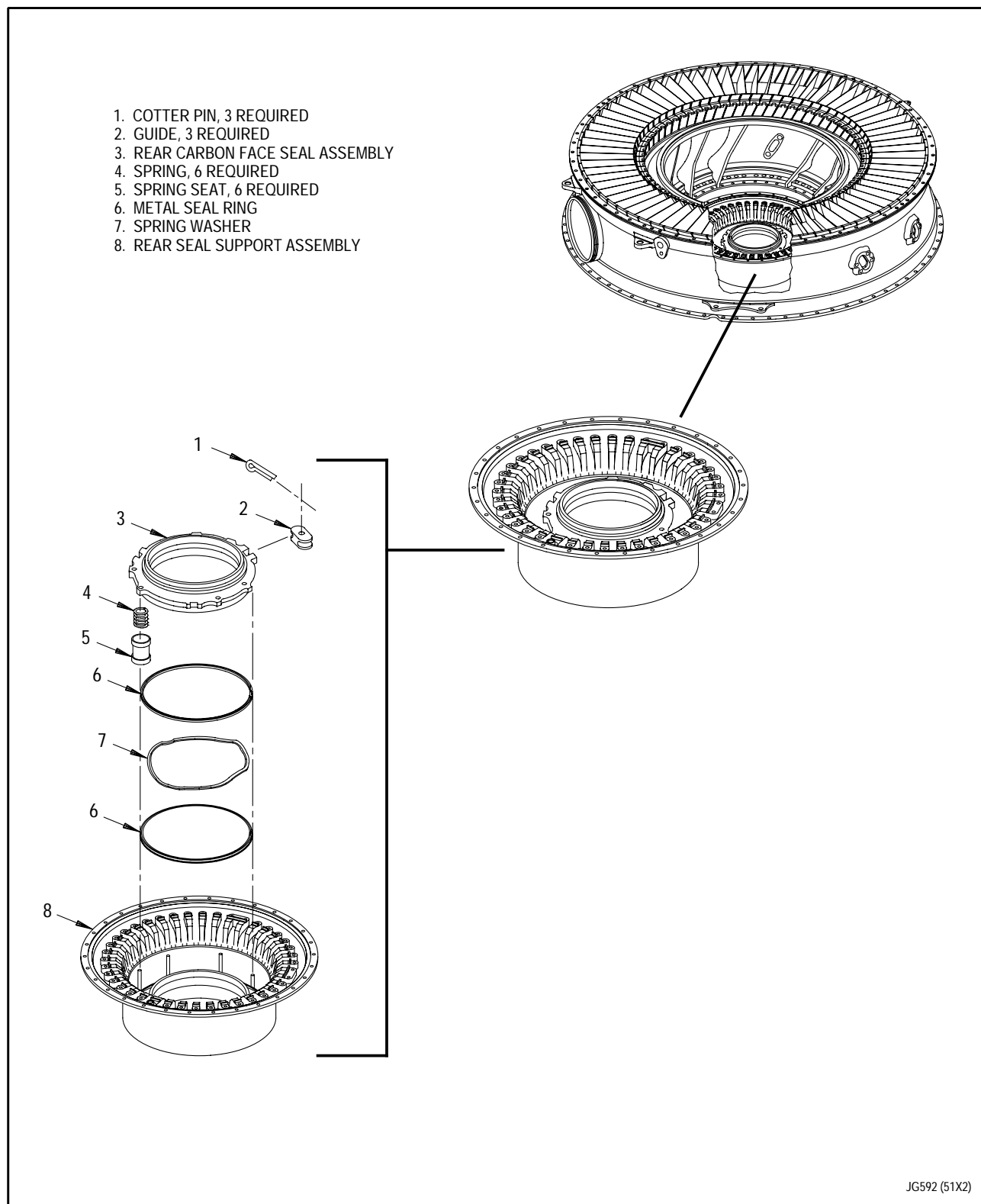
5. NO. 3 BEARING REAR CARBON FACE SEAL ASSEMBLY - INSTALLATION.

(See Figure 5.)

NOTE

If No. 3 bearing rear carbon face seal assembly was removed during dismantling of front core (WP 014 00), it shall be installed at this time. If No. 3 bearing rear carbon face seal assembly is already installed, proceed to paragraph 6.

- a. Install metal seal ring(6, figure 5) into the lower ring groove in rear seal support assembly(8). Widest side of seal ring goes down.
- b. Install spring washer(7) into the ring groove against seal ring(6) that was just installed.
- c. Install a second metal seal ring(6) into the ring groove against spring washer(7). Widest side of seal ring goes up.
- d. Turn the two metal seal rings(6) so that gaps are exactly opposite (180 degrees apart).
- e. Install PWA 52843 compressor around metal seal rings. Be sure that knob of compressor can be removed without hitting springs after seal is assembled.
- f. Install spring seats(5) and springs(4) over each of the six pins in rear seal support assembly(8).
- g. Install three guides(2) into three slots in rear carbon face seal assembly(3). Flat side of guides face outward.
- h. Install rear carbon face seal assembly(3) and guides(2) in rear seal support assembly(8). Align rear carbon face seal assembly with pins in rear seal support assembly.
- i. Tighten knob of PWA 52843 ring compressor and push rear carbon face seal assembly(3) down so body goes over seal rings(6) in rear seal support assembly(8).
- j. Install cotter pins(1) into pins in rear seal support assembly(8) to secure rear carbon face seal assembly(3). Heads of cotter pins go toward right hand side.
- k. Bend cotter pins(1).
- l. Remove PWA 52843 ring compressor.



JG592 (51X2)

Figure 5. No. 3 Bearing Rear Carbon Face Seal Assembly - Installation

**5A. NO. 3 BEARING REAR SEAL ASSEMBLY -
AIR LEAKAGE CHECK.**

(See Figure 5A.)

- a. Install PWA 57190 fixture on No. 3 bearing rear seal as follows:

- (1) Ensure details-9, -11, and -12 packings are present and are not damaged. See figure 5A. If necessary, install new lubricated packings.
- (2) Install detail-2 adapter to No. 3 bearing and gear assembly mating flange. Tighten detail-1 bolts in an alternating pattern. Torque bolts 15 to 20 pound-inches.
- (3) Install detail-10 ring on detail-3 body.
- (4) Carefully install this assembly into detail-2 adapter. Tighten detail-4 bolts in an alternating pattern. Torque bolts 15 to 20 pound-inches.

- b. Perform vacuum check using PWA 50003 tester or Habco 1543003 tester as follows:

- (1) If PWA 50003 tester is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 024 00.

- (2) Connect vacuum line from tester to large fitting on PWA 57190 fixture detail-3 body.
- (3) Connect gage pressure line from tester to small fitting on detail-3 body.
- (4) Refer to T.O. 2J-F100-53-1, WP 024 00 for PWA 50003 tester operating instructions or SWP 024 01 for Habco 1543003 tester operating instructions.
- (5) Airflow leakage shall not exceed 2.8 pounds per hour. Limits apply to facilities operating from sea level to 5,000-feet altitude for PWA 50003 tester only.
- (6) If limits cannot be met, ensure all fittings and connections are free of leaks. If limits still cannot be met, disassemble as required to determine cause of incorrect airflow. Replace parts as required and repeat airflow check.

- c. Following successful leak check, remove tooling.

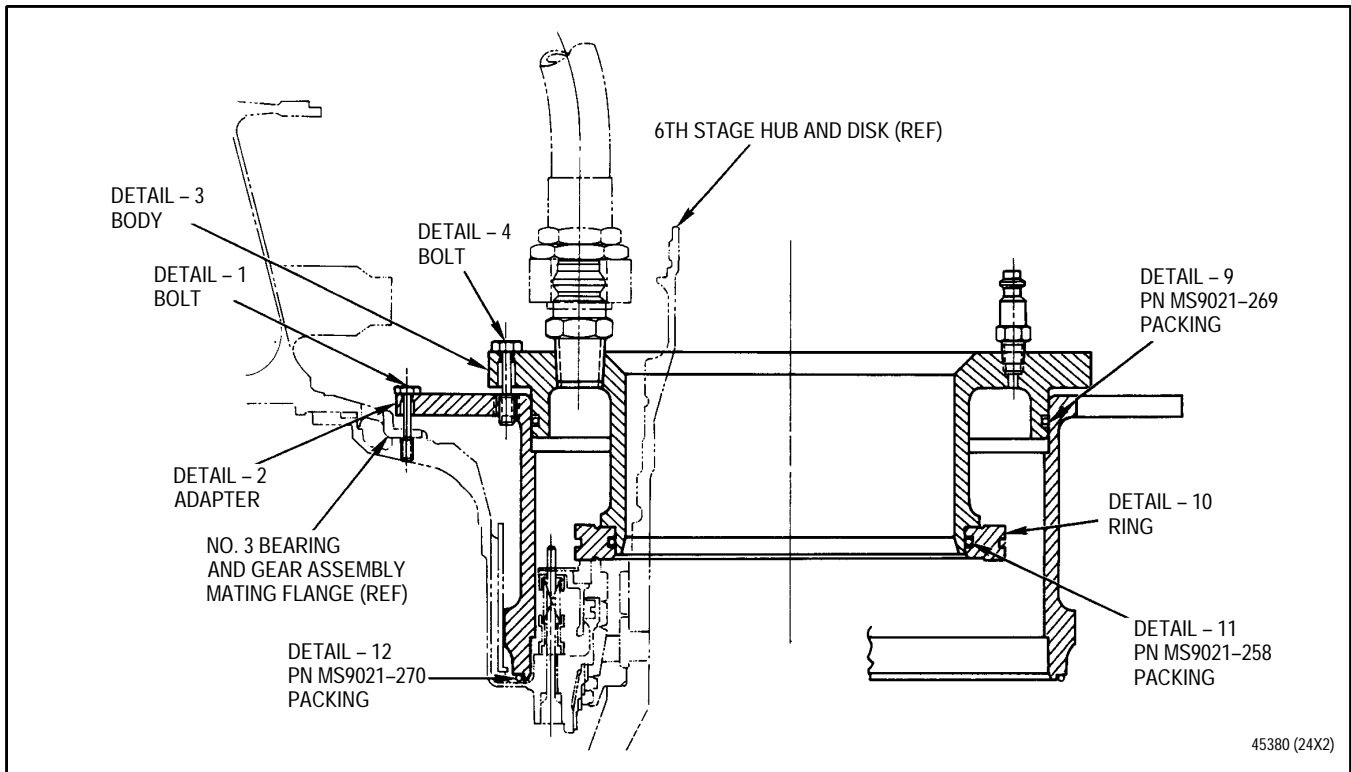


Figure 5A. No. 3 Bearing Rear Seal Assembly - Air Leakage Check (Sheet 1 of 2)

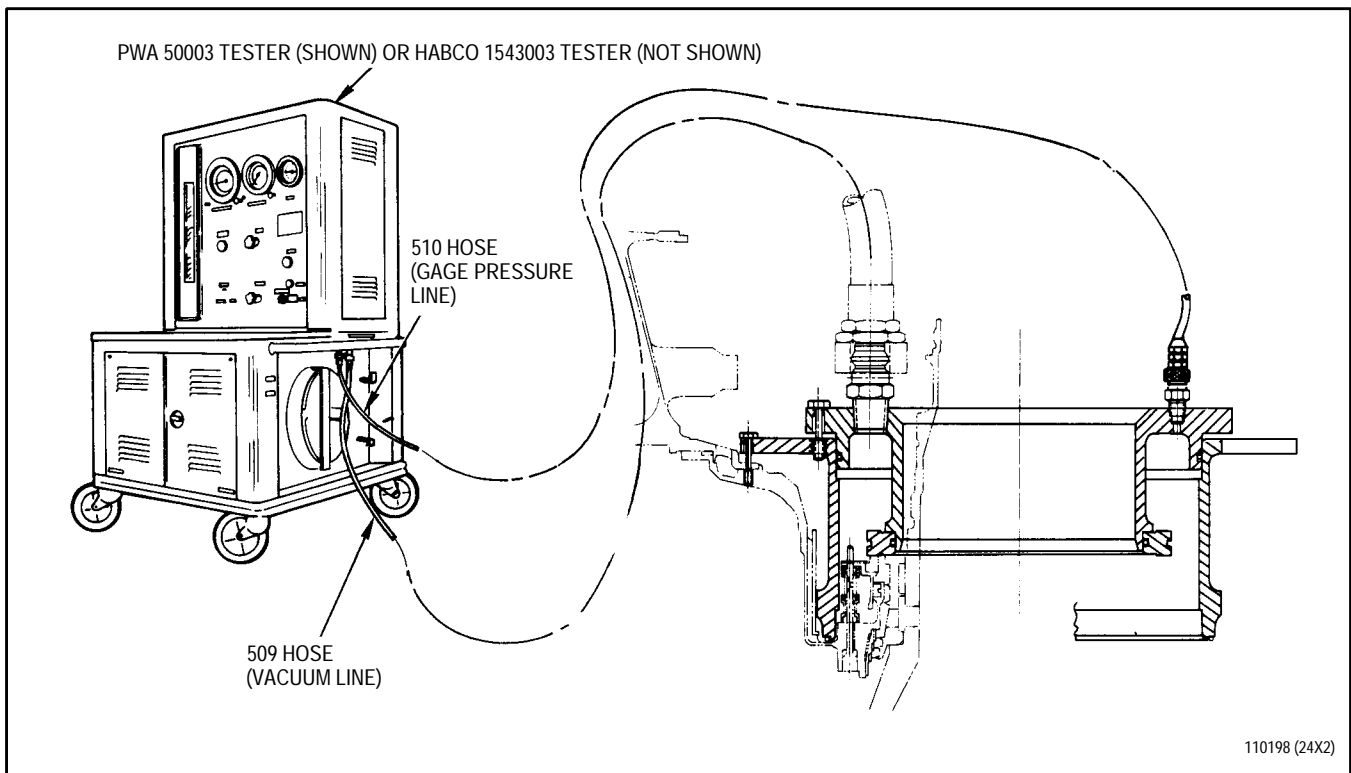


Figure 5A. No. 3 Bearing Rear Seal Assembly - Air Leakage Check (Sheet 2 of 2)

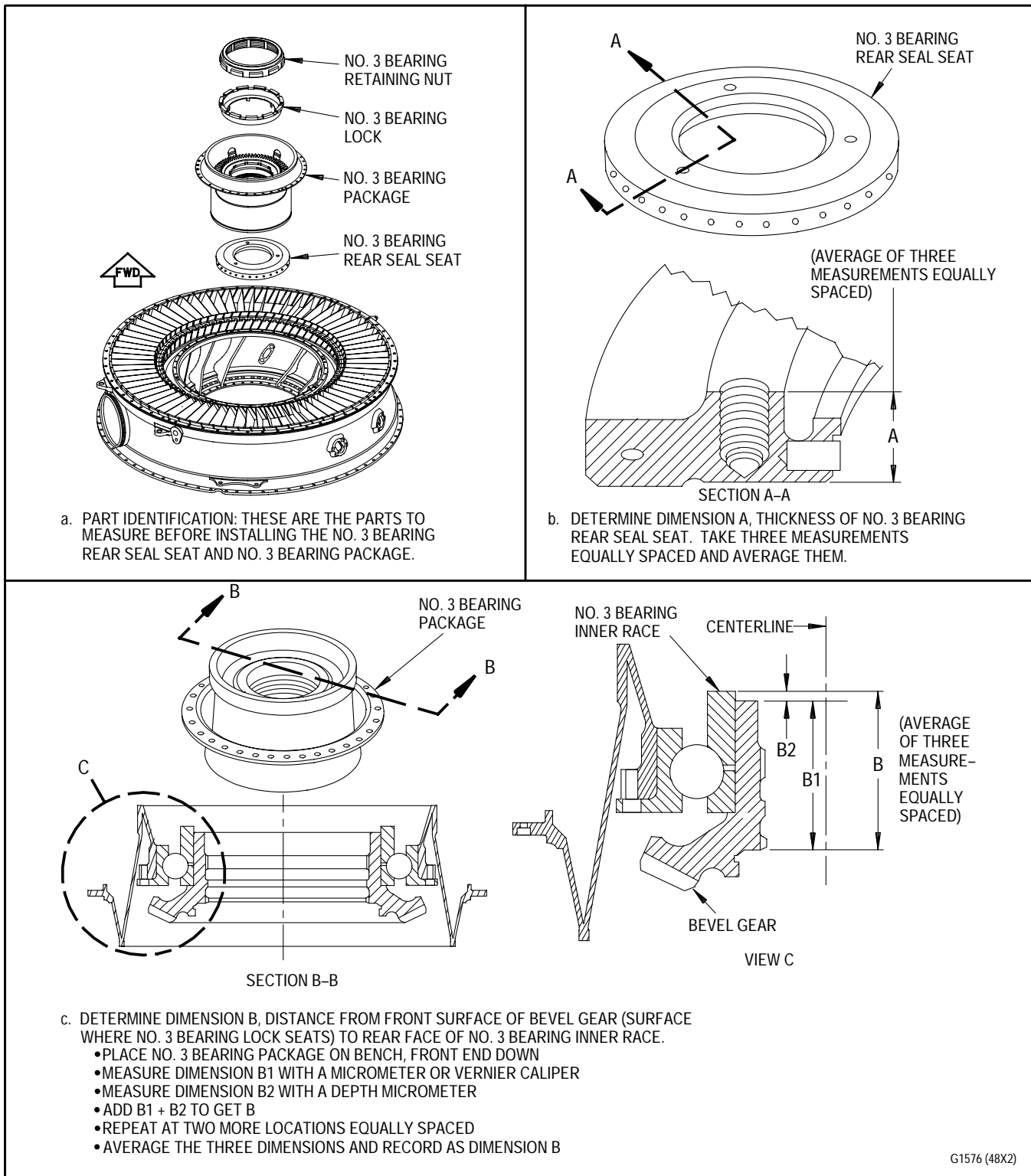
6. NO. 3 BEARING PACKAGE - MEASUREMENT OF PARTS BEFORE INSTALLATION.

(See Figure 6.)

NOTE

Measurement will be used to
check seating of No. 3 bearing
package after it is installed.

- a. Measure the following parts as
shown in figure 6. Record
measurement as dimension G.
- No. 3 bearing rear seal seat
 - No. 3 bearing package
 - No. 3 bearing lock
 - No. 3 bearing retaining nut



G1576 (48X2)

Figure 6. No. 3 Bearing Package - Measurement of Parts Before Installation (Sheet 1 of 2)

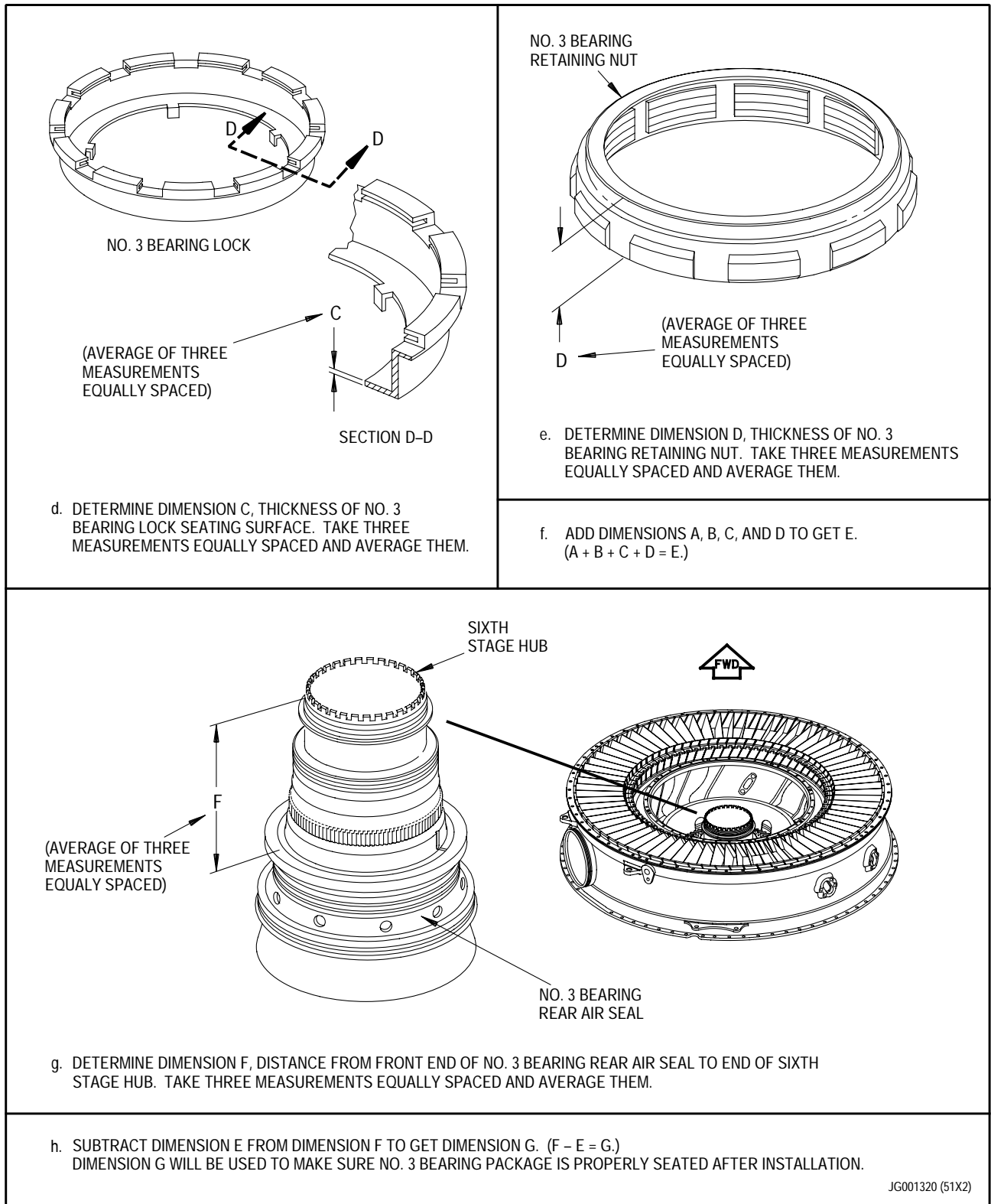


Figure 6. No. 3 Bearing Package - Measurement of Parts Before Installation (Sheet 2 of 2)

**7. NO. 3 BEARING REAR SEAL SEAT -
INSTALLATION.**

(See Figure 7.)

- a. Lap the seat and perform a flatness inspection if No. 3 bearing rear seal seat is used and is being installed with a new or different carbon seal. Refer to T.O. 2J-F100-53-1, SWP 091 05 and SWP 091 06.
- b. Heat No. 3 bearing rear seal seat(2, figure 7) in hot oil for 20 minutes at 225° to 275°F (107° to 135°C).
- c. Install No. 3 bearing rear seal seat(2) onto sixth stage hub(3) so side with threaded holes is up. Align dowel pins on seal seat with slots in sixth stage hub.
- d. Seat No. 3 bearing rear seal seat(2) on sixth stage hub(3) using PWA 51673 drift(1). Hold until temperature normalizes.
- e. Remove PWA 51673 drift(1).

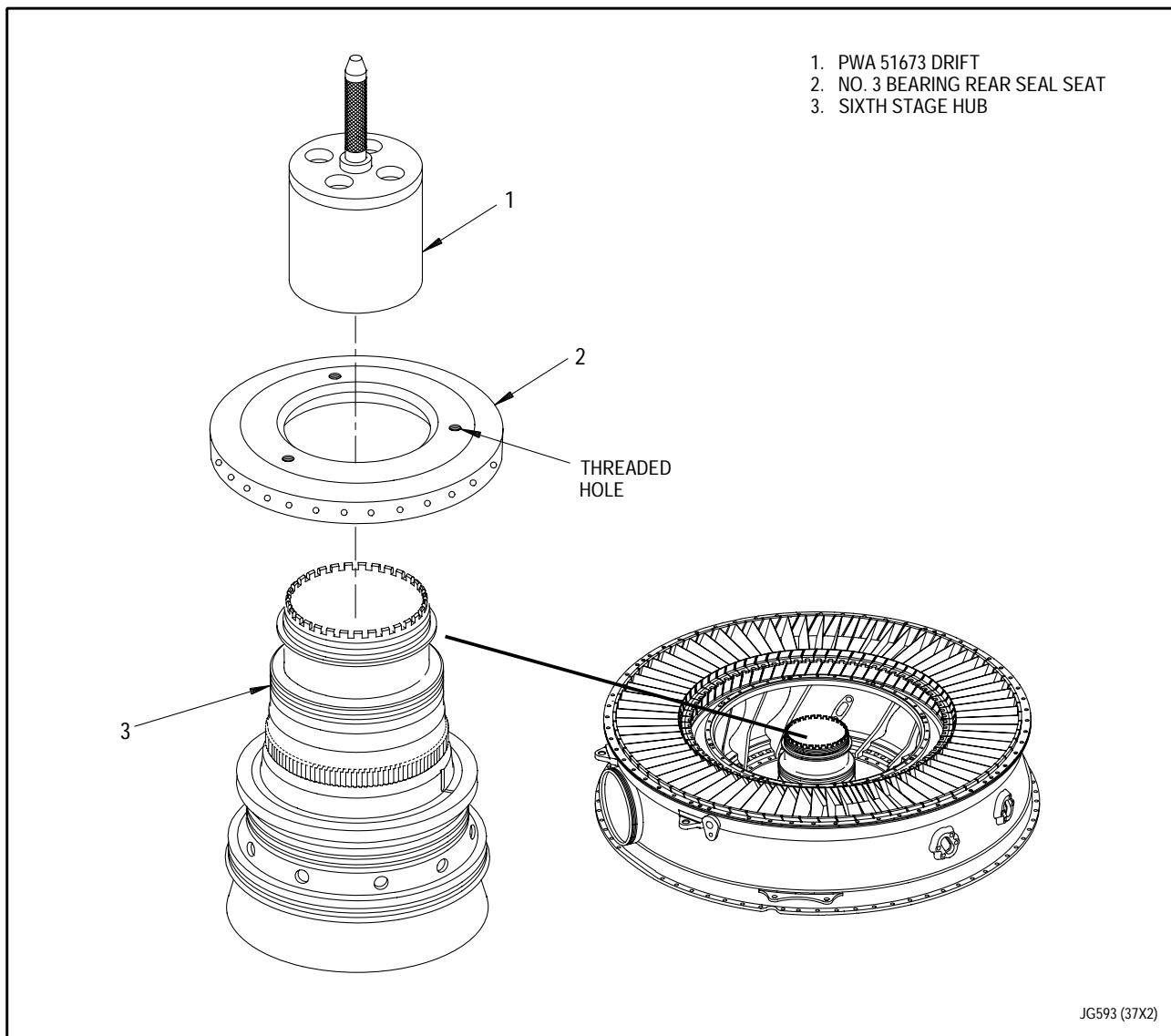


Figure 7. No. 3 Bearing Rear Seal Seat - Installation

8. NO. 3 BEARING PACKAGE - INSTALLATION.

(See Figures 8 and 9.)

NOTE

No. 3 bearing package consists of the following major parts:

- No. 3 bearing
- No. 3 bearing support
- Gearbox drive bevel gear

NOTE

Steps a. b. and c. shall be done concurrently.

a. Heat gearbox drive bevel gear(1, figure 8) in No. 3 bearing package as follows:

- (1) Place No. 3 bearing package on bench so gearbox drive bevel gear(1) is up.
- (2) Install PWA 56326 heater into inner diameter of gearbox drive bevel gear(1). Ensure thermocouple probe of heater contacts gearbox drive bevel gear.
- (3) Connect PWA 61685 control to heater.
- (4) Turn heater on and heat gearbox drive bevel gear(1) to 300°F (148°C) for 15 minutes.

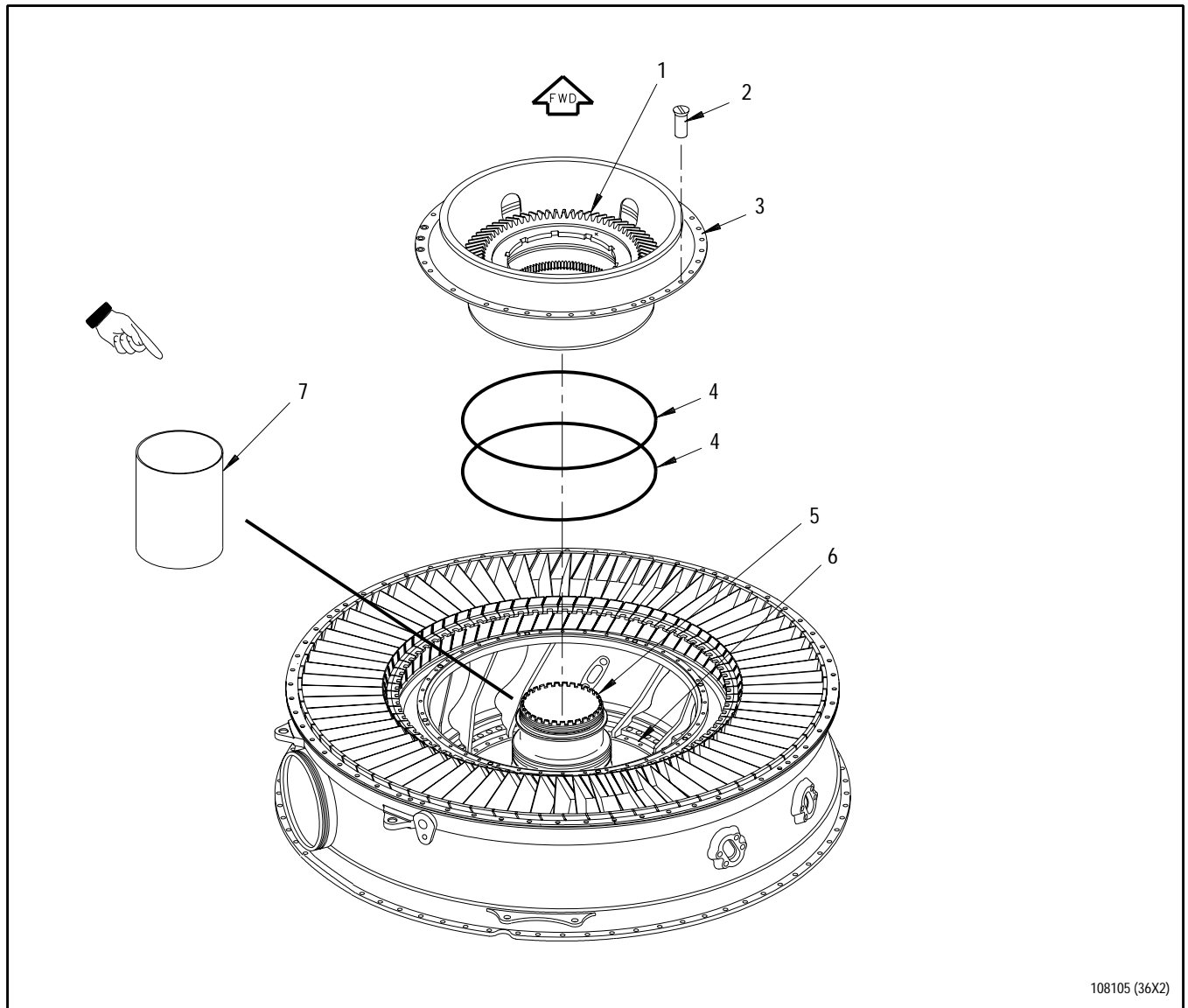
b. Heat inner flange of intermediate case(6) where No. 3 bearing support(3) will seat as follows:

- (1) Install PWA 52756 heater into intermediate case(6). Be sure thermocouple probe of heater contacts inner flange of intermediate case.
- (2) Connect PWA 61685 control to heater.
- (3) Turn heater on and heat flange of intermediate case(6) to 300°F (148°C) for 15 minutes.

c. Using dry ice, freeze splined area of 6th stage hub(5) where gearbox drive bevel gear(1) will mate. LM 1090 container(7) may be installed over hub to hold dry ice in place.

d. Install No. 3 bearing package into intermediate case(6) as follows:

- (1) Remove heater from intermediate case(6).
- (2) Install three PWA 52353 aligning pins in inner flange of intermediate case(6), equally spaced.
- (3) Remove heater from gearbox drive bevel gear(1) in No. 3 bearing package.
- (4) Find dowel pin hole in flange of No. 3 bearing support(3). This hole will engage dowel pin at 12 o'clock position in flange of intermediate case(6).
- (5) Coat two packings(4) with MIL-L-7808 lubricating oil or petrolatum and install in grooves in outer diameter of No. 3 bearing support(3).
- (6) Apply PWA 550 antigalling compound to mating surfaces of intermediate case(6) and No. 3 bearing support(3).
- (7) Install No. 3 bearing package into intermediate case(6). Engage splines of gearbox drive bevel gear(1) with splines on 6th stage hub(5) while aligning dowel pin hole in No. 3 bearing support(3) with dowel pin at 12 o'clock position in inner flange of intermediate case(6).



108105 (36X2)

1. Gearbox drive bevel gear
2. Countersunk screw
3. No. 3 bearing support
4. Packing
5. 6th stage hub
6. Intermediate case
7. LM 1090 container

Figure 8. No. 3 Bearing Package - Installation

- e. Seat No. 3 bearing package using PWA 53875 pusher as follows:



To prevent distortion of No. 3 bearing support, workbolts shall be installed and tightened at the same time gearbox drive bevel gear is being seated.

- (1) Install eight 0.190-32UNJF workbolts(5, figure 9) in unchamfered holes in No. 3 bearing support(3).
- (2) Install PWA 53875 pusher as follows:
 - (a) Position pusher with detail-1 ring(2) on gearbox drive bevel gear(4).
 - (b) Thread detail-3 nut(7) onto 6th stage hub(6).
- (3) Deleted
- (4) Connect PWA 55380 hydraulic pump to connector(8) on hydraulic cylinder(1).
- (5) Work hydraulic pump to seat No. 3 bearing package while torquing workbolts(5) 24 to 36 pound-inches. Do not exceed 2,000 psig to seat No. 3 bearing package. Excessive pressure may cause tool to fail resulting in injury to personnel or damage to the engine

- (6) Torque workbolts as follows:

- (a) First pair 180 degrees apart.
- (b) Second pair 90 degrees and 270 degrees from first bolt.
- (c) Torque remaining four bolts counterclockwise around flange.

- (7) Remove hydraulic pump, pusher, and aligning pins after No. 3 bearing package is seated.

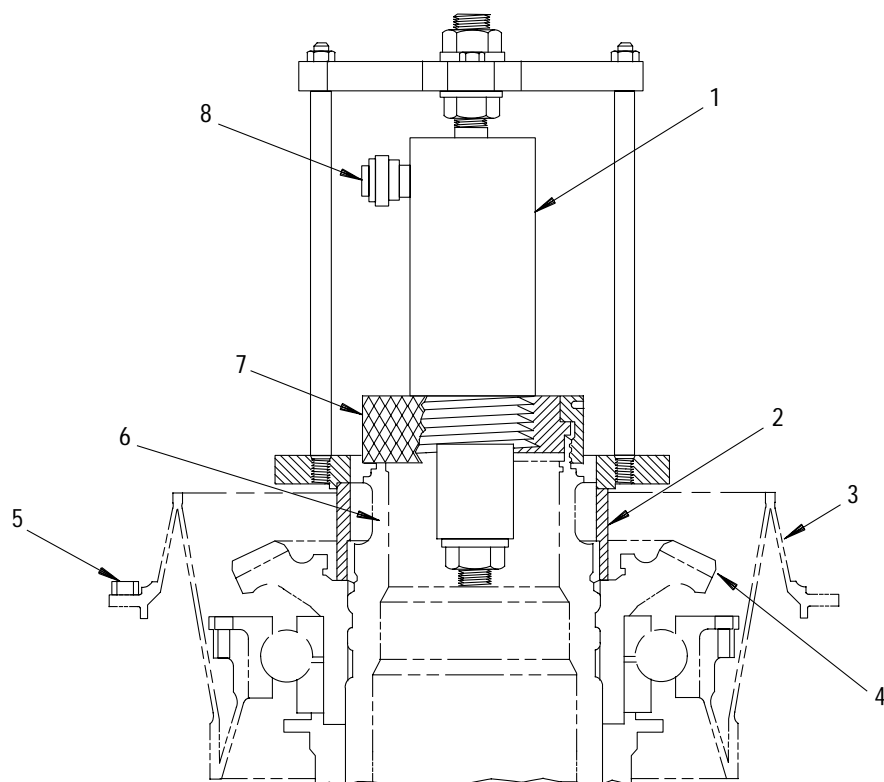
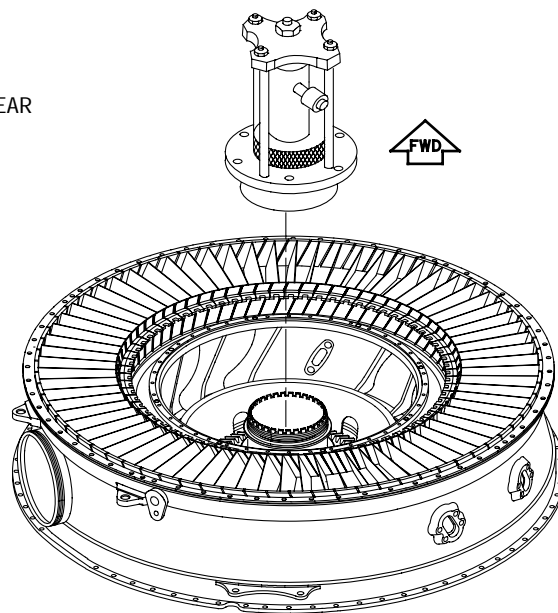
- f. Apply a thin, even coat of PWA 36000-3 sealing compound to five countersunk screws(2, figure 8).

NOTE

Wait ten minutes prior to installing five screws in flange of No. 3 bearing support.

- g. Install screws(2) in chamfered holes in flange of No. 3 bearing support(3). Torque screws 32 to 36 pound-inches.
- h. Check screws(2) to be sure heads are even with flange or below it.
- i. Remove workbolts(5, figure 9).

1. HYDRAULIC CYLINDER
2. RING
3. NO. 3 BEARING SUPPORT
4. GEARBOX DRIVE BEVEL GEAR
5. WORKBOLT
6. SIXTH STAGE HUB
7. NUT
8. CONNECTOR



JG40X3 (51X2)

Figure 9. No. 3 Bearing Package - Seating Using PWA 53875 Pusher

**9. NO. 3 BEARING RETAINING NUT -
INSTALLATION.**

(See Figures 10 and 11.)

- a. Install No. 3 bearing lock(4, figure 10) with tabs of lock in slots of gearbox drive bevel gear(6).
- b. Install No. 3 bearing retaining nut(3) on 6th stage hub(5) with wrench slots down.

NOTE

- PWA 50628 wrench used with PWA 56688 adapter and PWA 57806 adapter assembly can only be used with PWA 50308 hydraulic wrench.
 - PWA 56688 adapter and PWA 56586 torque adapter can be used with either PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier.
 - PWA 57806 wrench adapter is only needed when PWA 56586 torque adapter is used.
 - A nylon strap may be used to handle PWA 50308 hydraulic wrench.
 - SWE 81001/81002 sling may be used to handle SWE 8100/8200 torque multiplier.
- bl. Place PWA 56688 adapter onto hub and rotate until adapter engages hub. Fully thread retaining ring of adapter onto hub then back off one quarter turn from bottom.
 - c. Install PWA 50628 wrench, PWA 57806 adapter assembly, and PWA 50308 wrench;
or,
Assemble PWA 57806 adapter and wrench adapter and secure with set screws. Install PWA 56586 torque adapter, PWA 57806 adapter and wrench adapter, and PWA 50308 wrench or SWE 8100/8200 torque multiplier. Attach ratchet adapter and work handle if SWE 8100/8200 torque multiplier is used. See figure 11.
 - d. Set hydraulic wrench or torque multiplier to actuate splines in counterclockwise direction. Body of wrench will move clockwise to tighten nut while splines at center of wrench remain stationary. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
 - e. Operate hydraulic wrench or torque multiplier to tighten nut until first indication of pressure buildup in wrench or increased resistance in torque multiplier.
 - f. Loosen PWA 56688 adapter thumbscrews from against 2nd stage turbine disk so that No. 3 bearing supports full weight of rear compressor rotor.
 - g. Torque No. 3 bearing retaining nut as follows:
 - (1) Set hydraulic wrench or torque multiplier to actuate splines in counterclockwise direction.
 - (2) Actuate hydraulic wrench or torque multiplier to torque nut 5900 to 6100 pound-inches.



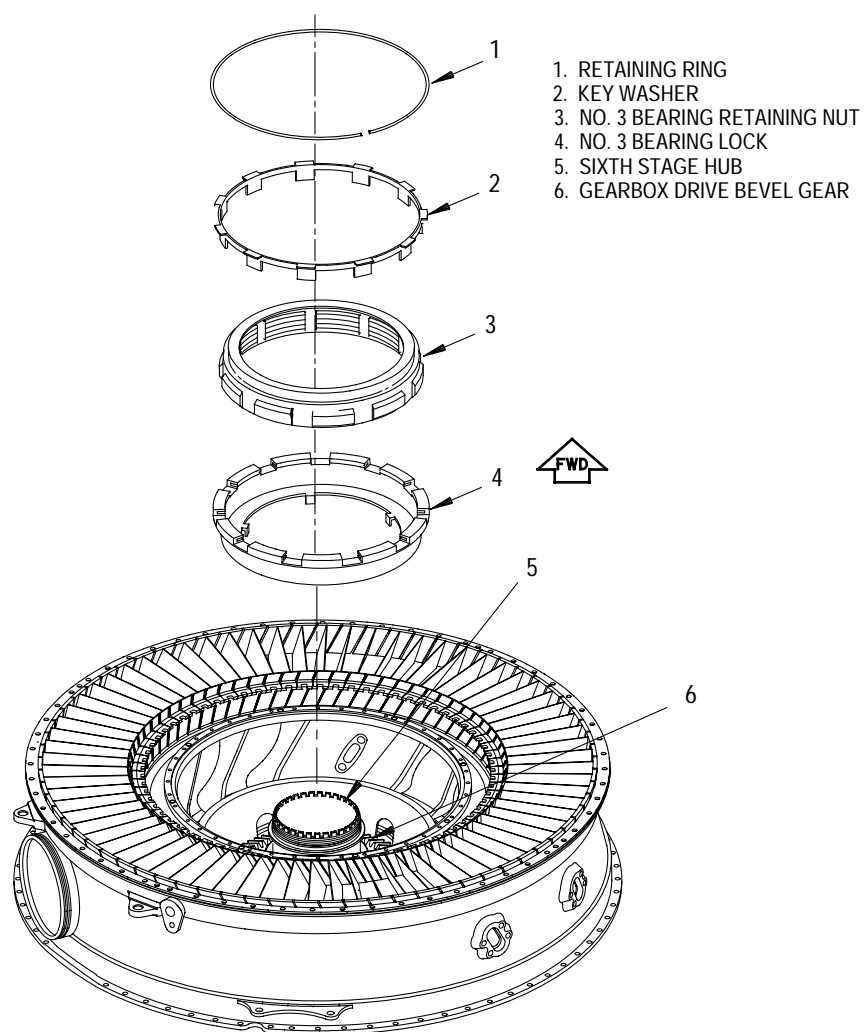
Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut causing damage to engine components.

- (3) Loosen nut to zero torque.
- (4) Actuate hydraulic wrench or torque multiplier to torque nut 5900 to 6100 pound-inches.
- (5) Align zero degree mark on outer scale of hydraulic wrench or SWE 8100/8200 torque multiplier with zero degree mark on scale around splines. Lock scale in position with thumbscrew.
- (6) Loosen nut to zero torque.
- (7) Actuate hydraulic wrench or torque multiplier to torque nut 5900 to 6100 pound-inches.
- (8) Check zero degree marks on scales of PWA 50308 hydraulic wrench or SWE 8100/8200 torque multiplier.
- (9) If marks are aligned, or mark on outer scale is beyond mark on inner scale within two degrees maximum, proceed to step (11).
- (10) If marks are not aligned, repeat steps (5) through (9).

- (11) Loosen nut to zero torque.
- (12) Actuate hydraulic wrench or torque multiplier to torque nut 1500 to 1700 pound-inches.
- (13) Further tighten nut by turning it through an angle of 15°30' minimum to 16°30' maximum.

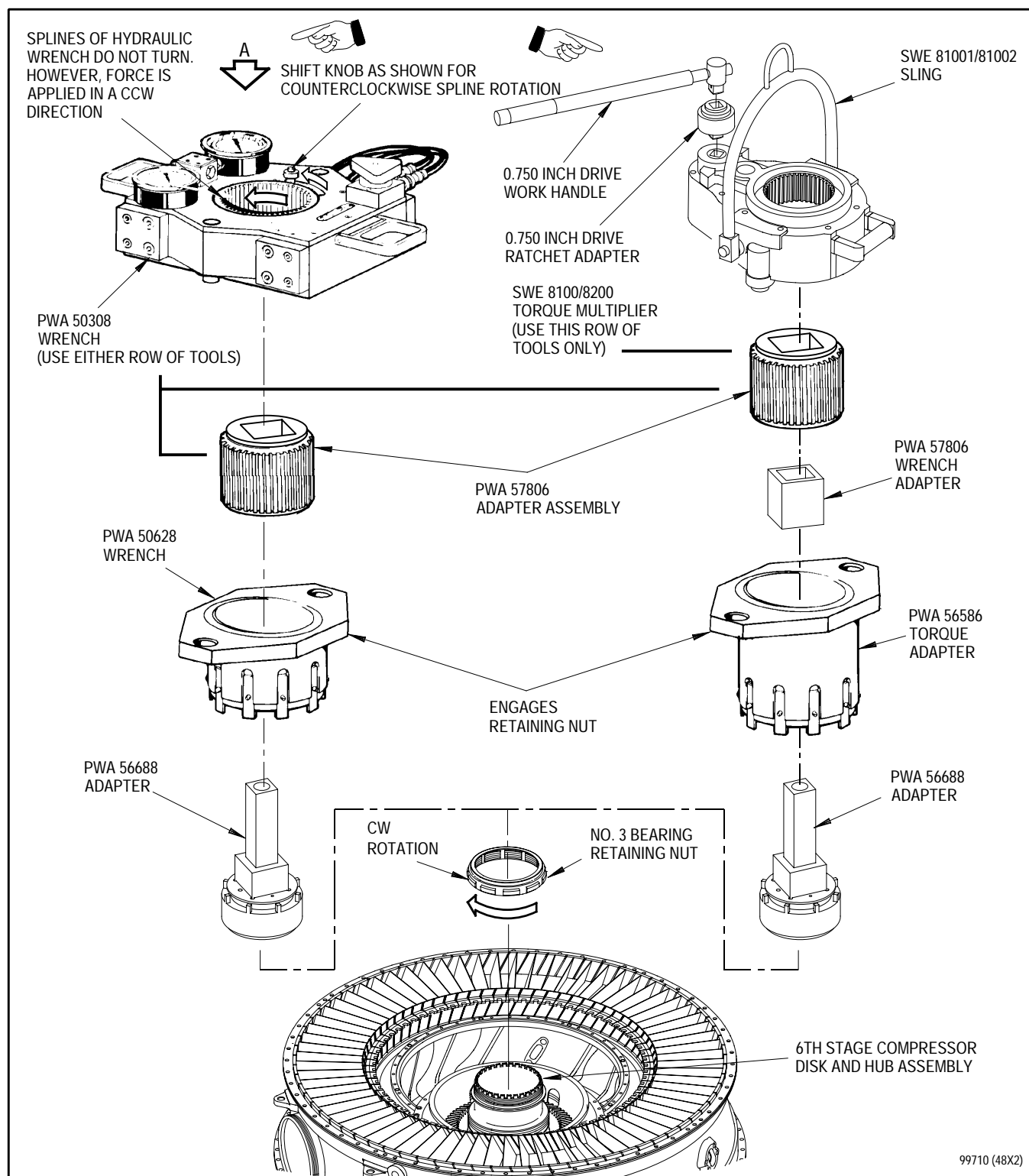
NOTE

- A nylon strap may be used to handle PWA 50308 wrench.
 - SWE 81001/81002 sling may be used to handle SWE 8100/8200 torque multiplier.
- (14) Remove tooling and try to install key washer(2, figure 10). If key washer tabs do not line up, install tooling and torque nut so next slot lines up.
 - (15) Install key washer(2).
 - (16) Install retaining ring(1) in groove of No. 3 bearing lock(4).



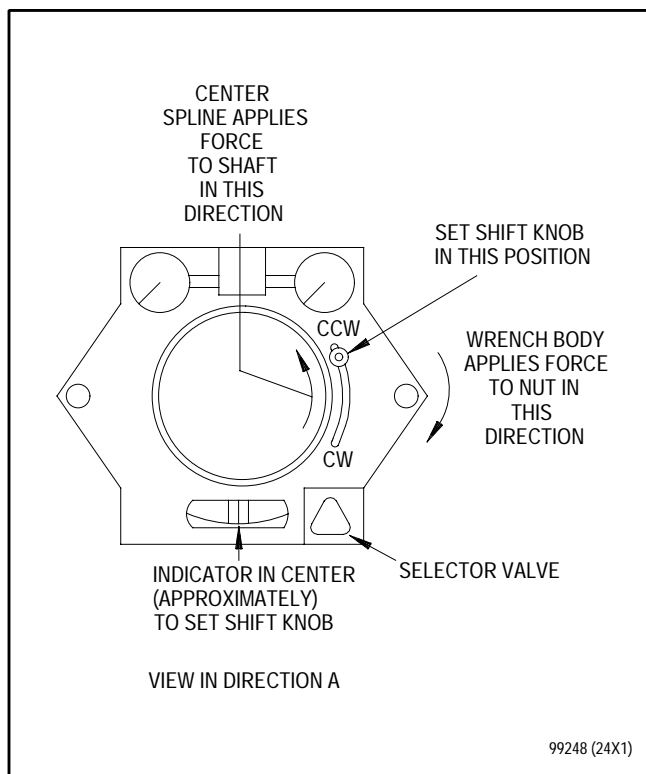
JG72X1 (37X2)

Figure 10. No. 3 Bearing Retaining Nut - Installation



99710 (48X2)

Figure 11. No. 3 Bearing Retaining Nut - Installation Tooling (Sheet 1 of 2)



**Figure 11. No. 3 Bearing Retaining Nut -
Installation Tooling (Sheet 2 of 2)**

10. NO. 3 BEARING PACKAGE - SEATING MEASUREMENT AFTER INSTALLATION OF NO. 3 BEARING RETAINING NUT.

(See Figure 12.)

- a. Measure distance from end of sixth stage hub to front face of No. 3 bearing retaining nut. (See figure 12.) Take three measurements equally spaced and record as Dimension H.
- b. Compare Dimension H determined in step a. with Dimension G determined in paragraph 7. Dimension H shall be equal to Dimension G (+0.010, -0.000).
- c. If Dimension H is not within limits, No. 3 bearing package is not properly seated and shall be removed to determine cause.

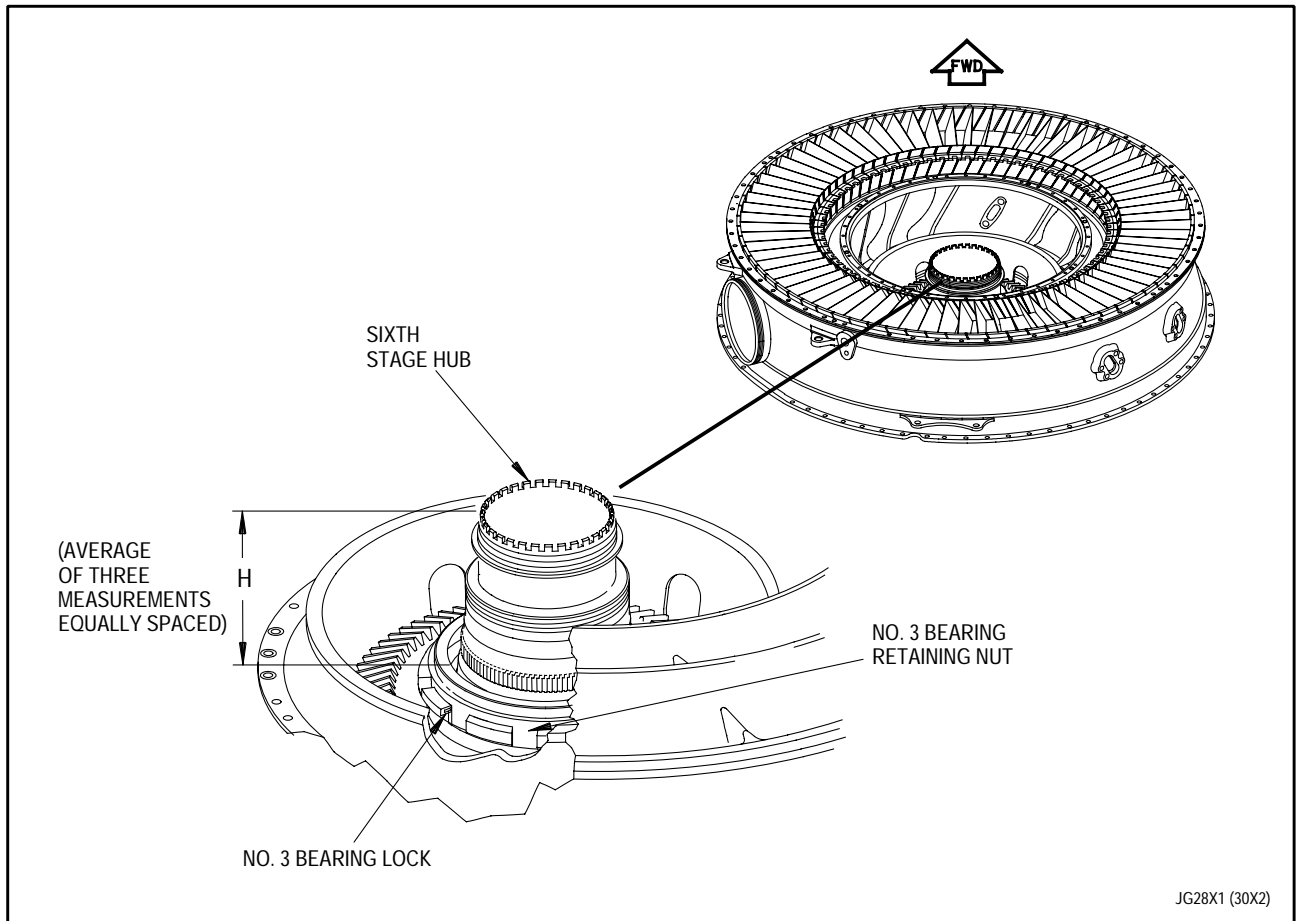


Figure 12. No. 3 Bearing Package - Final Seating Measurement After Installation of No. 3 Bearing Retaining Nut

**11. NO. 3 BEARING FRONT SEAL SEAT -
INSTALLATION.**

(See Figure 13.)

NOTE

If No. 3 bearing front seal seat is used and is being installed with a new or different carbon seal, lap the seat and perform a flatness inspection. Refer to T.O. 2J-F100-53-1, SWP 091 05 and SWP 091 06.

- a. Install No. 3 bearing front seal seat(4, figure 13) on 6th stage hub(5), flat side up, with two antirotation pins in slots in hub.
- b. Apply a light coat of MIL-L-7808 lubricating oil or petrolatum to threads of retaining nut(3). Install nut on 6th stage hub(5).
- c. Install PWA 56677 adapter so it engages slots in 6th stage hub(5). Tighten hex-head cap screw at center so internal ring expands. This will keep adapter centered.
- d. Install PWA 53858 wrench over adapter and engage slots in retaining nut(3).
- e. Install standard tools on adapter and wrench. Hold wrench flats on PWA 56677 adapter to prevent rear compressor rotor assembly from turning.
- f. Torque retaining nut(3) 1475 to 1525 pound-inches.
- g. Remove tooling.
- h. Install key washer(2)
- i. If tabs of key washer(2) do not align with slots in retaining nut(3), tighten retaining nut to align next slot in nut. Do not exceed maximum torque.
- j. Secure key washer(2) with retaining ring(1).

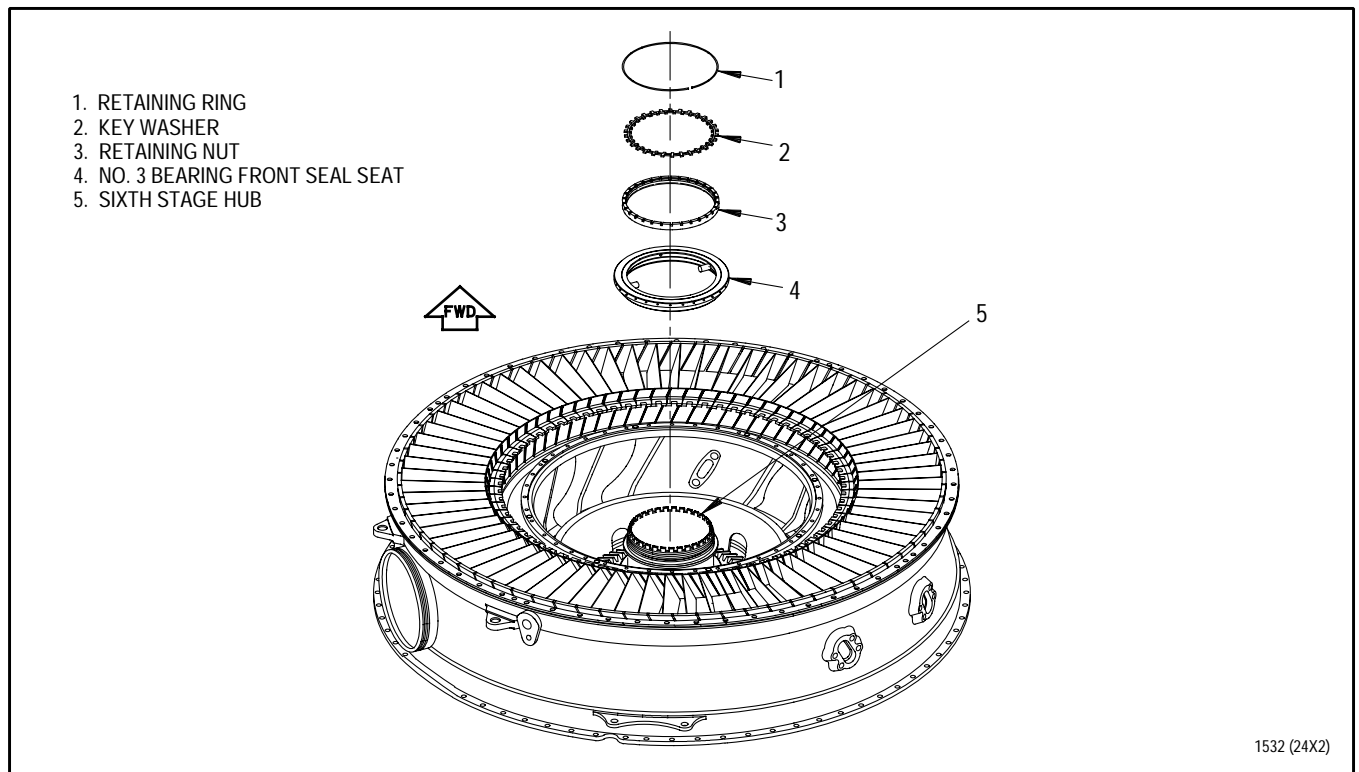


Figure 13. No. 3 Bearing Front Seal Seat - Installation

12. NO. 3 BEARING PACKAGE - PRESSURE LEAK CHECK.

- a. Coat PN ST1000-010 packing with lubricating oil and install on No. 3 bearing oil check valve assembly.
- b. Install oil check valve assembly to No. 3 bearing rear seal support assembly.
- c. Apply a thin coat of PWA 36000-3 compound to threads of two PN MS9894-12 bolts. Wait ten minutes and install them at oil check valve assembly bolt holes.
- d. Torque bolts 32 to 36 pound-inches. Do not lockwire bolts.
- e. Attach a suitable threaded adapter, using PN ST2284-04 conical gasket, to installed oil check valve assembly.
- f. Tighten adapter nut 65 to 75 pound-inches.
- g. Insert hose from nitrogen gas bottle regulator and gage assembly through tower shaft strut and connect to adapter.
- h. Slowly open regulator valve so that pressure flows between 185 to 215 psig nitrogen, for a minimum of 15 seconds.
 - (1) If limits cannot be met, disassemble as required to determine cause of incorrect nitrogen flow.
- (2) Replace parts as required and repeat nitrogen flow check.
- i. Slowly close regulator valve to obtain 0 psig.
- j. Install a suitable plug over small oil weep hole in No. 3 bearing rear support assembly.
- k. Slowly open regulator valve until a pressure reading of 95 to 105 psig nitrogen is obtained. With regulator valve in open position close valve on nitrogen gas bottle.
- l. Monitor pressure gage for a minimum of 30 seconds for a reduction in pressure. A pressure reduction of up to 5 psig is acceptable. If pressure reduction exceeds acceptable limits perform the following:
 - (1) Check adapter nut for correct torque.
 - (2) Inspect plug over small oil weep hole in No. 3 bearing rear seal support assembly for leakage.
 - (3) Disassemble as required and replace parts as necessary and repeat pressure leak check.
- m. Remove all tooling and oil check valve assembly. Discard gasket and packing.

**13. NO. 2 BEARING PACKAGE -
INSTALLATION.**

(See Figure 14.)

NOTE

No. 2 bearing package consists of the following major parts:

- No. 2 bearing housing assembly
 - No. 2 bearing and coupling
 - Gearbox drive bevel gearshaft assembly
 - No. 2 and 3 bearing seal assembly
- a. Ensure there are two workbolts(4, figure 14) securing No. 2 bearing and coupling(5) to No. 2 bearing housing assembly(12).
 - b. Ensure that gearbox driveshaft coupling(15) is installed in gearbox drive bevel gearshaft(14).
 - c. Heat rear flange of No. 2 bearing housing assembly(12) as follows:
 - (1) Place PWA 56324 heater on bench with handles down so that they act as feet for heater.
 - (2) Position rear flange of No. 2 bearing housing assembly(12) on PWA 56324 heater. Ensure thermocouple probe of heater contacts flange of No. 2 bearing housing assembly.
 - (3) Connect power and thermocouple cables of PWA 61685 or PWA 25672 heater control to PWA 56324 heater.
 - (4) Set heater control to 250°F (121°C) and heat rear flange of No. 2 bearing housing assembly(12).
 - d. Install three equally spaced PWA 52353 aligning pins into mating flange in intermediate case(13).
 - e. Remove No. 2 bearing housing assembly from heater.
 - f. Apply PWA 550 antigalling compound to mating surfaces of intermediate case(13) and No. 2 bearing housing assembly(12).
 - g. If necessary, insert PWA 57538 rotator through towershaft opening and engage splines in gearbox driveshaft coupling(15). Rock gear so that No. 2 bearing housing assembly(12) can be seated.

- h. Manually install No. 2 bearing housing assembly(12). Align dowel pin hole at 12 o'clock position with dowel pin in intermediate case(13).
- i. Remove three PWA 52353 aligning pins.
- j. Coat packing(11) with MIL-L-7808 lubricating oil or petrolatum and install on oil check valve assembly(10).

NOTE

For use of ST5001-12 spline head bolts (6 and 9) refer to steps k, k1, l, m, and m1. For use of MS9894-11/MS9894-12 bolts (6A and 9A) refer to steps k, m2, m3, m4, and m5.

- k. Install oil check valve assembly(10) using ST5001-12 (6 and 9) or MS9894-11/MS9894-12 (6A and 9A) bolts.
- k1. Use ST5001-12 spline head bolts (6 and 9) as follows:

NOTE

No sealant permitted under bolthead after assembly.

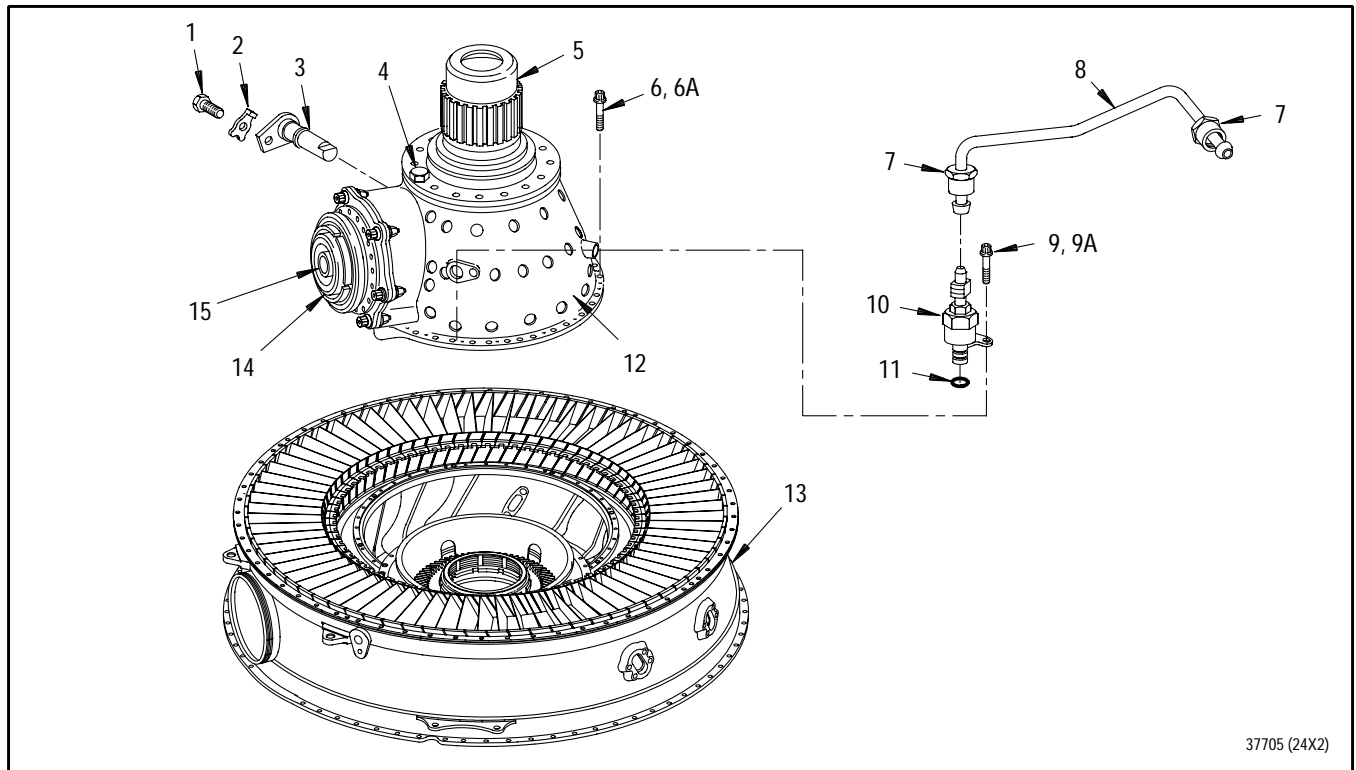
- l. Seat flange and apply a thin even coat of PWA 36000-2 or PWA 36000-3 sealing compound to exterior threads of 31 flange bolts(6) and two flange bolts(9) attaching oil check valve assembly. Apply PWA 36545-3 under bolthead. No antigallant curing required.

NOTE

A spline No. 8 (1/4 inch by 1/4 inch drive) universal socket shall be used. The socket may be locally purchased from Snap-On Tools, PN TESU8, NSN 5120-01-065-8129. The universal socket shall be used at two bottom bolt locations. The remainder shall be removed and replaced with a straight spline socket, PN TES8, NSN 5120-01-023-4214.

- m. Wait 10 minutes then install 31 bolts(6) and two bolts(9). Torque bolts 62 to 67 pound-inches in an alternating 180 degree pattern.
- m1. Repeat step m until proper torque is achieved.
- m2. Use MS9894-11 and MS9894-12 (6A and 9A) bolts as follows:
- m3. Apply a thin, even coat of PWA 36003-2 or -3 sealing compound to threads of 31 flange bolts(6A) and two longer flange bolts(9A). Apply PWA 36545-3 under bolthead. No antigallant curing required.
- m4. Wait 10 minutes then install 31 bolts(6A) and two bolts(9A). Torque bolts 42 to 46 pound-inches in an alternating 180 degree pattern.
- m5. Repeat step m4 until proper torque is achieved.

- n. Lockwire two bolts(9 or 9A) with MS9226-04 lockwire.
- o. Lockwire 31 bolts(6 or 6A) with MS9226-03 lockwire.
- p. Install No. 3 bearing seal support damper pressure tube assembly(8) as follows:
 - (1) Install tube(8) and torque connectors(7) 65 to 75 pound-inches.
 - (2) Lockwire connectors(7) with MS9226-04 lockwire.
- q. Install three No. 2 and 3 bearing oil nozzles(3) as follows:
 - (1) Lubricate bolts(1) with MIL-L-7808 lubricating oil or petrolatum.
 - (2) Install No. 2 and 3 bearing oil nozzles(3) in No. 2 bearing housing assembly(12) and secure with bolts(1) and key washers(2). Torque bolts 23 to 26 pound-inches.
 - (3) Bend tabs of key washers(2).



37705 (24X2)

Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Bolt	MIL-L-7808	23 to 26	-
2.	Key washer	-	-	-
3.	No. 2 and 3 bearing oil nozzle	-	-	-
4.	Workbolt	-	-	-
5.	No. 2 bearing and coupling	-	-	-
6.	Bolt (ST5001-12)	PWA 36000-2 or -3	62 to 67	MS9226-03
6A.	Bolt (MS9894-11)	PWA 36000-3	42 to 46	MS9226-03
7.	Connector	-	65 to 75	MS9226-04
8.	No. 3 bearing seal support damper pressure tube assembly	-	-	-
9.	Bolt (ST5001-12)	PWA 36000-2 or -3	62 to 67	MS9226-04
9A.	Bolt (MS9894-12)	PWA 36000-3	42 to 46	MS9226-04
10.	Oil check valve assembly	-	-	-
11.	Packing	MIL-L-7808	-	-
12.	No. 2 bearing housing assembly	-	-	-
13.	Intermediate case	-	-	-
14.	Gearbox drive bevel gearshaft	-	-	-
15.	Gearbox driveshaft coupling	-	-	-

Figure 14. No. 2 Bearing Package - Installation

**14. GEARBOX DRIVE BEVEL GEARSHAFT AND
GEARBOX DRIVE BEVEL GEAR - BACKLASH
CHECK.**

(See Figure 15.)

a. Install PWA 51154 gage as follows:

- (1) Insert detail-2 tube assembly(8, figure 15) through towershaft opening in intermediate case(11) and engage expander(9) with splines in gearbox driveshaft coupling(10).
- (2) Position detail-5 plate(6) against towershaft opening in intermediate case(11) and secure using four hook bolt assemblies(7).
- (3) Connect force gage(3) to jaw end fitting(2) and detail-7 nut(4) using quick-disconnect pins. Adjust hand knob(1), as required to install pins.

b. Check backlash as follows:

- (1) Turn hand knob(1) clockwise until 20 to 25 pound load is indicated on force gage(3).

- (2) Position flat of detail-26 arm(5) against pin of dial indicator(12) ensuring dial pin is free and not jammed into dial indicator case.
- (3) Zero dial indicator(12).
- (4) Rock detail-26 arm(5) back and forth and record backlash reading.
- (5) Backlash shall be 0.058 inch minimum to 0.081 inch maximum.
 - (a) If backlash is not within limits, remove and replace gearbox drive bevel gearshaft.
 - (b) Check backlash per steps a. and b.
 - (c) If backlash is still unacceptable, reject core engine module.
- (6) Remove PWA 51154 gage.

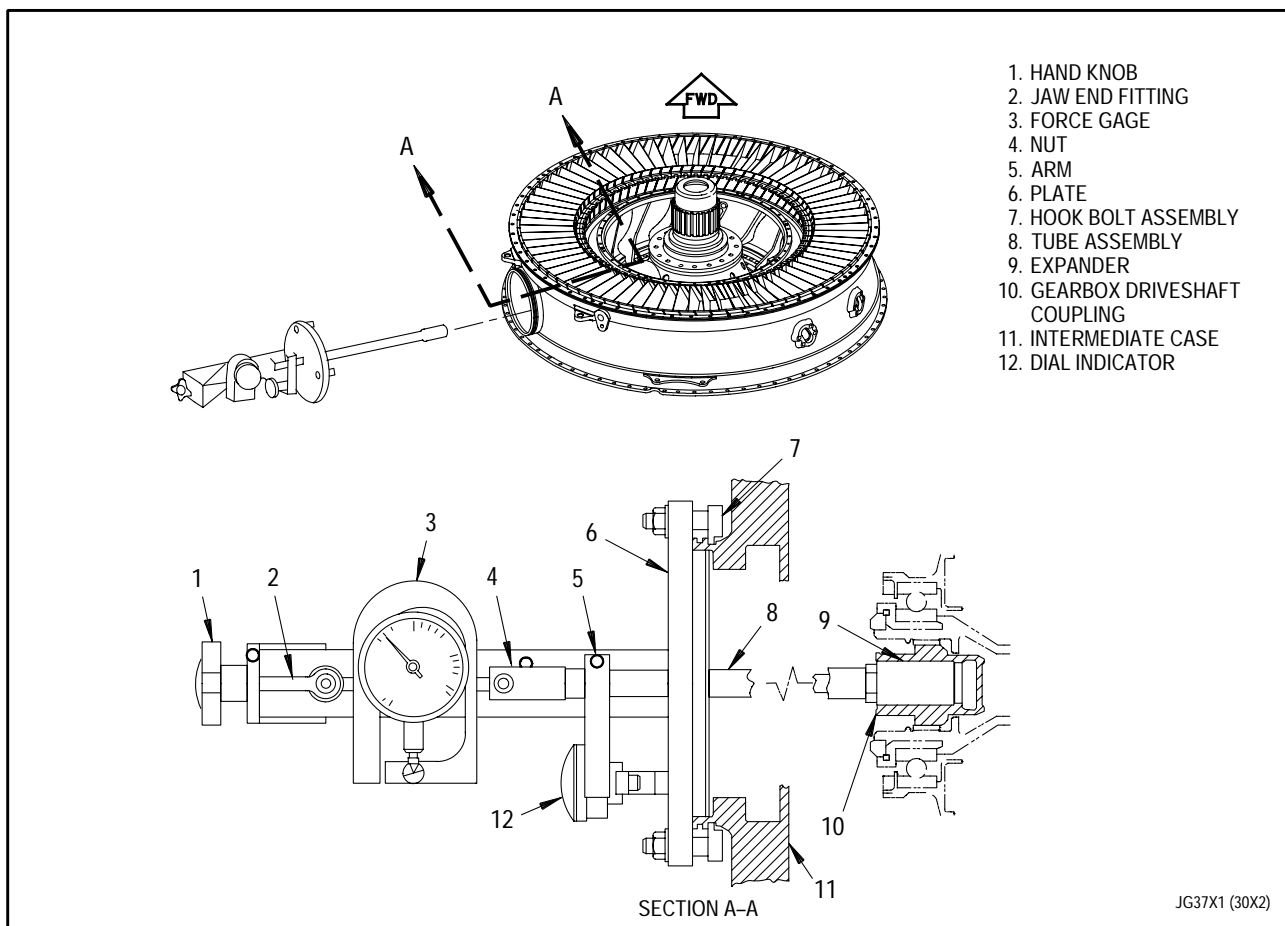


Figure 15. Gearbox Drive Bevel Gearshaft and Gearbox Drive Bevel Gear - Backlash Check Using PWA 51154 Gage

15. NO. 2 AND 3 BEARING INNER OIL PRESSURE TUBES - INSTALLATION.

(See Figure 16.)

- a. Coat four packings(6, figure 16) with PWA 36500 assembly fluid No. 1 (preferred) or MIL-L-7808 lubricating oil and install on two adapters(7).
- b. Install two adapters(7) into ports in No. 2 bearing housing assembly(4).
- c. Install two tubes(5) on adapters(7) with gaskets(2) between tubes and intermediate case(3).
- d. Apply MIL-L-7808 lubricating oil or petrolatum to four bolts(1) and install. Torque bolts 85 to 95 pound-inches above minimum two pound-inch run-on torque.

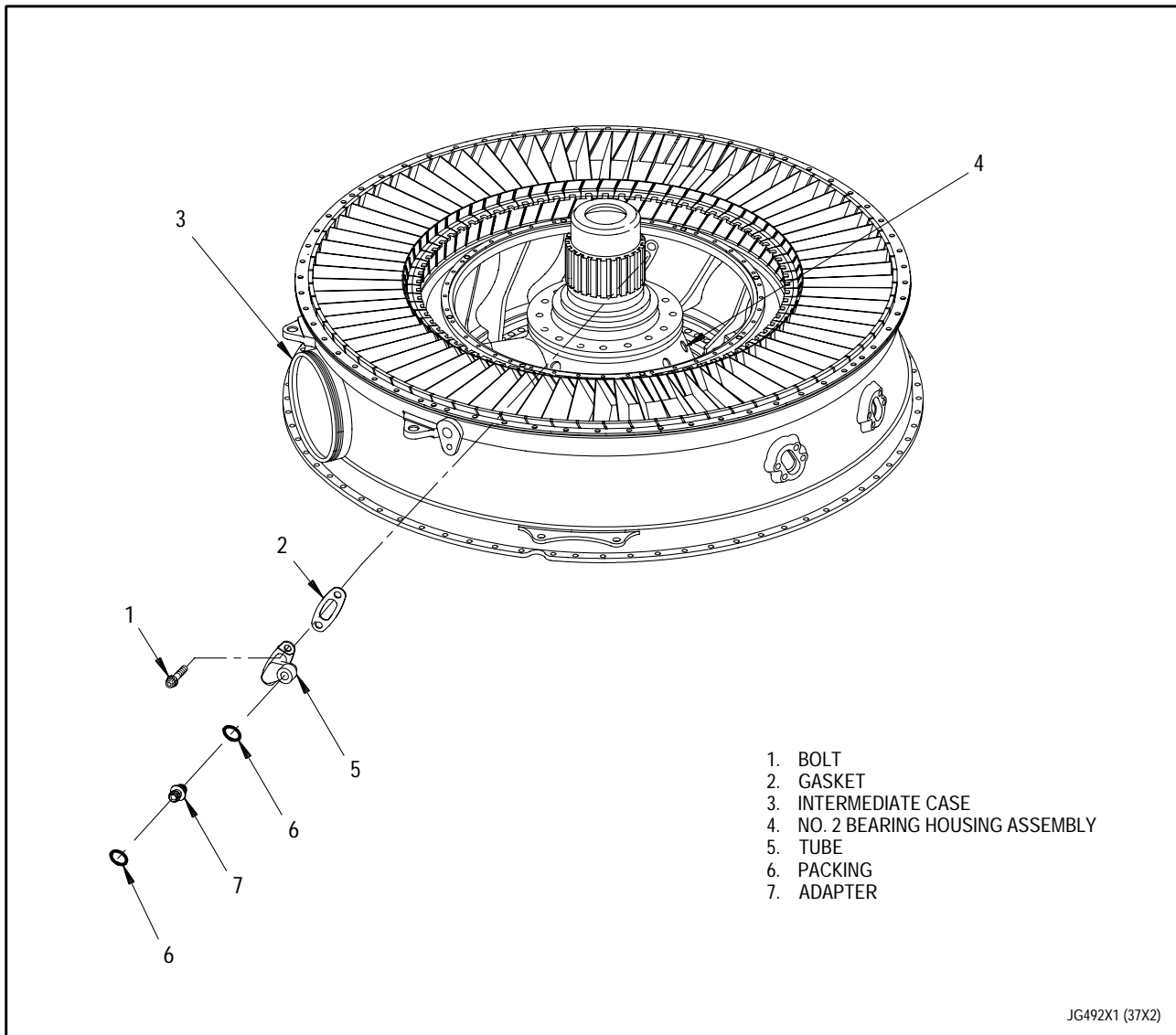
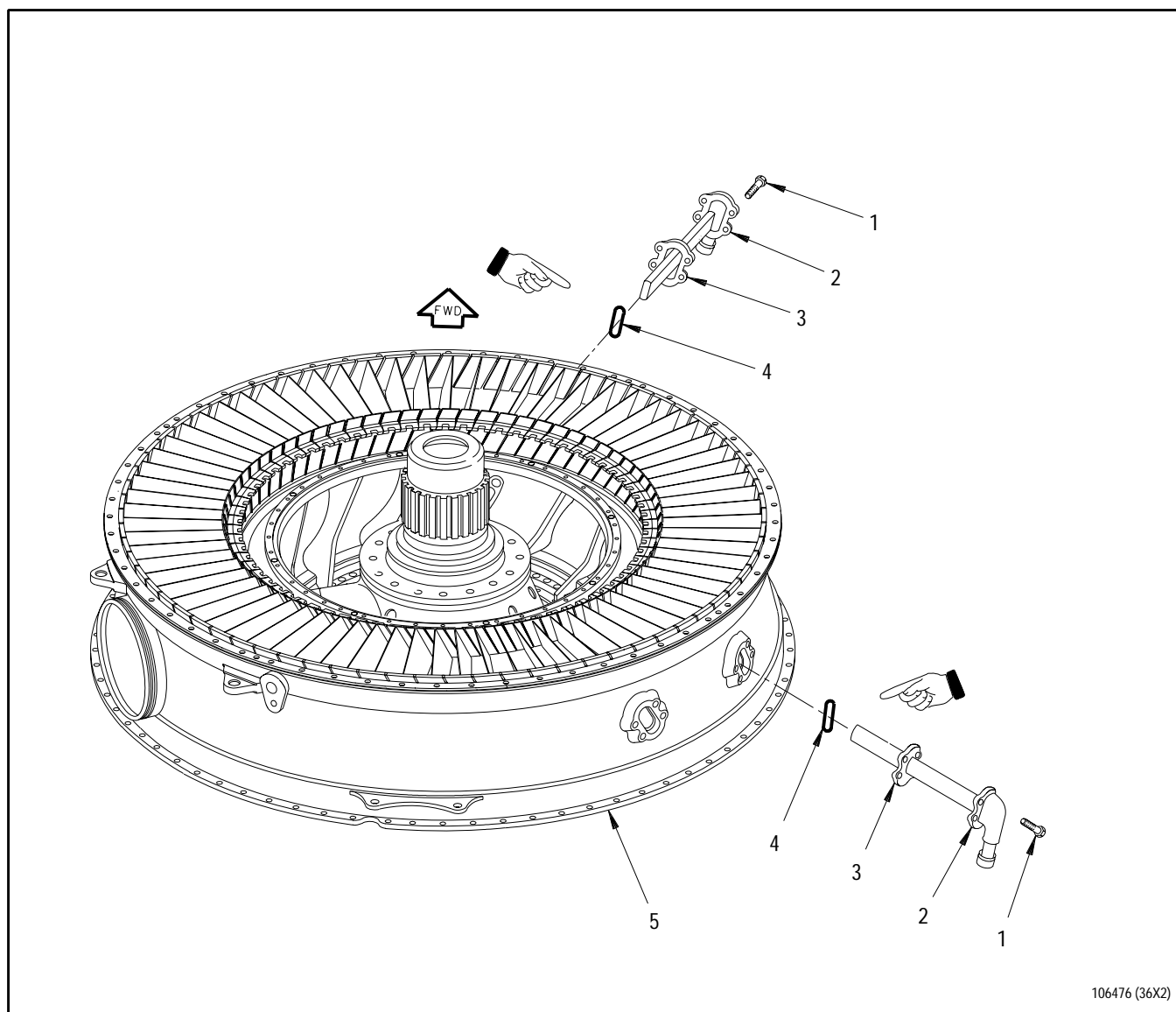


Figure 16. No. 2 and 3 Bearing Inner Oil Pressure Tubes - Installation (Typical Two Places)

16. NO. 2 AND 3 BEARING INTERNAL OIL PRESSURE TUBES - INSTALLATION.

(See Figure 17.)

- a. Coat two packings(4, figure 17) with PWA 36500 assembly fluid No. 1 (preferred) or MIL-L-7808 lubricating oil and install a packing on each oil pressure tube(2).
- b. Install a gasket(3) on each oil pressure tube(2).
- c. Install two oil pressure tubes(2) in intermediate case(5).
- d. Apply MIL-L-7808 lubricating oil or petrolatum to eight bolts(1) and install. Torque bolts 27 to 30 pound-inches above minimum two pound-inch run-on torque.



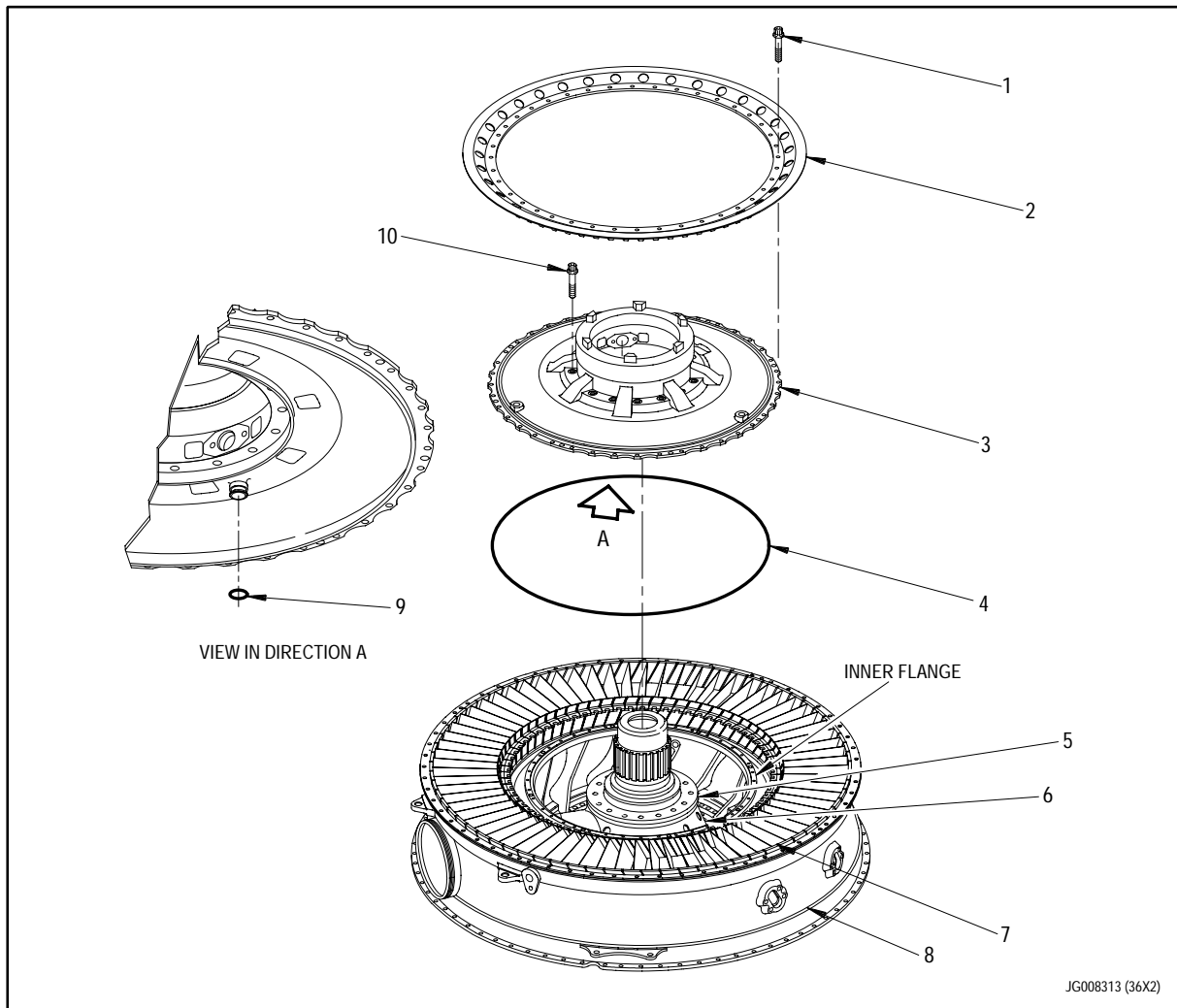
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|----------------------|------------|----------------------|
| 1. Bolt | 3. Gasket | 5. Intermediate case |
| 2. Oil pressure tube | 4. Packing | |

Figure 17. No. 2 and 3 Bearing Internal Oil Pressure Tubes - Installation

17. NO. 2 BEARING SEAL AND SUPPORT ASSEMBLY - INSTALLATION.

(See Figures 18 and 19.)

- a. Remove two workbolts securing No. 2 bearing and coupling(5, figure 18) to No. 2 bearing housing assembly(6).
- b. Flow check oil nozzle in No. 2 bearing seal and support assembly per WP 703 00.
- c. Coat packing(9) with MIL-L-7808 lubricating oil or petrolatum and install on oil boss inside No. 2 bearing seal and support assembly(3).
- d. Install PWA 56325 heater on inner flange of intermediate case(8). Ensure thermocouple probe of heater contacts flange of intermediate case.
- e. Connect power and thermocouple cables of PWA 61685 or PWA 25672 heater control to PWA 56325 heater.
- f. Set heater control to 200°F (93°C) and heat for 20 minutes.
- g. After inner flange of intermediate case(8) has been heated, remove PWA 56325 heater and PWA 61685 or PWA 25672 heater control.
- h. Install two PWA 14383 aligning pins in inner flange of intermediate case(8).
- i. Install two PWA 50611 aligning pins in threaded holes in No. 2 bearing and coupling(5).
- j. Install gasket(4) in groove in inner flange of intermediate case(8).
- k. Install No. 2 bearing seal and support assembly(3), aligning oil boss in support assembly with hole in No. 2 bearing housing assembly(6).
- l. Install third stage compressor stator shroud(2) on No. 2 bearing seal and support assembly(3), aligning lugs of shroud with slots in third stage stator(7) and offset holes at 6 o'clock position.
- m. Coat threads of 20 0.190-32UNJF X 0.625 inch workbolts with PWA 550 antigalling compound. Loosely install workbolts with washers in every other bolthole to secure third stage compressor stator shroud(2) and outer flange of No. 2 bearing seal and support assembly(3), to inner flange of intermediate case(8).



Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Bolt	PWA 36000-2 or -3	42 to 46	MS9226-04
2.	Third stage compressor stator shroud	-	-	-
3.	No. 2 Bearing seal and support assembly	-	-	-
4.	Gasket	-	-	-
5.	No. 2 Bearing and coupling	-	-	-
6.	No. 2 bearing housing assembly	-	-	-
7.	Third stage stator	-	-	-
8.	Intermediate case	-	-	-
9.	Packing	MIL-L-7808	-	-
10.	Bolt	PWA 36000-2 or -3	75 to 85	MS9226-04

Figure 18. No. 2 Bearing Seal and Support Assembly - Installation

- n. Apply a thin even coat of PWA 36000-3 sealing compound to threads of 16 final assembly bolts(10). Wait a minimum of 10 minutes prior to installation.
- o. Remove two PWA 50611 aligning pins from No. 2 bearing and coupling(5).
- p. Install 16 bolts(10) in inner flange of No. 2 bearing seal and support assembly(3).
- q. Torque all work bolts and engine bolts(10) 42 to 46 pound-inches in sequence shown in figure 19, alternating between outer and inner flanges.
- r. Further torque outer flange workbolts and inner flange engine bolts(10) 75 to 85pound-inches in sequence shown in figure 19. Continue to torque outer and inner flange bolts in sequence shown until all bolts maintain 75 to 85 pound-inches torque.
- s. Coat threads of 40 final assembly bolts(1, figure 18) with PWA 36000-3 sealing compound.
- t. Remove two PWA 14383 aligning pins from inner flange of intermediate case(8).
- u. Install 20 bolts(1) in empty holes. Torque bolts 42 to 46 pound-inches in sequence shown in figure 19. Continue to torque bolts in sequence shown until bolts maintain 42 to 46 pound-inches torque. Remove excess sealing compound.
- . One at a time, replace 20 workbolts and washers with final assembly bolts(1, figure 18) in sequence shown in figure 19. Torque bolts as they are installed 42 to 46 pound-inches. Remove excess sealing compound.
- w. Repeat torque sequence until all outer flange bolts maintain 42 to 46 pound-inches and inner flange bolts maintain 75 to 85 pound-inches.
- x. Lockwire all bolts(1 and 10, figure 18) with MS9226-04 wire.
- y. Flow check per WP 703 00.
- z. Vacuum check per WP 704 00.



JG008314 (30X2)

Figure 19. No. 2 Bearing Seal and Support Assembly Bolts - Torque Sequence

(See Figures 19A and 19B.)

Stator segments are identified with dash number suffixes to base part number.

- a. Select four -01, four -02, three -03, and one -04 stator segments.

Stator segments, damping springs, and shrouds may be assembled using PWA 57910 fixture per step b or PWA 57739 fixture per step c. Use of PWA 57910 fixture is preferred.

- b. Assemble stator segments, damping springs, and shrouds using PWA 57910 fixture as follows:

- (1) Place fixture on suitable workbench.

(2) Install stator segment(10, figure 19A) into fixture as follows:

- (a) Rotate swing arm assembly(1) counterclockwise away from stage(13) using handle assembly(7).
- (b) Raise double cam lever(11) and slide clamp strap(12) outward from stage(13). Release toggle clamp(14).
- (c) Slide stator segment(10) clockwise onto stage(13) engaging center hook on outside of segment under lip of trap(16). Align segment antirotation lugs with end stop assemblies(15). Align segment flange on step of stage(13).
- (d) Engage toggle clamp(14). Slide clamp strap(12) inward over segment flange and secure by lowering double cam lever(11).

NOTE

Pusher assemblies(2, 5, and 6) are marked 10TH, 11TH, and 12TH respectively.

- (3) Position 10th stage pusher assembly(2) as follows:

NOTE

Ball lock pin is used to lock applicable pusher assembly in proper position for shroud installation.

- (a) Remove ball lock pin(4) if not already installed in 10th stage pusher assembly.

- (b) Loosen 10th stage knob assembly(3). Slide pusher assembly clockwise on swing arm assembly until ball lock pin can be inserted through hole in pusher assembly to engage hole in plate on swing arm assembly. Tighten knob assembly to secure pusher assembly.



Failure to reposition unused pusher assemblies will cause damage to hardware during shroud installation.

- (c) Loosen knob assemblies(3) on 11th and 12th stage pusher assemblies. Slide pusher assemblies counterclockwise on swing arm assembly and tighten knob assemblies to secure.

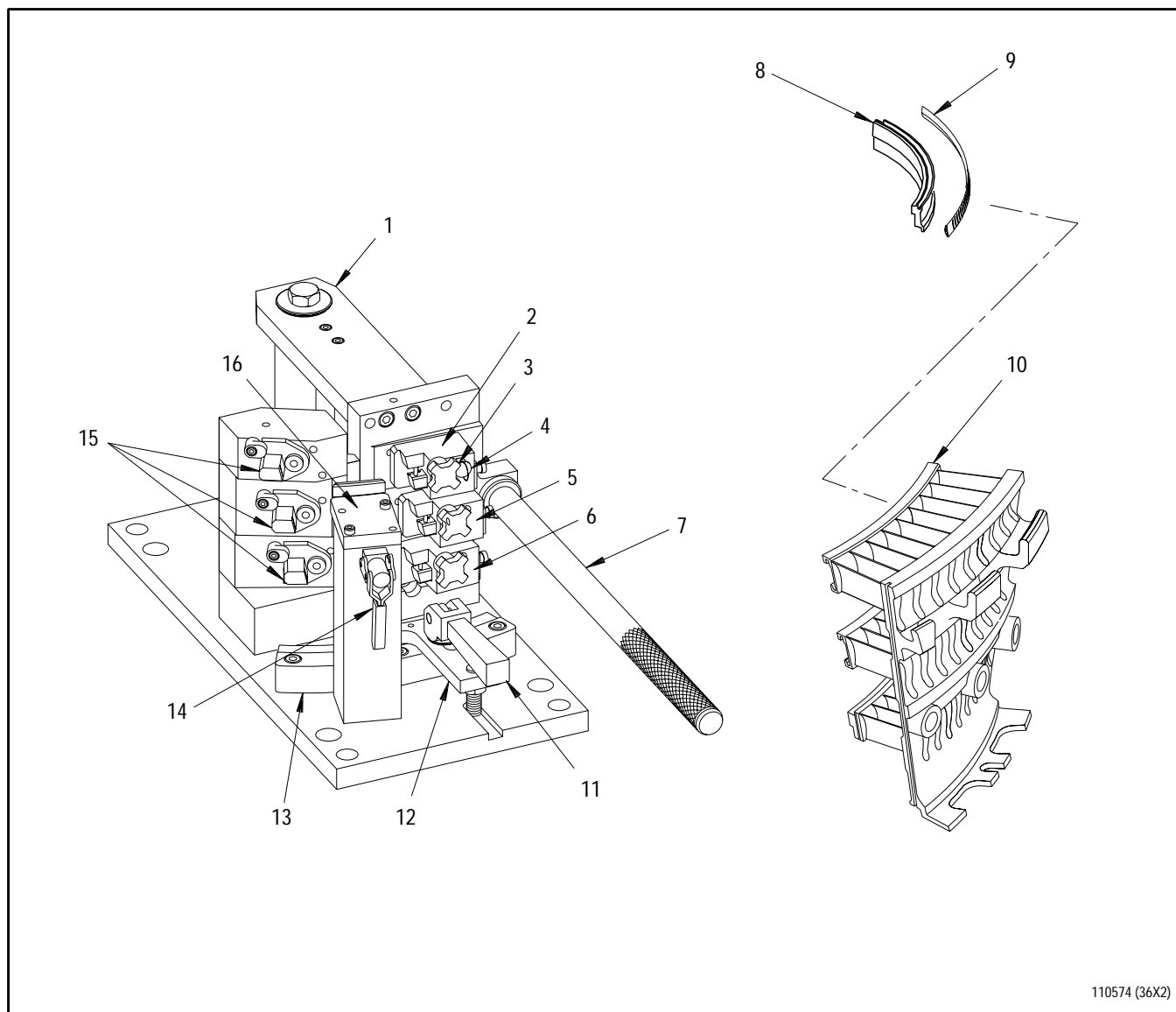
WARNING

Leather gloves should be worn when handling shrouds to avoid injury.



Use of new damping springs is required.

- (4) Apply NSN 9150-00-905-1387 (Aero Kroil) or MIL-L-7808 lubricating oil to mating surfaces of stator segment, new 10th stage damping spring(9) and 10th stage shroud(8).
- (5) Install damping spring into groove of stator segment. Manually install shroud part way into groove of stator segment.



110574 (36X2)

- | | |
|--------------------------------|--------------------------------------|
| 1. Swing arm assembly | 9. Damping spring (typical 3 stages) |
| 2. Pusher assembly, 10th stage | 10. Stator segment |
| 3. Knob assembly (3 places) | 11. Double cam lever |
| 4. Ball lock pin | 12. Clamp strap |
| 5. Pusher assembly, 11th stage | 13. Stage |
| 6. Pusher assembly, 12th stage | 14. Toggle clamp |
| 7. Handle assembly | 15. End stop assemblies |
| 8. Shroud (typical 3 stages) | 16. Trap |

Figure 19A. Tenth Through Twelfth Stage Stator Segments - Assembly Using PWA 57910 Fixture

CAUTION

Use of excessive force can cause damage to hardware if shroud binds during installation.

- (6) Align swing arm assembly(1) so that pusher assembly(2) contacts end of shroud. Slowly push swing arm assembly clockwise to push shroud into place until it is flush with lug end of stator segment. If shroud binds during installation, carefully and lightly tap shroud off with nonmetallic drift and mallet and repeat installation procedure.
- (7) Repeat steps (3) through (6) for 11th and 12 stages using applicable pusher assemblies(5 or 6).
- (8) Release double cam lever(11) and slide clamp strap(12) outward. Release toggle clamp(14). Remove stator segment, damping spring and shroud assembly from fixture.
- (9) Repeat steps (2) through (8) for remaining 10th through 12th stage stator segments.

c. Assemble stator segments, damping springs, and shrouds using PWA 57739 fixture as follows:

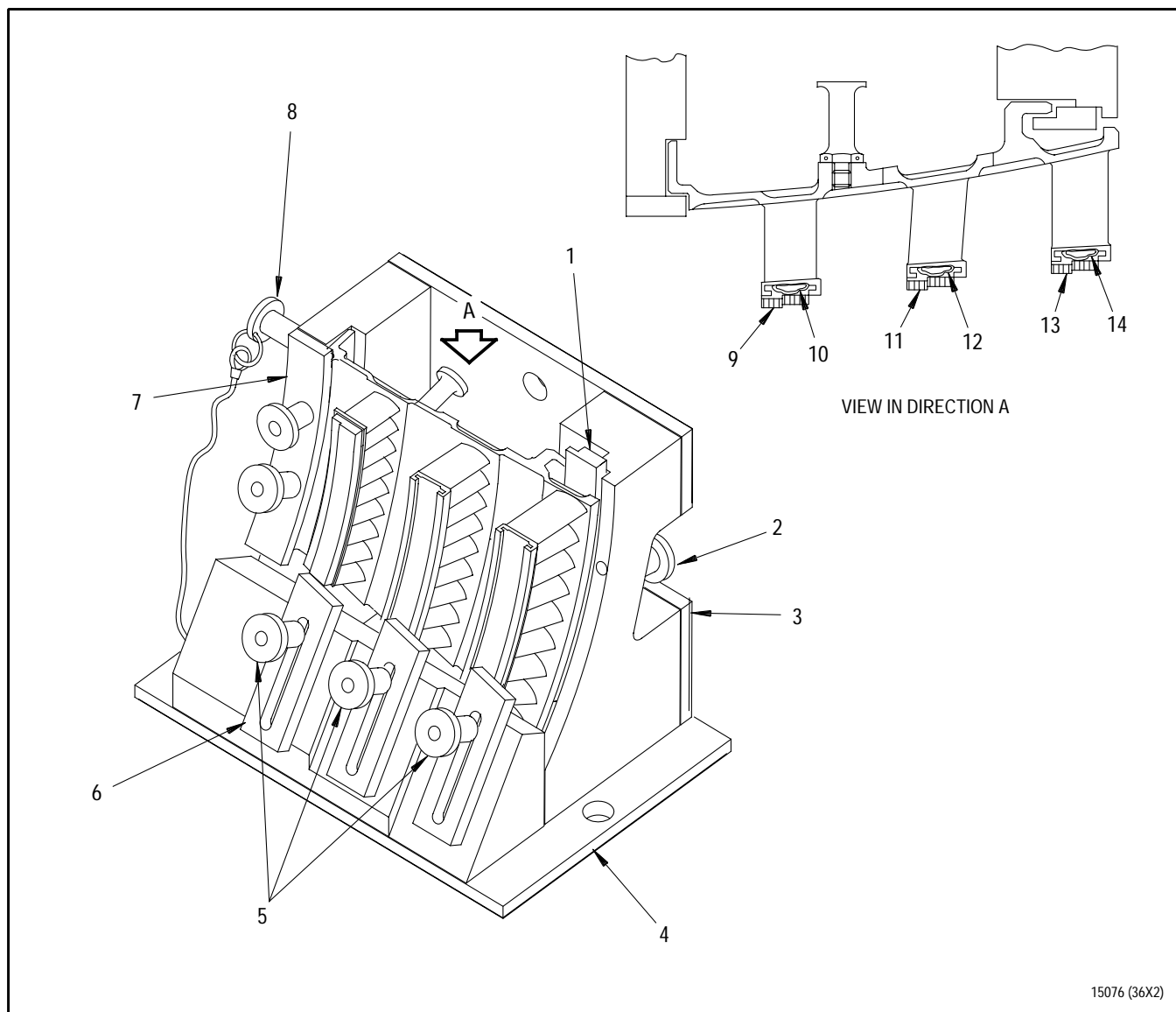
- (1) Install stator segment into PWA 57739 fixture as follows:
 - (a) Place fixture on flat work surface with detail-1 base(4, figure 19B) down.
 - (b) Loosen three detail-14 knobs(5) and detail-15 clamps(6)
 - (c) Loosen three detail-12 knobs(2) and rotate stator segment under detail-5(1) and -6 clamps(7).
 - (d) Insert detail-18 pin(8) into stop in aft flange of stator segment.
 - (e) Handtighten detail-12 knobs(2).
 - (f) Load detail-15 clamps(6) against the last vane ID shroud. Secure with detail-14 knobs(5).

WARNING

Leather gloves should be worn when handling shrouds to avoid injury.

CAUTION

- If shroud binds during installation, force shall not be used. Lightly tap shroud back off and begin installation again. Excessive force can cause damage to engine hardware.
- Avoid contact between drift and honeycomb portion of shroud. Contact can cause damage to engine hardware.
- Use of new damping springs is required.
 - (2) Slide new 10th stage damping spring(14) into slot in stator segment.
 - (3) Apply NSN 9150-00-905-1387 (Aero Kroil) or MIL-L-7808 lubricating oil to mating surfaces of 10th stage shroud and stator segment.



1. Detail-5 clamp
2. Detail-12 knurl knob
3. Detail-13 plate
4. Detail-1 base
5. Detail-14 knurl knob
6. Detail-15 clamp
7. Detail-6 clamp
8. Quick release pin
9. 12th stage shroud
10. 12th stage damping spring
11. 11th stage shroud
12. 11th stage damping spring
13. 10th stage shroud
14. 10th stage damping spring

Figure 19B. Tenth Through Twelfth Stage Stator Segments - Assembly Using PWA 57739 Fixture

- (4) Using leather gloves, slide 10th stage shroud into slot in stator segment by pressing down on shroud to compress damping spring then sliding shroud around stator and into position. If shroud cannot be installed, tap shroud lightly with nonmetallic drift and hammer until shroud can be installed by hand.
- (5) Repeat steps (2) through (4) for installation of 11th and 12th stage shrouds.
- (6) Remove assembled stator segment from fixture. Assemble remaining stator segments per steps (1) through (5).

**18. TENTH THROUGH TWELFTH STAGE
STATOR SEGMENTS - INSTALLATION.**

(See Figures 20 through 24 and Figure 20A.)

- a. Remove two detail-28 posts from PWA 57722 stand.
- b. Deleted.

c. Install typical PN 4077920 tenth through twelfth stage stator segments (with damper, shroud and stator segment having same circumferential length) as follows:

- (1) Lubricate bolts(2, figure 20) with MIL-L-7808 oil.

NOTE

- Tenth through twelfth stage stator segments are identified by PN suffix -01 through -04 and require installation in specific locations. (See figure 20A.)
- Compressor stator support outer flange clocking feature (hole or pin) is just left of bottom center when viewed from front to rear. Clocking pin was installed in stator support when originally delivered but may have been removed during prior maintenance.
 - (2) Install a -01 stator segment(1, figure 20) in first position counterclockwise from clocking feature (hole or pin) on compressor stator support(5).
 - (3) Secure stator segment with bolts(2), tighten until snug. Ensure shoulder of bolt lines up with nutplate hole in support ring.



Use of new seals between stator segments is required.

NOTE

- On first stator segment, install seal only in most counterclockwise slot. Seal for slot near clocking feature (hole or pin) will be installed last.
 - Seal ends are angled and seals shall be installed so that seal ends are parallel to stator forward surface.
- (4) Install new seal(4) into slot of stator segment.
- (5) Install remaining segments and new seals, one at a time, proceeding in a counterclockwise direction, and locating segment dash numbers per figure 20A. Secure stator segments with bolts(2, figure 20). Tighten bolts until snug.
- (6) Install last new seal, at split line near clocking feature (hole or pin), by sliding it axially into stator slot.
- c1. Verify run-on torque of 3.5 to 30 pound-inches before torquing bolts(2). Replace bolts not meeting this limit.
- d. Torque bolts(2) as follows:
- (1) If silver plated nutplates are used on compressor stator support, torque 75 to 85 pound-inches.
 - (2) If non silver plated nut plates are used, torque 54 to 60 pound-inches.
- e. Use 0.001 inch feeler gage to ensure bolts(2) are seated on 10th through 12th stage stators.
- f. Remove PWA 57722 build stand, detail ball lock pins(3, figure 22) and lower detail-25 bracket assemblies(9) to next lower position and secure with detail ball lock pins.
- g. Apply PWA 36545 antigalling compound to bolts(7).

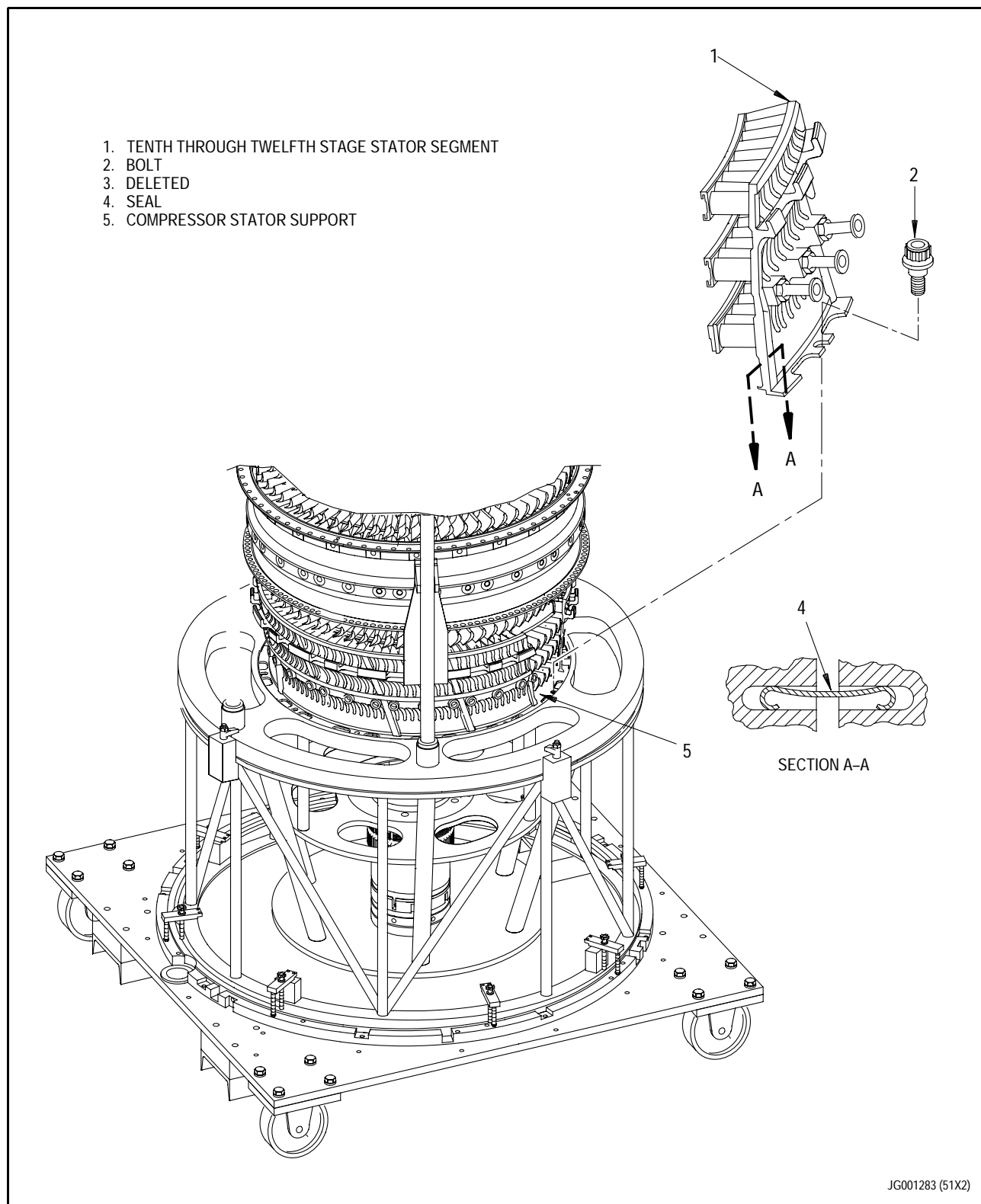


Figure 20. Tenth Through Twelfth Stage Stator Segments - Installation

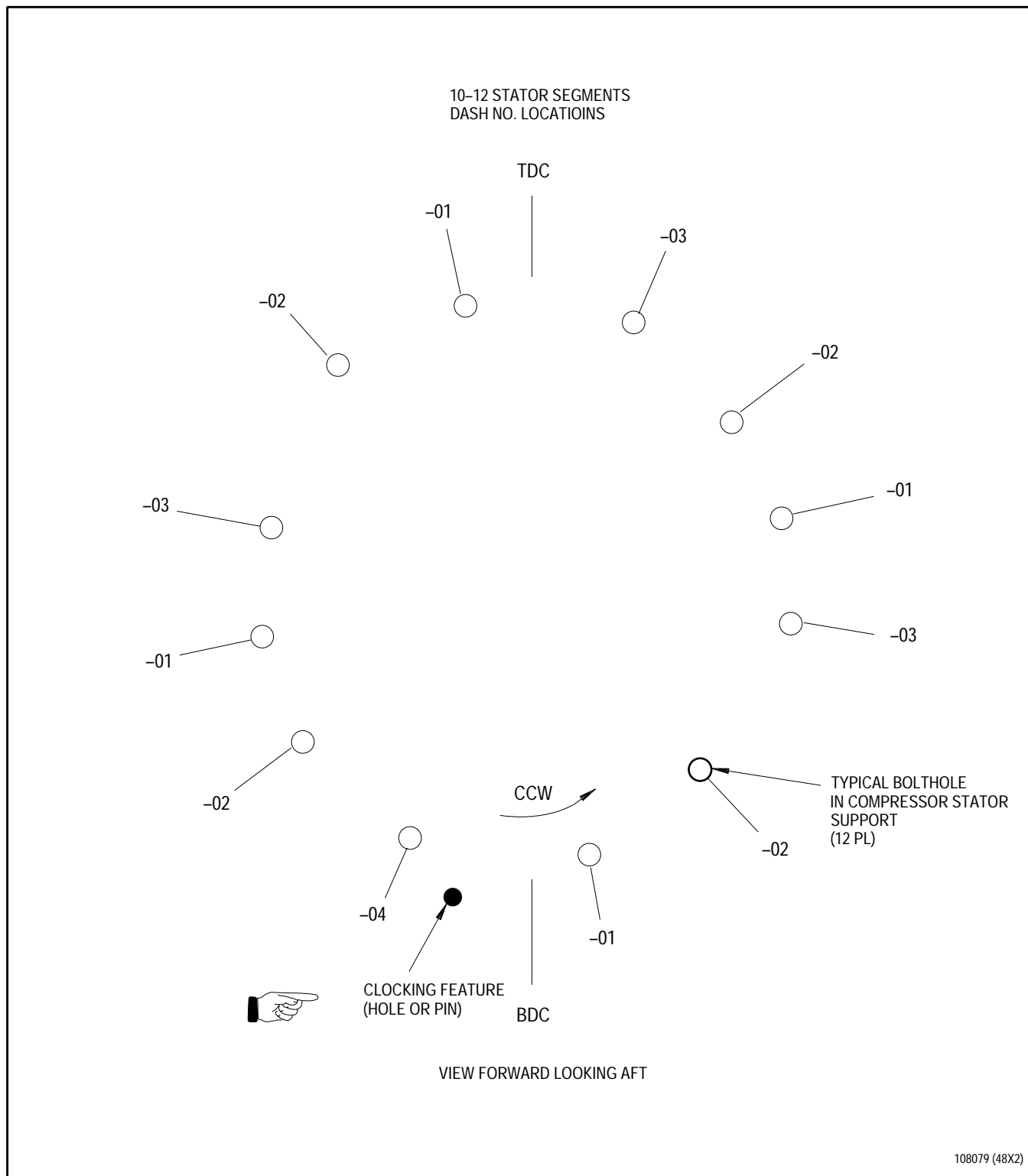


Figure 20A. Typical PN 4077920 10th Through 12th Stator Dash Number Locations

Figure 21. Deleted.

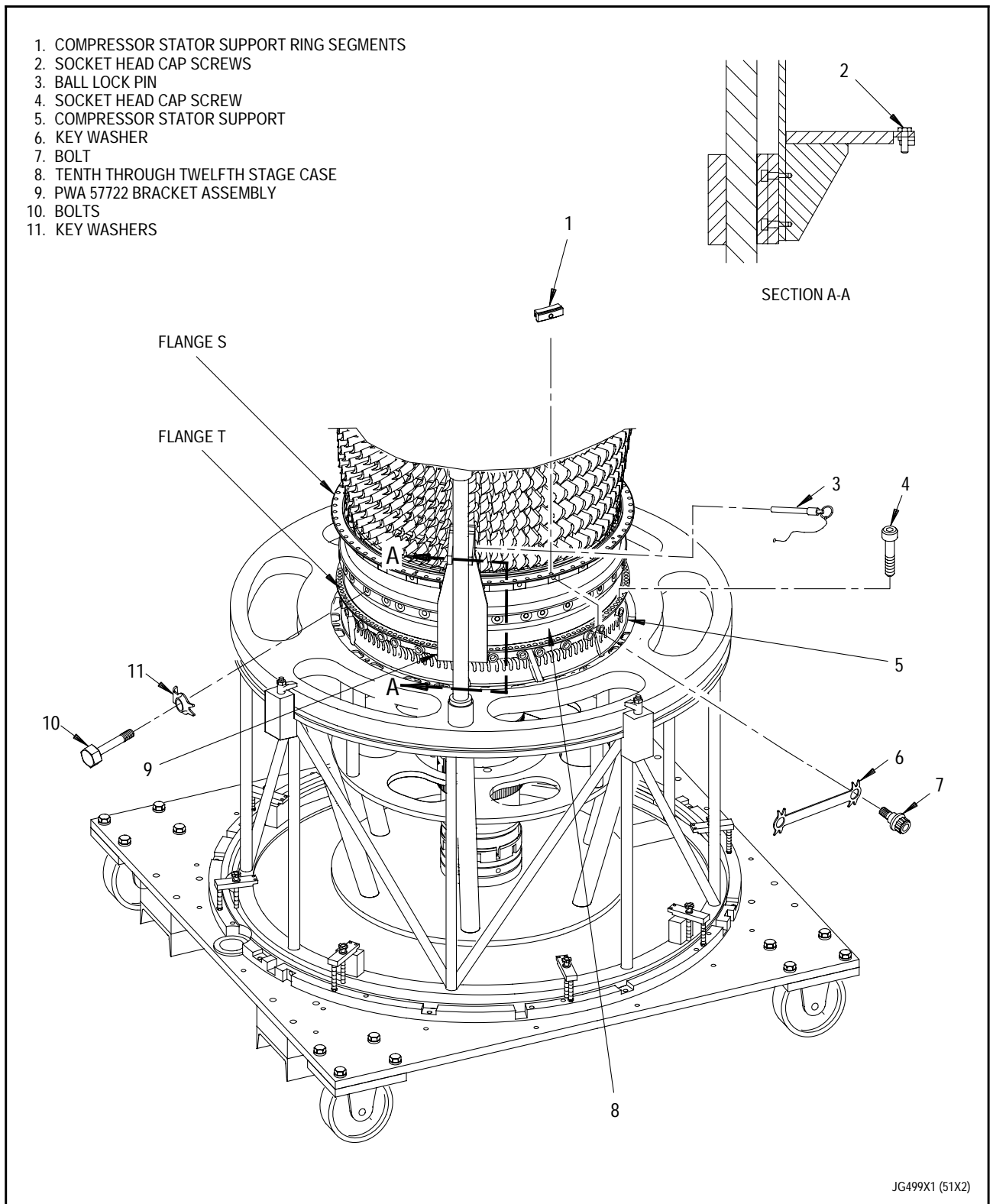


Figure 22. Tenth Through Twelfth Stage Case - Installation

NOTE

Twelve of the twenty-four compressor stator support ring segments have antirotation features and are installed in an alternating pattern relative to the dowel pin located in Flange S of tenth through twelfth stage case. (See figure 23.)

- h. Install a compressor stator support ring segment(1, figure 22) with antirotating feature (short segment) immediately clockwise of dowel pin on Flange S of tenth through twelfth stage case(8). Secure with keywasher(6) and bolt(7) fingertight.
- i. Install remaining compressor stator support ring segments(1) in alternating pattern. Secure with keywashers(6) and bolts(7) fingertight.
- j. Remove PWA 57722 build stand, detail ball lock pins(3) and lower tenth through twelfth stage case(8). Align Flange T clocking pin hole with clocking pin in compressor stator support(5) while engaging compressor stator support ring segments(1) with lip on tenth through twelfth stage stator segments.
- k. Seat Flange T of tenth through twelfth stage case(8) by installing and tightening 12 PWA 57722 build stand, detail socket head cap screws(4).
- l. Verify borescope boss on tenth through twelfth stage case(8) aligns with borescope port in tenth through twelfth stage stator segment.
- m. Apply PWA 36545 antigalling compound to bolts(10).

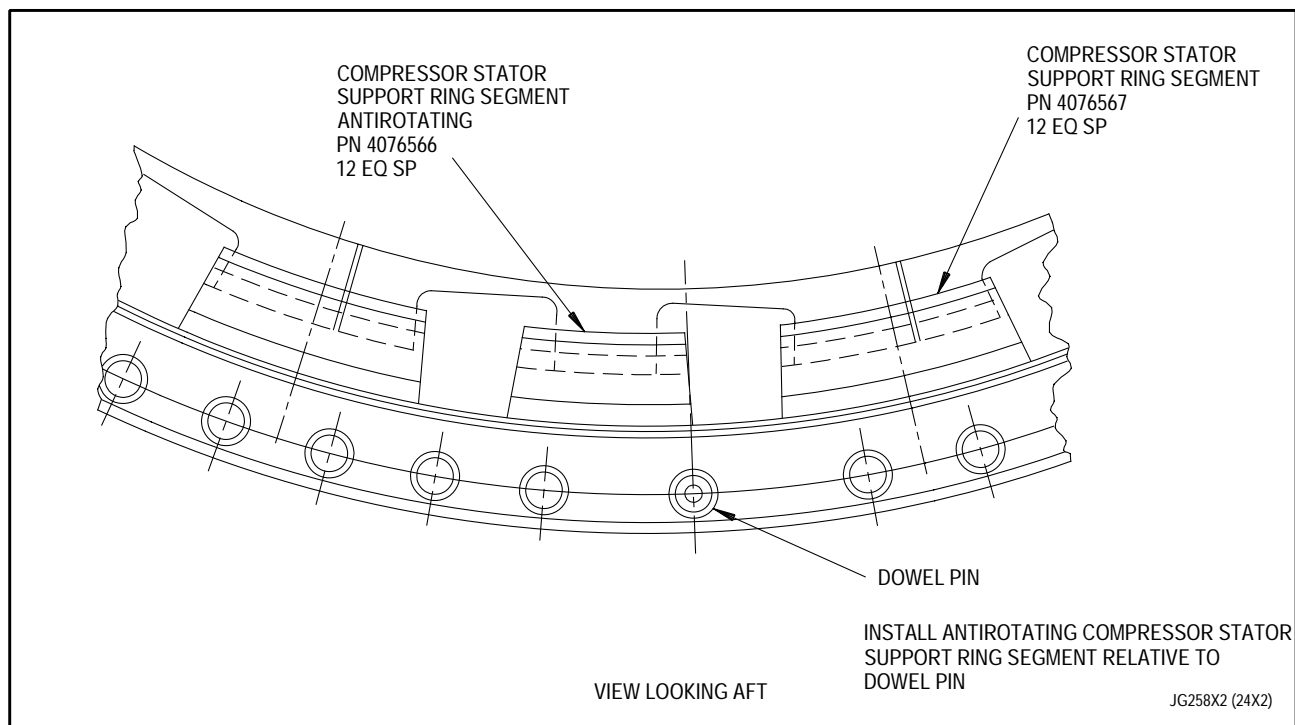


Figure 23. Compressor Stator Support Ring Segments - Installation

- n. Install bolts(10) and key washers(11). Torque bolts in sets of three (inner bolt first, then outer two bolts). (See figure 24.) Torque each bolt 80 to 90 pound-inches. One at a time backoff each bolt one turn and retorque 80 to 90 pound-inches.
- o. Torque bolts(7, figure 22) 130 to 145 pound-inches, backoff one turn and retorque 130 to 145 pound-inches.
- p. Bend tabs of key washers(11).
- q. Install PWA 57538 rotator in towershaft opening and engage splines in gearbox driveshaft coupling. Turn rotator to ensure rear compressor rotor assembly is free to rotate. If rotor assembly binds, continue to slowly rotate rotor to wear in knife-edge seals and/or blade tip abradables until rotor rotates freely.
- r. Bend tabs of key washers(6).
- s. Remove PWA 57722 build stand, detail socket head cap screws(2) securing detail-25 bracket assemblies(9) to Flange S of tenth through twelfth stage case(8).

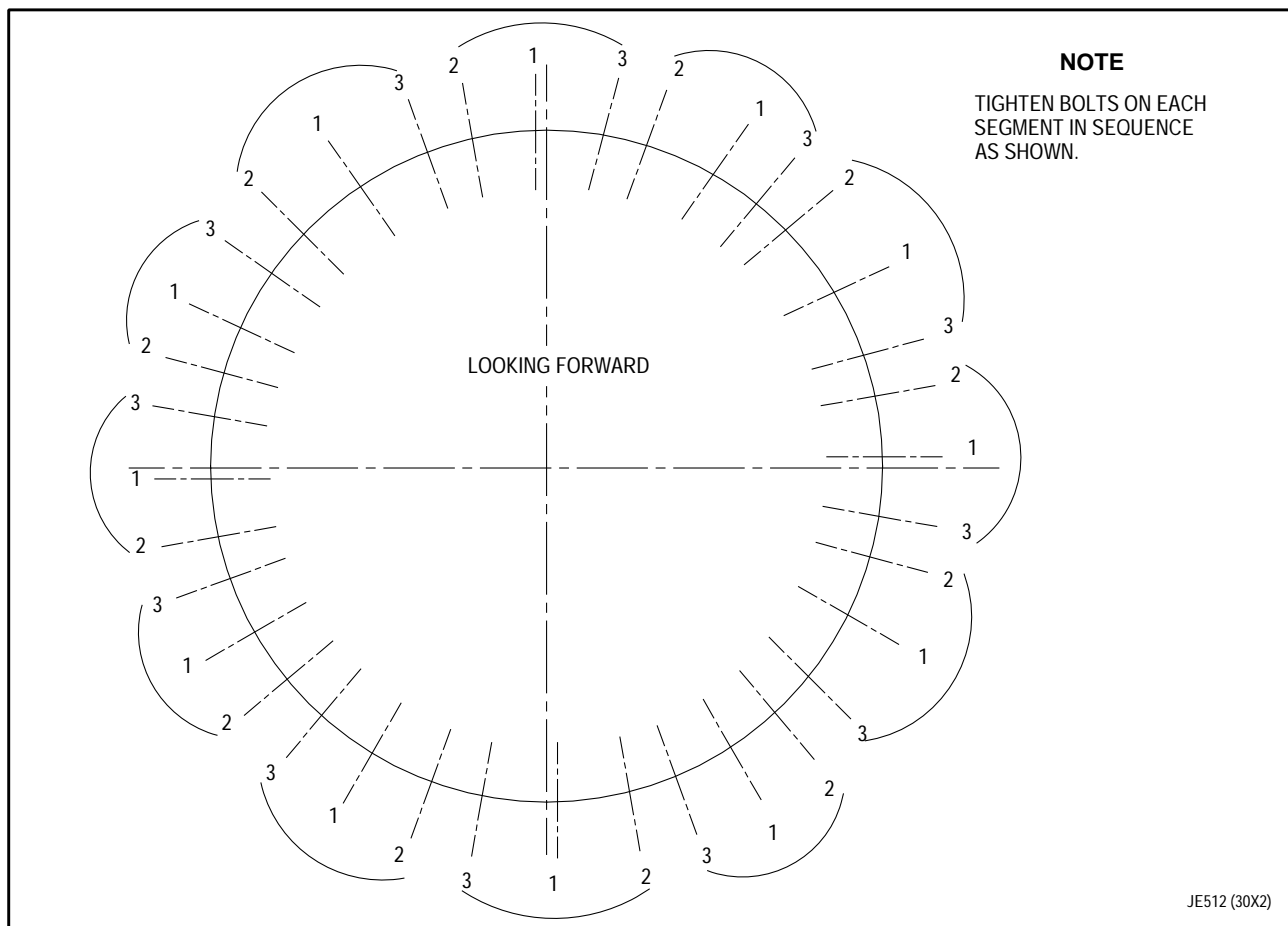


Figure 24. Tenth Through Twelfth Stage Case To Stator Segment Bolts - Torque Sequence

**19. FOURTH THROUGH NINTH STAGE CASE -
INSTALLATION.**

(See Figures 25 through 28.)

- a. Install PWA 57722 build stand, detail-32 support plate assemblies on build stand.
- b. Ensure fourth stage compressor duct segments are installed.
- c. Rotate upper and lower fourth stage synchronizing rings(4, figure 25) to position vane arms straight up and down. Secure with tape.

NOTE

Bolts(5) should have been installed in forward flange of upper and lower fourth through ninth stage cases(3 and 9) prior to installation of fourth stage synchronizing ring(4).

- d. Position bolts(5) rearward, clear of forward flange.
- e. Support 9th stage stators while lifting 4th through 9th stage case to avoid loose fit assemblies from dropping out.

- f. Attach PWA 14175 lifting sling to lower fourth through ninth stage case(9) and using hoist, lift case and position on PWA 57722 build stand, detail-32 support plate assembly.
- g. Remove PWA 14175 lifting sling.
- h. Slide lower fourth through ninth stage case(9) into position, aligning bolt holes and slot in case with dowel pin on forward flange of tenth through twelfth stage case(8). Avoid vane to blade contact during case installation.
- i. Apply PWA 36545 antigalling compound to bolts(5).
- j. Push Flange P bolts(5) forward through fourth stage case(1) and install nuts(2). Do not tighten.



- k. Attach PWA 14175 lifting sling to upper fourth through ninth stage case(3) and using hoist, lift case and position on PWA 57722 build stand, detail-32 support plate assembly.
 - l. Remove PWA 14175 lifting sling.
 - m. Slide upper fourth through ninth stage case(3) into position, aligning boltholes. Avoid vane to blade contact during case installation.
 - n. Remove tape from upper fourth stage synchronizing ring(4) and flange P bolts(5).
 - o. Apply PWA 36545 antigalling compound to threads of bolts(5).
 - p. Push Flange P bolts(5) forward through fourth stage case(1) and install nuts(2). Do not tighten nuts.
- Do not turn horizontal split line flange bolts during installation or torquing. A non-metallic drift may be used to aid in installation of bolts.
 - Do not apply lubricant to horizontal split line flange bolts or nuts.
- q. Secure righthand and lefthand horizontal split line flanges of fourth through ninth stage cases(3 and 9) with bolts(6) and nuts(10). (Boltheads toward upper fourth through ninth stage case, nuts toward lower fourth through ninth stage case.)
 - r. Remove PWA 57722 build stand, detail-32 support plate assemblies from build stand.

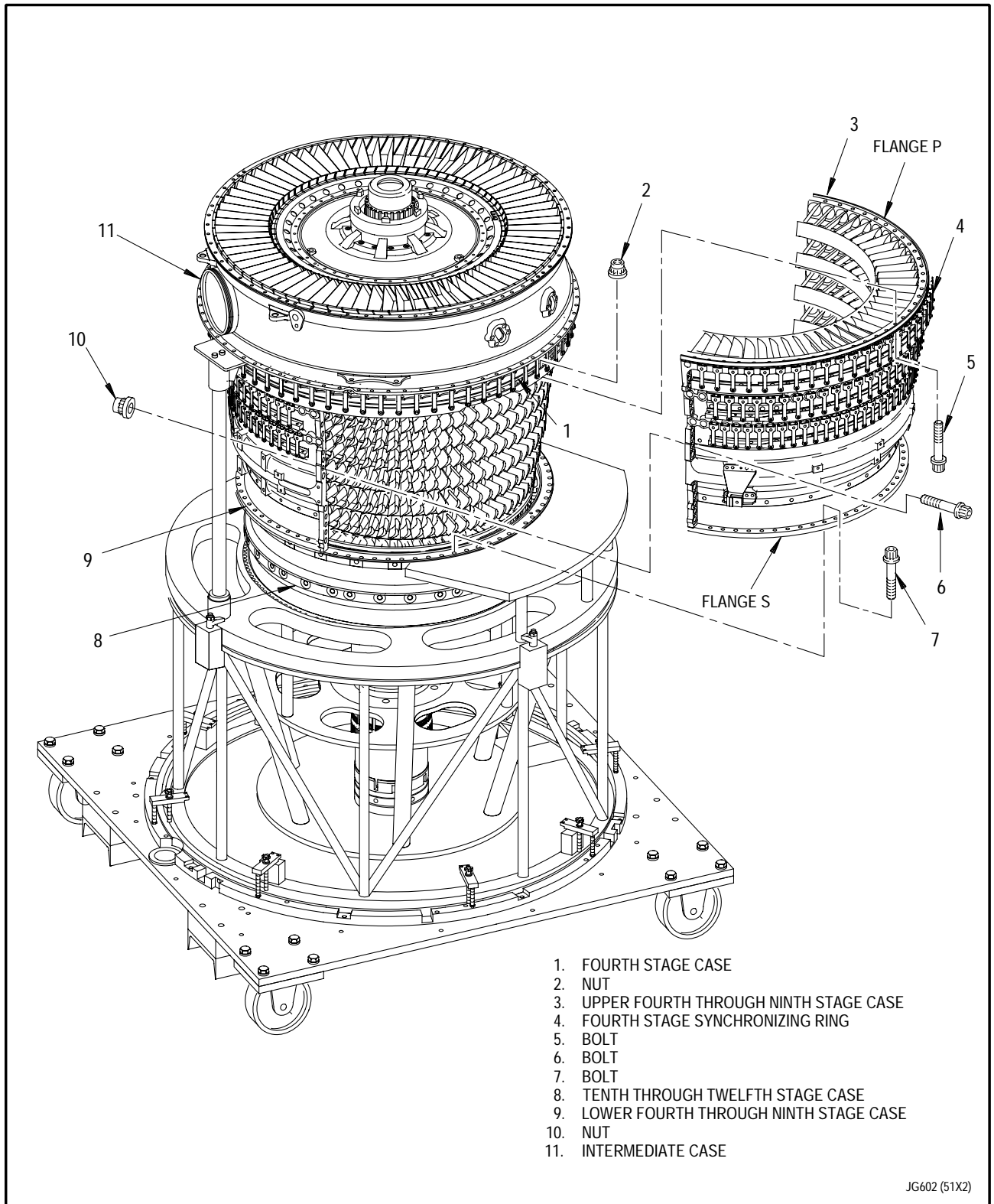


Figure 25. Fourth Through Ninth Stage Case - Installation

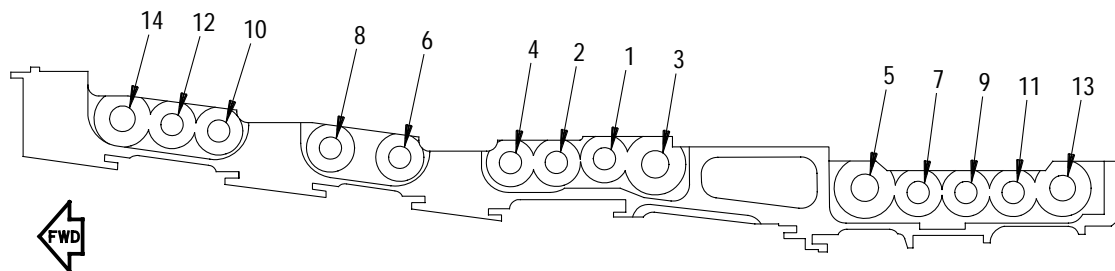
s. Torque right-hand and left-hand horizontal split line flange nuts(10, figure 26) as follows:

- (1) Install PWA 57538 rotator in towershaft opening and engage splines in gearbox driveshaft coupling. Turn rear compressor rotor assembly while drawing cases(3 and 9) together during torquing of nuts(10).

- (2) Torque nuts to seating torque, using torque sequence shown in figure 26. Alternate between right and left flanges until all nuts are torqued.

- (3) Repeat for final torque.

t. Verify right-hand and left-hand horizontal split line flanges are properly seated using 0.001 inch feeler gage.



TORQUE SEQUENCE	SEATING TORQUE (POUND - INCHES)	FINAL TORQUE (POUND - INCHES)
1	200±25	400±25
2	200±25	400±25
3	400±25	1000±25
4	200±25	400±25
5	400±25	1000±25
6	200±25	400±25
7	200±25	400±25
8	200±25	400±25
9	200±25	400±25
10	200±25	400±25
11	200±25	400±25
12	200±25	400±25
13	400±25	850±25
14	400±25	850±25

NOTE

- LEFT SIDE SHOWN, RIGHT SIDE TYPICAL.
- ALTERNATE BETWEEN LEFT AND RIGHT SIDE FLANGES WHEN TORQUING NUTS.

JG603 (30X2)

Figure 26. Fourth Through Ninth Stage Case Horizontal Split Line Flanges - Torque Sequence

- t1. Torque Flange P nuts(2, figure 25) 62 to 72 pound-inches in sequence shown in figure 27.

NOTE

- No intermixing of silver plated and non silver plated nutplates within a set allowed.
- Silver plated fasteners will be identified by thread color when new. Used parts will require part number verification.

- u. If silver plated clinch nuts are used in the forward flange of the 10th through 12th case, install as follows:

- (1) Apply MIL-L-7808 lubricating oil to bolts(7).

- (2) Verify a run-on torque of 3.5 to 30 pound-inches prior to installing. Replace bolts not meeting this requirement.

- (3) Install eight bolts(7) at flange S securing upper and lower fourth through ninth stage cases(3 and 9) to 10th through 12th stage case(8).

- (4) Torque bolts 75 to 85 pound-inches.

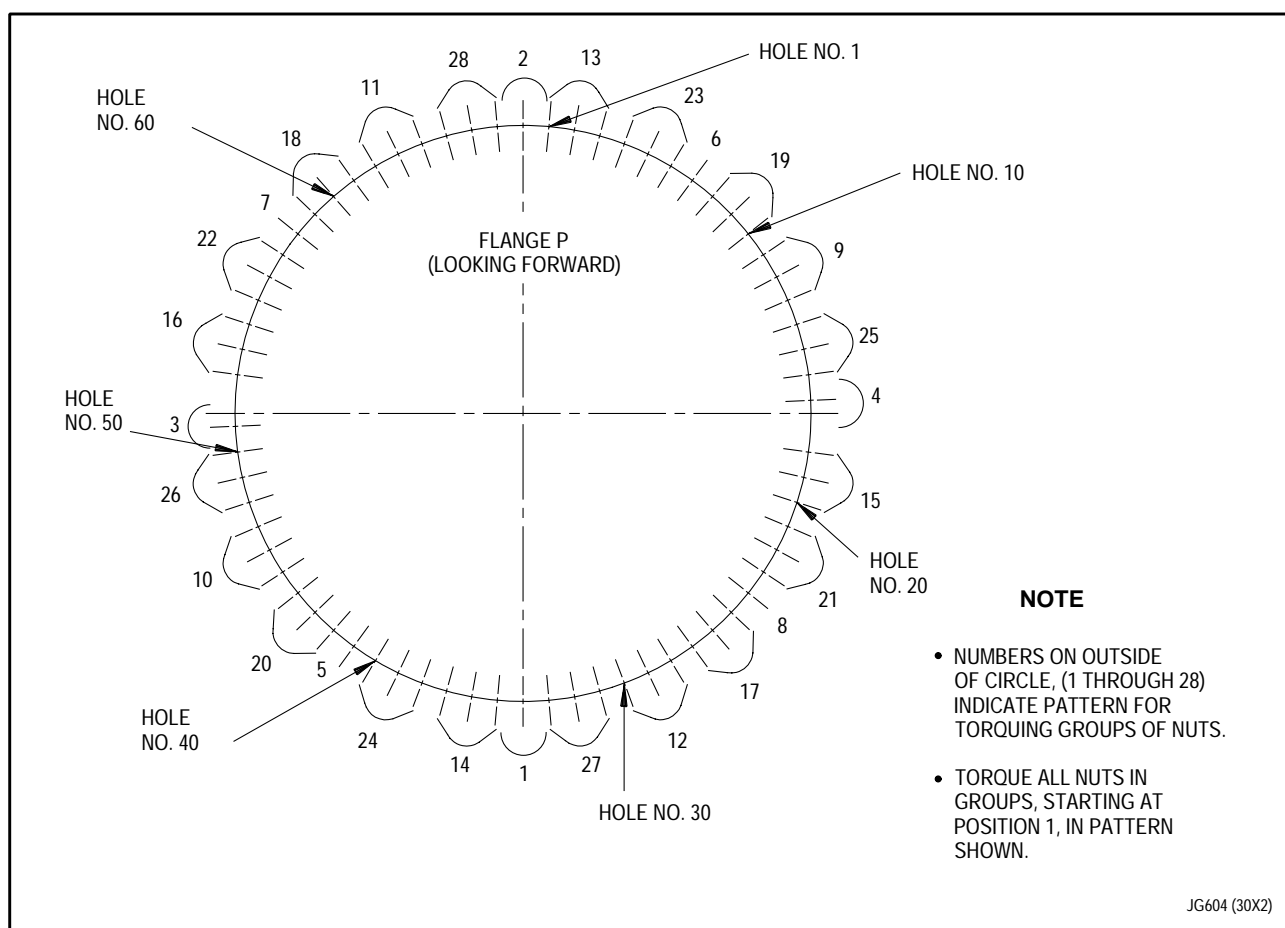


Figure 27. Flange P Nuts - Torque Sequence

v. If non-silver plated clinch nuts are used in the forward flange of the 10-12th case, proceed as follows:

(1) Apply PWA 36545 antigalling compound to bolts(7).

(2) Verify a run-on torque of 3.5 to 30 pound-inches prior to installing. Replace bolts not meeting this requirement.

(3) Install eight bolts(7) at flange S securing upper and lower fourth through ninth stage cases(3 and 9) to tenth through twelfth stage case(8).

(4) Torque bolts 54 to 60 pound-inches.

w. Remove two PWA 57722 detail-28 posts from stands.

20. FOURTH, FIFTH, AND SIXTH STAGE SYNCHRONIZING RING BRACKETS - INSTALLATION.

(See Figure 28.)

NOTE

The following instructions apply to both sides of module.

- a. Install 4th stage synchronizing ring bracket (figure 28, View A) as follows:

- (1) Rotate 4th stage vanes so slots in vane stems are in an axial position.
- (2) Place bracket(3) over vane arms(8). Ensure alignment pins on synchronizing ring halves engage bracket(3), and vane arm pins engage bracket(3).
- (3) Apply MIL-L-7808 lubricating oil or VV-P-236 petrolatum to threads of four bolts(1).
- (4) Install four bolts(1) and key washers(2). Torque bolts 75 to 85 pound-inches and bend tab of key washers.

- b. Adjust 4th stage synchronizing ring bumpers(5) as follows:

- (1) Remove worknuts securing bumpers(5) and bushings(6) at eight locations around upper and lower 4th stage vane synchronizing rings(4).
- (2) Position vane arms to point in the axial direction.



Failure to use non-metallic feeler stock to measure gap between case and bumpers will result in damage to bumper pads.

- (3) Adjust bushings(6) in sequence shown in figure 28, 180 degrees apart, to obtain 0.012 to 0.014 inch gap between case and bumper(5) all around case. Use only non-metallic feeler stock to measure bushings. Keep non-metallic shim stock under all eight bumper locations during adjustments.

- (4) Position upper and lower 4th stage synchronizing rings(4) so inner diameters of rings are concentric to case bumper pads within 0.015 inch of each other, at locations 1 and 2 and locations 3 and 4, per figure 28. Measure gap between ring and case bumper pad at four places. If ring is not concentric, adjust by tightening one side and loosening opposite side, then return to step b.(3).

- (5) Install collars(7) to secure bumpers(5) and bushings(6). While holding bushings(6), tighten collars until they shear.

- (6) Remove shim stock with moderate hand force only. If moderate hand force will not remove shim stock, return to step b.(3).

- (7) Verify that vane arms rotate freely in each direction from center with no binding or hesitation.

- c. Install 5th stage synchronizing ring bracket assembly as follows: (See figure 28, View B.)

- (1) Rotate 5th stage vanes next to the 4th - 9th case split line so slots in vane stems are in an axial position.

- (2) Position bracket backplate(29) to align boltholes in synchronizing ring(28).
 - (3) Position bracket(27) to align boltholes in bracket with boltholes in synchronizing ring(28).
 - (4) Ensure stator vane arm pins(12) engage bracket(27).
 - (5) Apply PWA 36545 antigalling compound to threads of four bolts(10).
 - (6) Install four bolts(10) and nuts(26), with boltheads forward. Torque nuts 23 to 26 pound-inches.
- d. Adjust 5th stage synchronizing ring bumpers(13) as follows:
- (1) Remove worknuts securing bumpers(13) and bushings(14) at eight locations around upper and lower 5th stage vane synchronizing rings(28).
 - (2) Adjust vane arms to point in axial direction.
 - (4) Position upper and lower 5th stage synchronizing rings(28) so inner diameters of rings are concentric to the case bumper pads within 0.015 inch of each other, at locations 1 and 2 and locations 3 and 4, per figure 28. Measure gap between ring and case bumper pad at four places. If ring is not concentric, adjust by tightening one side and loosening opposite side, then return to step d.(3).
 - (5) Install collars(15) to secure bumpers(13). Hold bushings(14) stable and tighten collars until they shear.
 - (6) Remove shim stock with moderate hand force only. If moderate hand force will not remove shim stock, return to step d.(3).
 - (7) Verify that vane arms rotate freely in each direction from center with no binding or hesitation.



Failure to use non-metallic feeler stock to measure gap between case and bumpers will result in damage to bumper pads.

- (3) Adjust bushings(14) in sequence shown in figure 28, 180 degrees apart, to obtain 0.014 to 0.016 inch gap between case and bumper(13) all around case. Use only non-metallic feeler stock to measure bushings. Keep non-metallic shim stock under all 8 bumper locations during adjustments.

NOTE

Core modules having fixed sixth vanes do not have 6th stage synchronizing ring and associated hardware.

- e. Install 6th stage synchronizing ring brackets(22 and 24) as follows:
- (1) Install four stator vane arms(17) (pin end into bracket, slotted end up) into bracket(22).

- (2) Rotate 6th stage vanes so slots in vane stems are in an axial position.
- (3) Align slotted end of each stator vane arm(17) with slots in its mating vane stem.
- (4) Slide bracket(22) and stator vane arms(17) forward until bolthole in stator vane arms aligns with threaded hole in vane stems.
- (5) Position brackets(22 and 24) to align boltholes in brackets with boltholes in synchronizing rings(23).
- (6) Apply PWA 550 antigalling compound to threads of four bolts(25).
- (7) Install four bolts(25) and nuts(21), with boltheads forward. Torque nuts 23 to 26 pound-inches.
- (8) Apply MIL-L-7808 lubricating oil or petrolatum to four bolts(16) and install. Check run-on (thread friction) torque of self-locking bolts. Minimum run-on torque is 2 pound-inches. Torque bolts 35 to 40 pound-inches.
- (9) Verify that there is zero clearance between vane stems and stator vane arms(17), and bolts(16) are seated.



Failure to use non-metallic feeler stock to measure gap between case and bumpers will result in damage to bumper pads.

f. Adjust 6th stage synchronizing ring bumpers(18) as follows:

- (1) Remove worknuts securing bumpers(18) and bushings(19) at eight locations around upper and lower 6th stage vane synchronizing rings(23).
- (1a) Keep vane arms pointing in axial direction. Adjust bushings(19) in sequence shown in figure 28, 180 degrees apart, to obtain 0.014 to 0.016 inch gap between case and bumper(18) all around case. Use only non-metallic feeler stock to measure bushings. Keep non-metallic shim stock under all 8 bumper locations during adjustments.
- (2) Position upper and lower 6th stage synchronizing rings(23) so inner diameter of rings are concentric to the case bumper pads within 0.015 inch of each other, at locations 1, 2, 3 and 4 of torque sequence chart in figure 28. Measure gap between ring and case bumper at four places. If ring is not concentric, adjust by tightening one side and loosening opposite side, then return to step f.(1a).
- (3) Adjust bushings(19) to obtain 0.017 to 0.019 inch gap between case and bumpers(18). Torque bushings 30 to 40 pound-inches.
- (4) Install collars(20) to secure bumpers(18) and bushings(19) and tighten until they shear.
- (5) Verify that vane arms rotate freely in each direction from center with no binding or hesitation.

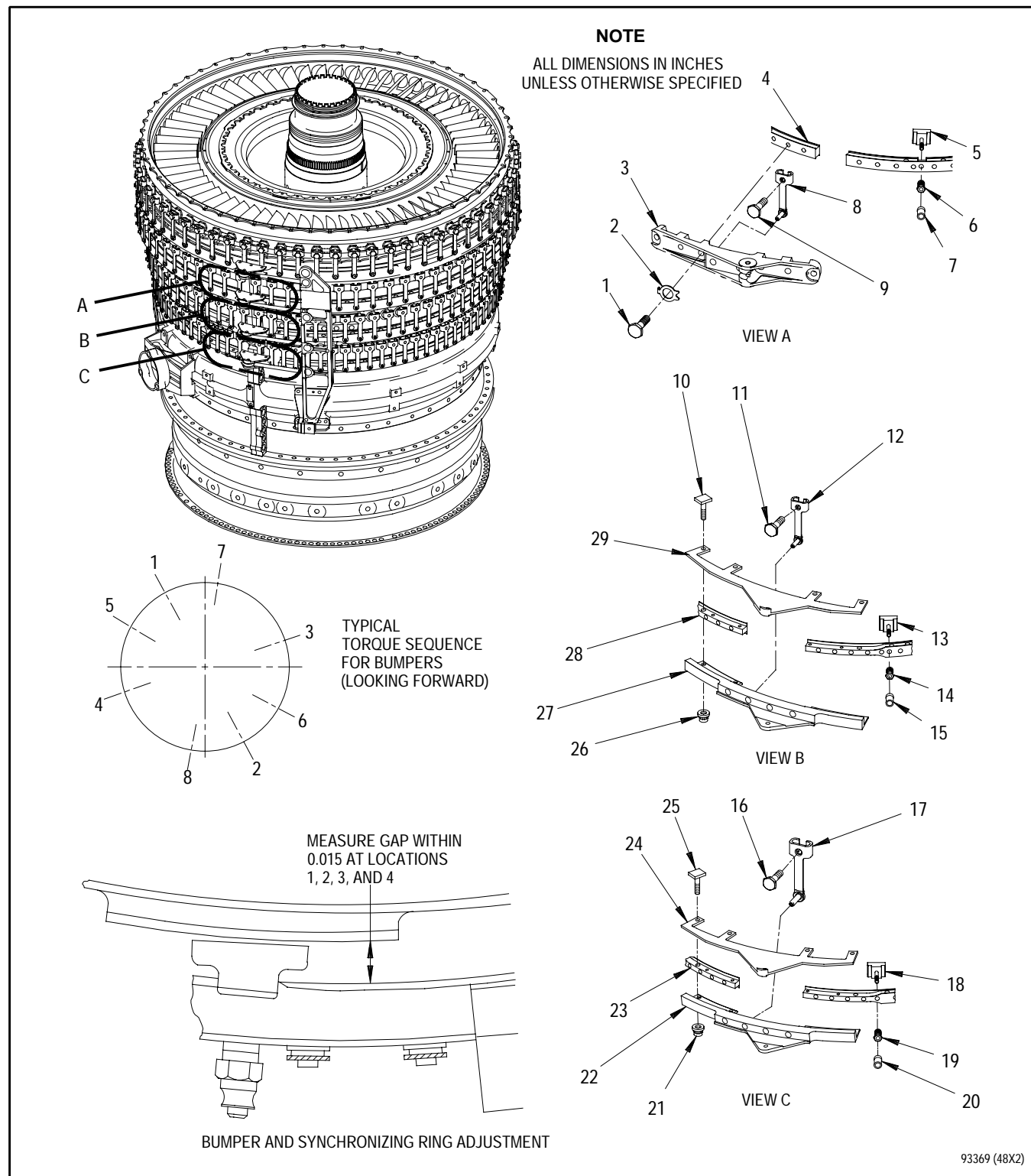


Figure 28. Fourth, Fifth, and Sixth Stage Synchronizing Ring Brackets - Installation

Legend for figure 28

1. Bolt
2. Key washer
3. Bracket
4. Fourth stage vane synchronizing ring
5. Bumper
6. Bushing
7. Collar
8. Stator vane arm
9. Bolt
10. Bolt
11. Bolt
12. Stator vane arm
13. Bumper
14. Bushing
15. Collar
16. Bolt
17. Stator vane arm
18. Bumper
19. Bushing
20. Collar
21. Nut
22. Bracket
23. Sixth stage vane synchronizing ring
24. Bracket
25. Bolt
26. Nut
27. Bracket
28. Fifth stage vane synchronizing ring
29. Bracket back plate

21. VARIABLE VANES SYNCHRONIZING ARM AND LINKAGE (VARIABLE 6TH STAGE VANES) -INSTALLATION.

(See Figure 29.)

NOTE

These instructions apply to both sides of module.

- a. Apply PWA 550 antigalling compound to bolts(22, figure 29).
- b. Position bracket(23) on case, aligning dowel pin and secure with 10 bolts(22). Torque bolts 23 to 26 pound-inches.
- c. Insert synchronizing arm(25) through bracket(23).
- d. Install connecting link(46) onto synchronizing arm(25) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolt(4).
 - (2) Position connecting link(46) onto synchronizing arm(25) and install bolt(4).
 - (3) Install nut(47). Torque nuts 3 to 5 pound-inches above run-on torque. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches torque.
 - (4) Install and bend cotter-pin(48).
- e. Install connecting link(14) and stator linkage arm(16) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolt(15).
 - (2) Install connecting link(14) on stator linkage arm(16) and secure with bolt(15).

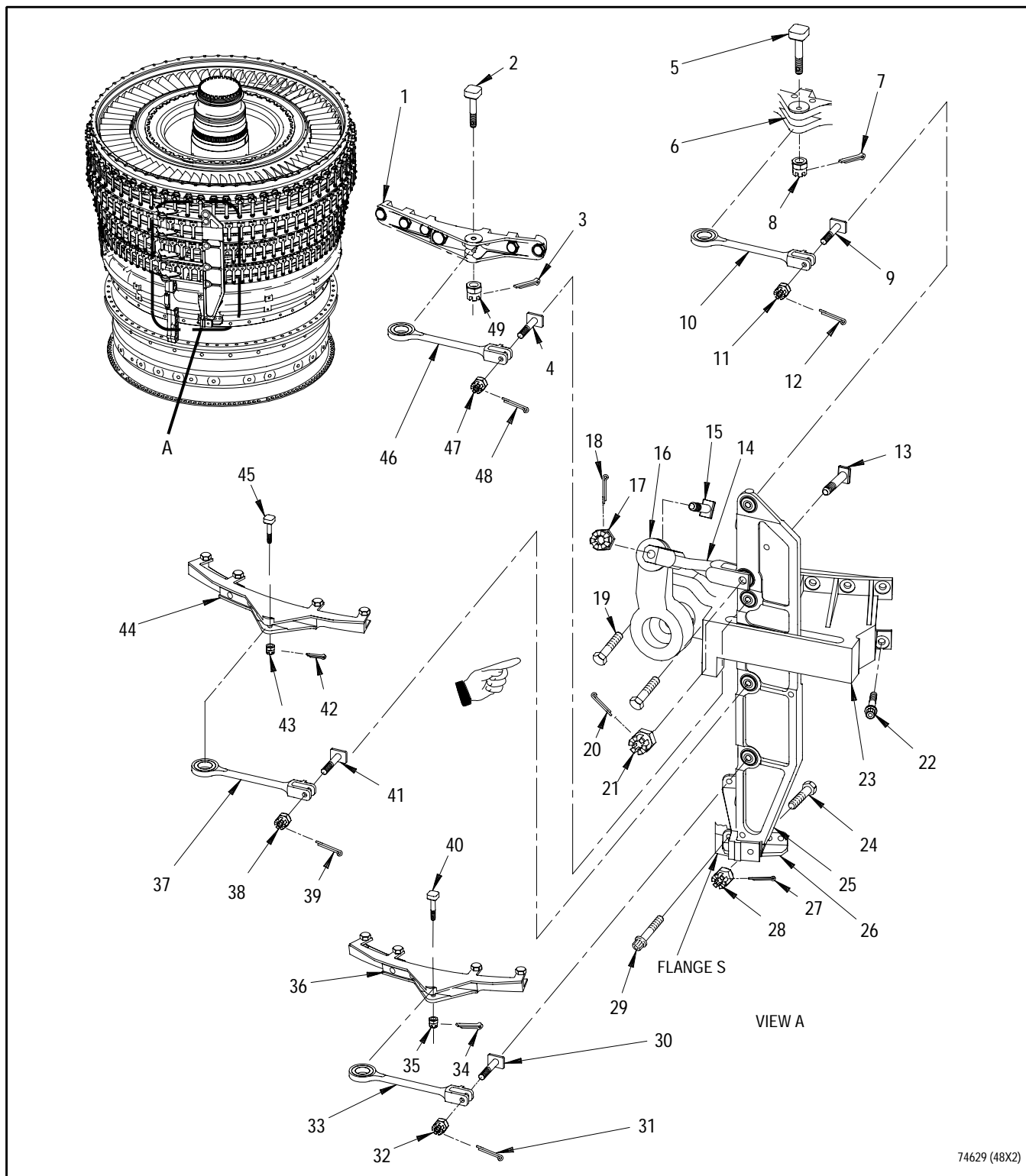


Ensure connecting link(14) is properly installed with long rectangular opening towards stator linkage arm(16). Improper installation of connecting link can cause RCVV system binding.

- (3) Install nut(17). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches torque.
- (4) Install and bend cotter pin(18).
- (5) Apply PWA 36545 antigalling compound to threads of bolts(19).
- (6) Install stator linkage arm(16) and secure with bolts(19).
- (7) Torque bolts 65 to 85 pound-inches.
- (8) Lockwire bolts(19) using PN MS9226-04 (0.032 inch) wire.
- (9) Apply PWA 36545 antigalling compound to threads of bolt(13).

- (10) Position connecting link(14) onto synchronizing arm(25) and install bolt(13).
- (11) Install nut(21). torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
- (12) Install and bend cotter pin(20).
- f. Install connecting link(10) onto synchronizing arm(25) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolt(9).
 - (2) Position connecting link(10) onto synchronizing arm(25) and install bolt(9).
 - (3) Install nut(11). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(12).
- g. Install connecting link(37) onto synchronizing arm(25) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolts(41).
 - (2) Position connecting link(37) onto synchronizing arm(25) and install bolt(41).
 - (3) Install nut(38). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(39).
- h. Install connecting link(33) onto synchronizing arm(25) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolt(30).
 - (2) Position connecting link(33) onto synchronizing arm(25) and install bolt(30).
 - (3) Install nut(32). torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(31).
- i. Install synchronizing zrm(25) to bracket(26) as follows:
 - (1) Apply PWA 36545 antigalling compound to threads of bolt(24).
 - (2) Align boltholes on bottom of synchronizing arm(25) with bolthole in bracket(26). Install bolt(24).

- (3) Install nut(28). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(27).
- j. Install connecting link(46) to fourth stage synchronizing ring bracket(1) as follows:
- (1) Apply PWA 36545 antigalling compound to threads of bolt(2).
 - (2) Position connecting link(46) into fourth stage synchronizing ring bracket(1). Install bolt(2).
 - (3) Install nut(49). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(3).
- k. Install connecting link(10) to IGV synchronizing ring bracket(6) as follows:
- (1) Apply PWA 36545 antigalling compound to threads of bolts(5).
 - (2) Position connecting link(10) to IGV synchronizing ring bracket(6). Install bolt(5).
 - (3) Install nut(8). Torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(7).
- l. Install connecting link(37) to fifth stage synchronizing ring bracket(44) as follows:
- (1) Apply PWA 36545 antigalling compound to threads of bolt(45).
 - (2) Position connecting link(37) to fifth stage synchronizing ring bracket(44). Install bolt(45).
 - (3) Install nut(43). Torque nut 3 to 5 pound-inches above run-on torque. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
 - (4) Install and bend cotter pin(42).



74629 (48X2)

Figure 29. Variable Vanes Synchronizing Arm and Linkage (Variable 6th Stage Vanes) - Installation

Legend for figure 29

1. Bracket	21. Nut	41. Bolt
2. Bolt	22. Bolt	42. Cotter pin
3. Cotter pin	23. Bracket	43. Nut
4. Bolt	24. Bolt	44. Bracket
5. Bolt	25. Synchronizing arm	45. Bolt
6. Bracket	26. Bracket	46. Connecting link
7. Cotter pin	27. Cotter pin	47. Nut
8. Nut	28. Nut	48. Cotter pin
9. Bolt	29. Bolt	49. Nut
10. Connecting link	30. Bolt	
11. Nut	31. Cotter pin	
12. Cotter pin	32. Nut	
13. Bolt	33. Connecting link	
14. Connecting link	34. Cotter pin	
15. Bolt	35. Nut	
16. Stator linkage arm	36. Bracket	
17. Nut	37. Connecting link	
18. Cotter pin	38. Nut	
19. Bolt	39. Cotter pin	
20. Cotter pin	40. Bolt	

m. Install connecting link(33) to sixth stage synchronizing ring bracket(36) as follows:

- (1) Apply PWA 36545 antigalling compound to threads of bolt(40).
- (2) Position connecting link(33) to sixth stage synchronizing ring bracket(36). Install bolt(40).
- (3) Install nut(35). torque nut 20 to 26 pound-inches. Continue tightening nut to align cotter pin holes. Do not exceed 45 pound-inches of torque.
- (4) Install and bend cotter pin(34).

21A. VARIABLE VANES SYNCHRONIZING ARM AND LINKAGE (FIXED 6TH STAGE VANES) - INSTALLATION.

(See Figure 29A.)

NOTE

- These instructions apply to both sides of module.
- Chill bushing PN 4079029 for ease of assembly.

- a. Install compressor stator linkage arm(27), on bracket(10). Torque bolts 54 to 60 pound-inches.
- b. Lockwire bolts using PN MS9226-04 wire.
- c. Install synchronizing arm(25), through bracket(10).
- d. Position IGV connecting link(4) on synchronizing arm(25). Install bolt(5), with threaded end facing outward. Install nut handtight.



Improper installation of connecting link can cause RCVV system binding.

- e. Position connecting link(8) on arm(25) with long rectangular opening of link towards stator linkage arm(27). Install bolt(9) with threaded end facing outward. Install nut handtight.
- f. Install other end of link(8) with long rectangular opening onto stator linkage arm(27). Install bolt(26) with threaded end facing outward and nut, handtight.
- g. Position 4th stage connecting link(6) onto arm(25). Install bolt(7) with threaded end facing outward. Install nut handtight.
- h. Press two bushing(38) into bellcrank assembly(12).
- i. Check dimension across bushings. Dimension should be 0.546 to 0.553 inch. If bushing does not meet requirements, replace bushing.
- j. Position link(14) onto bellcrank assembly(12). Install bolt(13) with threaded end facing outward. Install nut handtight.
- k. Position 5th stage connecting link(11) onto bellcrank assembly(12). Install bolt(17) with threaded end facing outward. Install nut handtight.
- l. Position bellcrank assembly(12) into slot in bracket(15) (see view Z-Z). Ensure bellcrank assembly(12) rotates freely with no binding in bracket assembly(15). Install pin(22) and lock(20). Install bolt(21) and torque 20 to 26 pound-inches.
- m. Install link(8) onto bellcrank(12) with bolt threaded end facing outward.
- n. Install preassembled bracket assembly(15), (12), (11), (14), and connecting links and brackets, linkage arm bracket assembly(16) and bracket(42) (removed during disassembly) onto case as follows:

NOTE

Do not complete final torque procedures until all connecting links are mounted into bracket assemblies(41), (40), and (39), with bolts, nuts, and cotter pins.

- (1) Remove bracket assembly(16), if previously installed. Ensure correct bracket configuration. Refer to T.O. 2J-F100-54.
- (1a) Place bleed valve strap seat(37) on case. Position preassembled bracket assembly(15) over bleed valve strap seat(42) and bracket assembly(16) and install on case. Ensure all dowel pins properly engage.
- (2) Install four bolts(2) and six bolts(3) handtight.

- (3) Position preassembled rear compressor linkage arm bracket assembly(10) onto case, align dowel pin hole and secure with bolts. Torque bolts 23 to 26 pound-inches.
- (4) Position connecting link(11) into 5th stage synchronizing ring bracket assembly(39) and install bolt(23), with threaded end facing aft. Install nut.
- (5) Position link arm(14) onto arm(25) and install bolt(18) with threaded end facing outward. Install nut handtight.
- (6) Position connecting link(6) into bracket assembly(40) and install bolt(43) with threaded end facing aft. Install nut fingertight.
- (7) Position connecting link(4) into synchronizing ring bracket assembly(41) and install bolt(44) with threaded end facing aft. Install nut fingertight.
- (8) Position RCVV sync arm(25) into linkage arm bracket(16). Install bolt(19), with threaded end facing radially outward. Install nut and torque 20 to 26 pound-inches. Align cotter pin holes. Do not exceed 45 pound-inches. Install pin and bend.
- (9) Torque nuts at locations (5, 7, 17, 23, 43 and 44) 3 to 5 pound-inches above run-on torque. Align cotter pin holes. Do not exceed 45 pound-inches. Install cotter pin and bend.
- (10) Torque nuts at locations (9, 13, 18 and 26) 3 to 5 pound-inches above run-on torque. Align cotter pin holes. Do not exceed 85 pound-inches. Install cotter pin and bend.
- (11) Back off bolts(2 and 3) approximately 2 to 3 turns from fully seated position. At end where bellcrank assembly(12) pivots around pin(22), push end of bracket assembly(15) towards synchronizing arm(25). While holding position, torque bolts(2 and 3) 45 to 55 pound-inches. Lockwire bolts using PN MS9226-04 wire.
- o. Install adjusters(33 and 29) into bracket(10). Install nuts(34 and 35) onto adjusters fingertight.
- p. Install adjuster(28) into bracket(15). Install nut(36) onto adjuster fingertight.

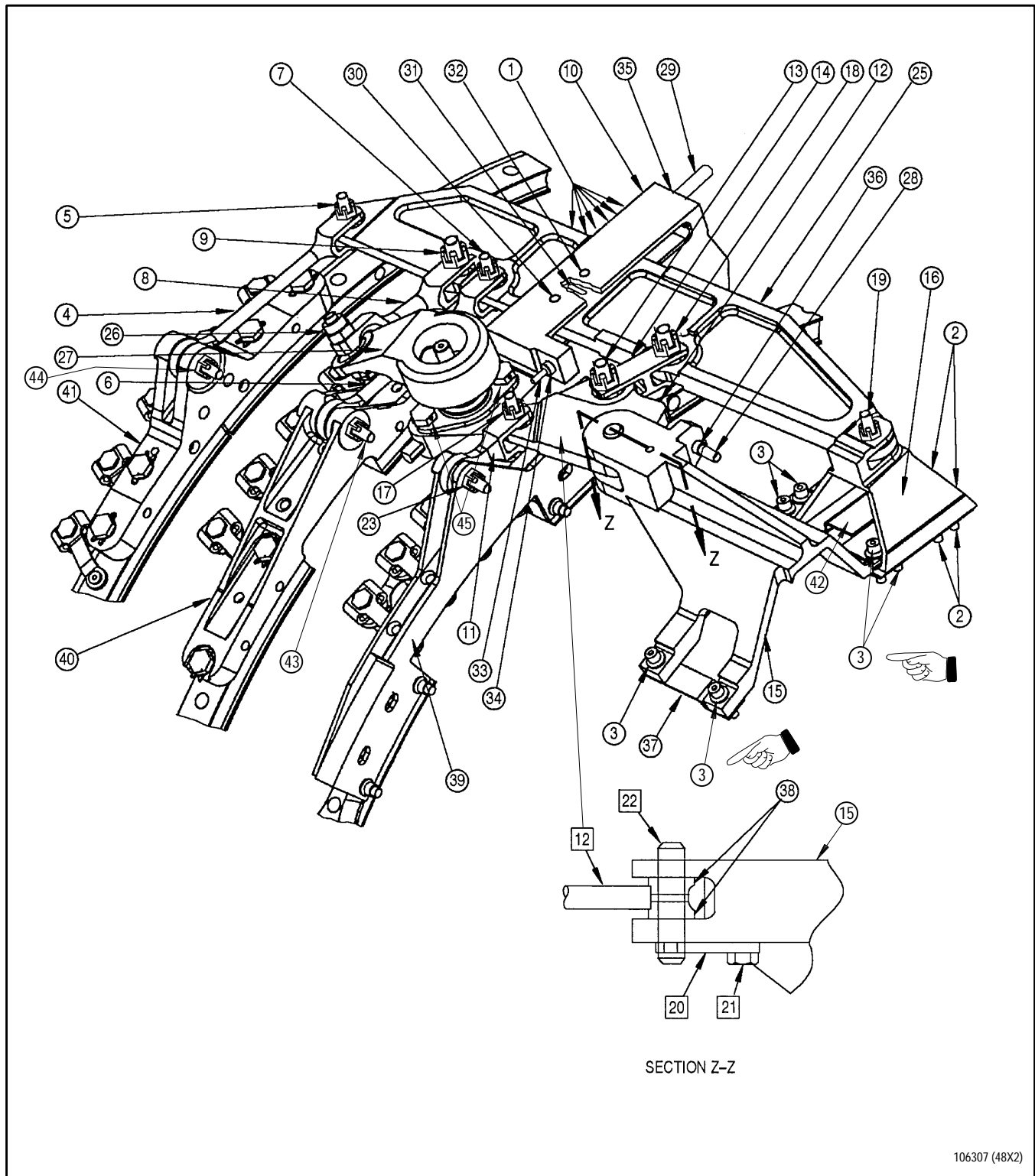


Figure 29A. Variable Vanes Synchronizing Arm and Linkage (Fixed Sixth Stage Vanes) - Installation

Legend for figure 29A

- | | |
|--------------------------|------------------------------|
| 1. Bolt | 23. Bolt, pin, nut |
| 2. Bolt | 24. Deleted |
| 3. Bolt | 25. Synchronizing arm |
| 4. Connecting link | 26. Bolt, nut option |
| 5. Nut option, bolt | 27. Stator linkage arm |
| 6. Connecting link | 28. Adjuster |
| 7. Nut option, pin, bolt | 29. Adjuster |
| 8. Connecting link | 30. Hole in bracket assembly |
| 9. Nut, bolt | 31. Slot in arm assembly |
| 10. Bracket assembly | 32. Hole in bracket assembly |
| 11. Connecting link | 33. Adjuster |
| 12. Bellcrank assembly | 34. Nut |
| 13. Bolt, nut | 35. Nut |
| 14. Link | 36. Nut |
| 15. Bracket assembly | 37. Bleed valve strap seat |
| 16. Bracket assembly | 38. Bushing |
| 17. Bolt, nut, pin | 39. Bracket assembly |
| 18. Bolt, nut, pin | 40. Bracket assembly |
| 19. Bolt, nut, pin | 41. IGV bracket assembly |
| 20. Lock | 42. Bleed valve strap seat |
| 21. Bolt | 43. Bolt, nut, pin |
| 22. Pin | 44. Bolt, nut, pin |
| | 45. Bolt |

22. BLEED VALVE STRAP AND ACTUATING LINKAGE - INSTALLATION.

(See Figure 30.)

- a. Insert single lug end of bleed strap(15, figure 30) under strap seats and around rear compressor fourth through ninth stage cases until ends of strap overlap.
- b. Apply PWA 550 antigalling compound to threads of four bolts(14).
- c. Position guide assembly(16) on case and secure with four bolts(14).
- d. Torque bolts(14) 86 to 92 pound-inches and secure with MS9226-04 lockwire.
- e. Assemble connecting links(6 and 13) and rigid connecting link(9) as follows:
 - (1) Apply PWA 550 antigalling compound to threads of bolt(3).
 - (2) Position single lug end of connecting link(13) inside double lug end of connecting link(6).
 - (3) Position rigid connecting link(9) over connecting links(6 and 13) and secure with bolt(3) and nut(10). Torque nut 23 to 26 pound-inches.

f. Secure connecting link(6) to bleed strap(15) as follows:

- (1) Apply PWA 550 antigalling compound to threads of bolt(3).
- (2) Position double lug end of bleed strap(15) over single lug end of connecting link(6).
- (3) Install bolt(4), rollers(5 and 7), and nut(8). Torque nut(8) 23 to 26 pound-inches.

g. Secure connecting link(13) to bleed strap(15) as follows:

- (1) Apply PWA 550 antigalling compound to threads of bolt(1).
- (2) Position double lug end of connecting link(13) over single lug end of bleed strap(15).
- (3) Install bolt(1), rollers(2 and 12), and nut(11). Torque nut 23 to 26 pound-inches.

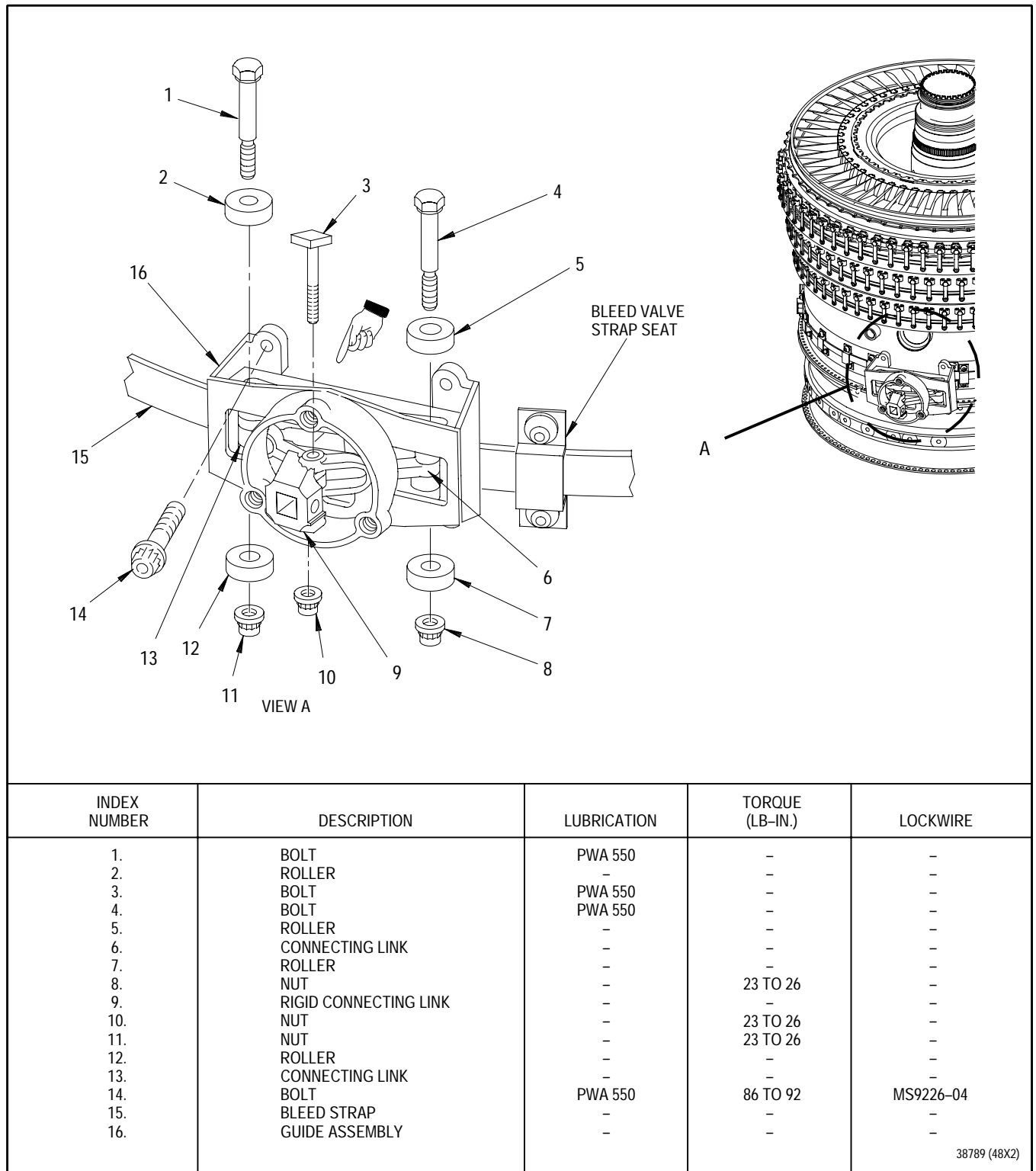


Figure 30. Bleed Valve Strap and Actuating Linkage - Installation

23. FOLLOW-ON MAINTENANCE.

- a. Set angular travel of rear compressor variable stator vanes actuation system per WP 702 00.
- b. If rear of core engine module is disassembled, rotate to front end down position per WP 709 00.
- c. Assemble rear of core engine module per WP 706 00.

WORK PACKAGE

TECHNICAL PROCEDURES

ACTUATION SYSTEM, REAR COMPRESSOR VARIABLE STATOR VANE -

SETTING ANGULAR TRAVEL AND ACTUATION TORQUE CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	4 - 8	29	10	29
3	18	9	18	11 - 12 Added	29

REFERENCE MATERIAL REQUIRED

Title	Number
Core Engine Module - - - - -	T.O. 2J-F100-53-7
Dismantling (Front) - - - - -	WP 014 00
Case and Stator Assembly, Rear Compressor, Fourth Through Ninth Stage - Assembly - - - - -	WP 621 00

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-509	15 APR 92	O/I	Retrofit of 4th Through 9th Stage Compressor Stator Assembly Featuring Proportionally Scheduled 5th Stage Variable Vanes and Non-Variable 6th Stage Vanes, F100-PW-229 Engine, F-15/ F-16 Aircraft (ECP 90QA096)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
LOCKWIRE (0.032 INCH DIAMETER)	MS9226-04

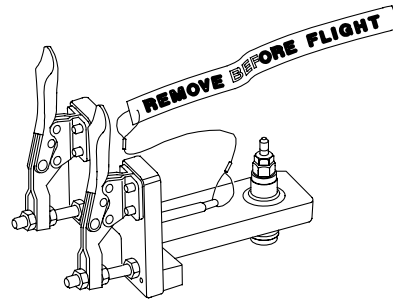
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
2	REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM (FIXED SIXTH STAGE VANES) - SETTING ANGULAR TRAVEL	
	ADAPTER, RCVV INTERNAL BELLCRANK ACTUATION - - - - -	PWA 57657
3	REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM (VARIABLE SIXTH STAGE VANES) - SETTING ANGULAR TRAVEL	
	ADAPTER, RCVV INTERNAL BELLCRANK ACTUATION - - - - -	PWA 57657
4	REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM - ACTUATION TORQUE CHECK	
	ADAPTER, RCVV INTERNAL BELLCRANK ACTUATION - - - - -	PWA 57657

ILLUSTRATED SUPPORT EQUIPMENT



PWA 57657 -C

Figure T1. PWA 57657 ADAPTER

1. INTRODUCTION.

- a. This work package contains instructions for setting angular travel and checking actuation torque of rear compressor variable stator vane actuation system.

2. REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM (FIXED SIXTH STAGE VANES) - SETTING ANGULAR TRAVEL.

(See Figure 1.)

NOTE

These instructions apply to both sides of module.

- a. Ensure bracket assemblies(10 and 16, figure 1) are properly installed. If assembly procedures were accomplished per WP 701 00, proceed to step a2. If assembly procedures were not accomplished per WP 701 00, reposition brackets per step a1.
 - a1. Remove lockwire from 10 bolts(17) securing brackets(10 and 16). Back off 10 bolts approximately 2 to 3 turns from fully seated position. At location where bellcrank assembly(11) pivots around pin of bracket assembly(10), push end of bracket assembly(10) towards synchronizing arm(7). While holding position, torque bolts(17) 45 to 55 pound-inches. Lockwire bolts using PN MS9226-04 wire.
 - a2. Attach PWA 57657 adapters to rear flange of intermediate case. Dowel pins at 9 o'clock on intermediate case fit in cutout location of support plate on PWA 57657 adapter. Rear flange of intermediate case shall be located between grip handles and support plate of PWA 57657 adapter.

- b. Align tapered fitting (positive locking feature) of PWA 57657 adapter with tapered ID of internal bellcrank assembly. Secure fitting by tightening bolt.
- c. Prior to setting angular travel, remove lockwire on adjusters(4, 8, and 13), loosen nuts(5, 9, and 12), and back off adjusters two to three turns.



Exceeding specified applied torque limit on either torque wrench while cycling synchronizing system may result in engine malfunction.

- d. Attach torque wrench to hex nut on both PWA 57657 adapters and cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.
- e. Synchronizing system shall actuate freely at less than 550 pound-inches maximum applied torque in closed direction and less than 400 pound-inches maximum applied torque in open direction. If torque required to actuate system exceeds these values, determine cause of binding as follows:
 - (1) Check that variable vane bushings are properly seated using 0.002 inch feeler gage per WP 621 00, Figure 1A. If not seated, disassemble linkage per WP 014 00 and replace bushings per WP 621 00.
 - (2) Check that connecting links(15) are installed properly, long rectangular opening towards synchronizing arm(7). If required, reinstall per WP 701 00.

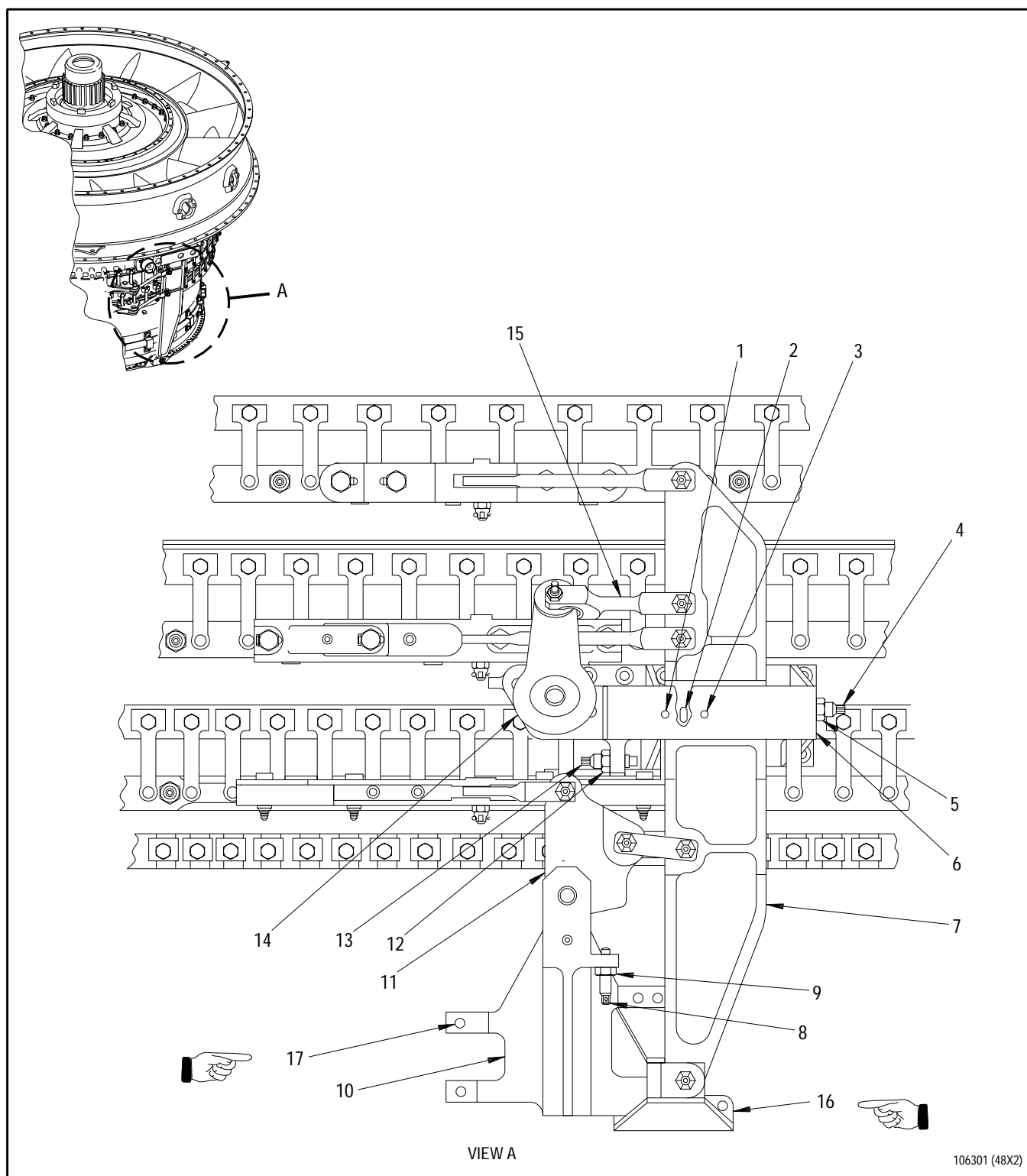


Figure 1. Rear Compressor Variable Stator Vane Actuation System (Fixed Sixth Stage Vanes) - Setting Angular Travel

Legend for figure 1

- | | |
|------------------------------------|---------------------------------|
| 1. Open rigging hole | 10. Bracket assembly |
| 2. Rigging slot | 11. Bellcrank assembly |
| 3. Closed rigging hole | 12. Nut |
| 4. Closed adjuster | 13. Open adjuster |
| 5. Nut | 14. Internal bellcrank assembly |
| 6. Rear Compressor linkage bracket | 15. Connecting link |
| 7. Synchronizing arm | 16. Bracket assembly |
| 8. Adjuster | 17. Bolt (10 required) |
| 9. Nut | |

(3) Check for interference between vane arms and underside of rear compressor linkage bracket(6). Verify bellcrank assembly(11) is not contacting adjuster(8) before synchronizing arm rigging slot(2) aligns with closed position rigging hole(3).

f. Move both synchronizing arms(7) so rigging slot(2) in each synchronizing arm(7) is in line with rigging hole(1) in rear compressor linkage bracket(6).

g. On each side, insert PWA 57657 pin through hole(1) in bracket assembly(6) into slot(2) in synchronizing arm(7). Relax force on both torque wrenches.

h. Turn adjusters(13) until light contact is made with synchronizing arms(7).

i. While immobilizing adjusters(13), torque nuts(12) 27 to 30 pound-inches.

j. Remove PWA 57657 pins.



Exceeding specified torque may cause damage to equipment and possible engine malfunction.

k. Using torque wrenches attached to both PWA 57657 adapters, cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.

l. Move synchronizing arms(7) so arms contact adjusters(13).

m. Check hole(1) and synchronizing arm slot(2) alignment using PWA 57657 pins, both sides, as follows:

(1) If PWA 57657 pins can be installed without exceeding 400 pound-inches maximum applied torque on either torque wrench, proceed to step n.

(2) If PWA 57657 pins cannot be installed, loosen nut(12) and adjuster(13) and repeat steps f. through m.

n. Remove PWA 57657 rigging pins.

- o. Move both synchronizing arms(7) so rigging slot(2) in each arm is in line with rigging hole(3) in rear compressor linkage bracket(6).
- p. Insert PWA 57657 pins, both sides, through hole(3) in bracket(6) into slot(2). Relax force on torque wrenches.
- q. Turn adjusters(4) until light contact is made with synchronizing arms(7).
- r. Immobilize and secure adjusters(4) and torque nuts(5) 27 to 30 pound-inches.
- s. Place 0.002 to 0.010 inch shim stock between bellcrank assembly(11) and adjusters(8).
- t. Turn adjusters(8) until light contact is made with shim stock.
- u. Immobilize and secure adjusters(8) and torque nuts(9) 27 to 30 pound-inches.
- v. Remove shim stock.
- w. Remove PWA 57657 pins.
- z. Check hole(3) and synchronizing arm slot(2) alignment using PWA 57657 pins, both sides, as follows:
 - (1) If PWA 57657 pins can be installed without exceeding 550 pound-inches maximum applied torque on either torque wrench, proceed to step aa.
 - (2) If PWA 57657 pins cannot be installed, loosen nuts(5 and 9) and adjusters(4 and 8) and repeat steps o. through z.
- aa. Lockwire adjuster(4) and nut(5), adjuster(13) and nut(12) to bracket assembly(6) using PN MS9226-04 wire.
- ab. Lockwire adjuster(8) and nut(9) to bracket assembly(10) using PN MS9226-04 wire.
- ac. Lockwire bolts securing bracket(10), and lockwire bolts securing adjacent bracket (at end of synchronizing arm).

3. REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM (VARIABLE SIXTH STAGE VANES) - SETTING ANGULAR TRAVEL.

(See Figure 2.)



Exceeding specified torque may cause damage to equipment and possible engine malfunction.

- x. Using torque wrenches attached to both PWA 57657 adapters, cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.
- y. Move synchronizing arms(7) so arms contact adjusters(4).

NOTE

These instructions apply to both sides of module.

- a. Attach PWA 57657 adapters to rear flange of intermediate case. Dowel pins at 9 o'clock on intermediate case fit in cutout location of support plate on PWA 57657 adapter. Rear flange of intermediate case shall be located between grip handles and support plate of PWA 57657 adapter.

- b. Align tapered fitting (positive locking feature) of PWA 57657 adapter with tapered ID of internal bellcrank assembly. Secure fitting by tightening bolt handtight.
- c. Prior to setting angular travel, remove lockwire on adjusters(4 and 9, figure 2), loosen nuts(5 and 8), and back off adjusters two to three turns.



Exceeding specified torque may cause damage to equipment and possible engine malfunction.

- d. Attach torque wrench to hex nut on both PWA 57657 adapters and cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.
- e. Synchronizing system shall actuate freely at less than 550 pound-inches maximum applied torque in closed direction and less than 400 pound-inches maximum applied torque in open direction. If torque required to actuate system exceeds these values, determine cause of binding as follows:
 - (1) Check that variable vane bushings are properly seated using 0.002 inch feeler gage per WP 621 00, figure 1A. If not seated, disassemble linkage per WP 014 00 and replace bushings per WP 621 00.

- (2) Check that connecting links(11) are installed properly, long rectangular opening towards synchronizing arm(7). If required, reinstall per WP 701 00.
- (3) Check for interference between vane arms and underside of rear compressor linkage bracket(6). If interference is noted, verify proper linkage assembly.

- f. Move both synchronizing arms(7) so rigging slot(2) in each synchronizing arm(7) is in line with rigging hole(3) in rear compressor linkage bracket(6).
- g. On each side, insert PWA 57657 pin through rigging hole(3) in bracket(6) and into rigging slot(2) in synchronizing arm(7). Relax force on both torque wrenches.
- h. Turn adjusters(4) until light contact is made with synchronizing arms(7).
- i. While immobilizing adjusters(4), torque nuts(5) 27 to 30 pound-inches.
- j. Remove PWA 57657 pins.
- k. Using torque wrenches attached to both PWA 57657 adapters, cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.

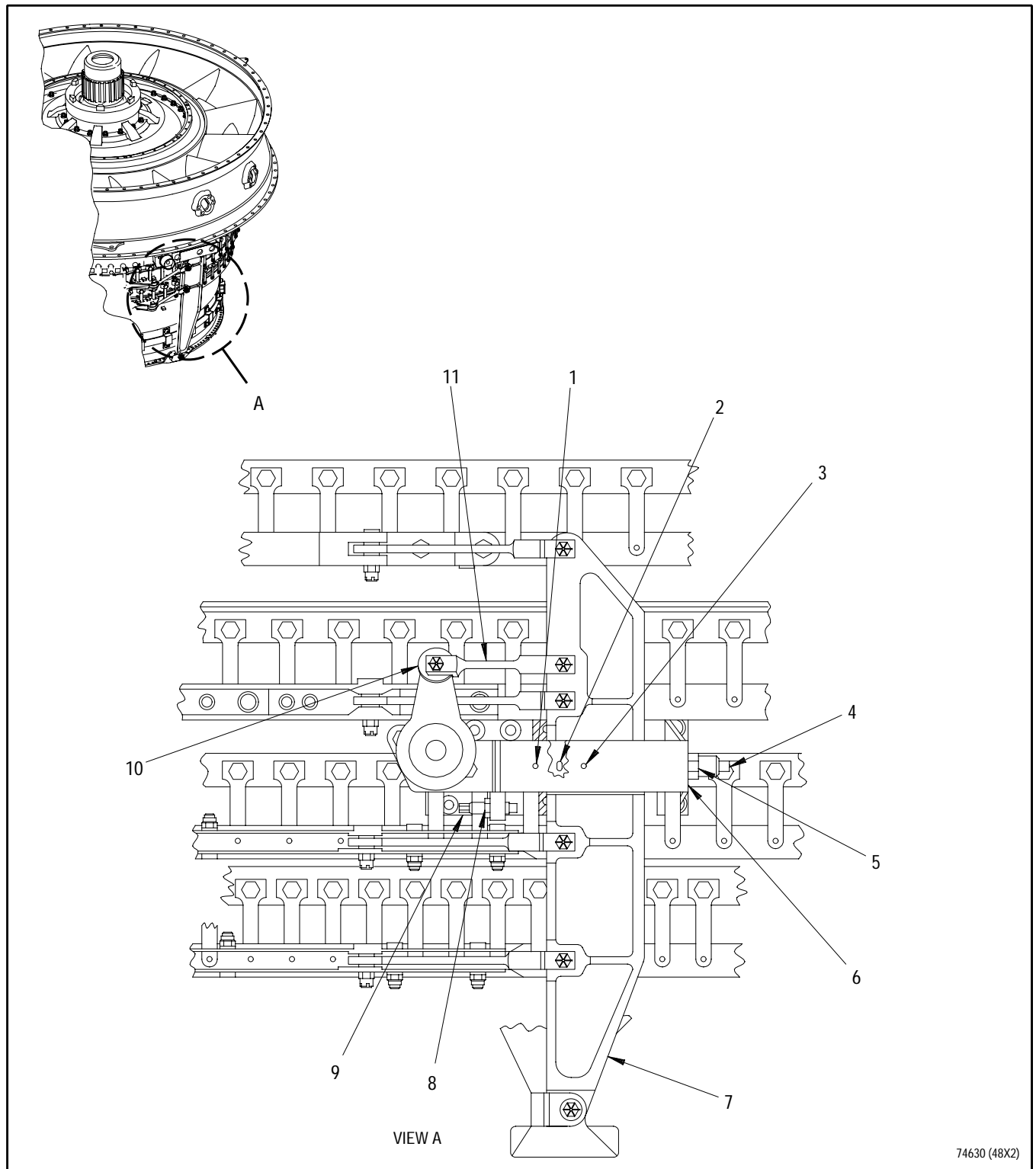


Figure 2. Rear Compressor Variable Stator Vane Actuation System (Variable Sixth Stage Vanes) - Setting Angular Travel

Legend for figure 2

- | | |
|------------------------------------|---------------------------------|
| 1. Open rigging hole | 7. Synchronizing arm |
| 2. Rigging slot | 8. Nut |
| 3. Closed rigging hole | 9. Open adjuster |
| 4. Closed adjuster | 10. Internal bellcrank assembly |
| 5. Nut | 11. Connecting link |
| 6. Rear compressor linkage bracket | |

l. Move synchronizing arms(7) so arms contacts adjusters(4).

m. Check rigging hole(3) and synchronizing arm rigging slot(2) alignment using PWA 57657 pin, both sides, as follows:

(1) If PWA 57657 pins can be installed without exceeding 550 pound-inches maximum applied torque on either torque wrench, proceed to step n.

(2) If PWA 57657 pins cannot be installed, loosen nut(5) and adjuster(4), repeat steps f. through m.

n. Remove PWA 57657 rigging pins.

o. Move both synchronizing arms(7) so rigging slot(2) in each arm is aligned with rigging hole(1) in bracket(6).

p. Insert PWA 57657 pins, both sides, through rigging hole(1) in bracket(6) and into rigging slot(2) of synchronizing arm(7). Relax force on torque wrenches.

q. Turn adjusters(9) until light contact is made with synchronizing arms(7).

r. Immobilize adjusters(9) and torque nuts(8) 27 to 30 pound-inches.

s. Remove PWA 57657 pins.



Exceeding specified torque may cause damage to equipment and possible engine malfunction.

t. Using torque wrenches attached to both PWA 57657 adapters, cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.

u. Move both synchronizing arms(7) so arms contact adjuster(9).

v. Check rigging hole(1) and synchronizing arm rigging slot(2) alignment using PWA 57657 pins, both sides, as follows:

(1) If PWA 57657 pins can be installed without exceeding 400 pound-inches maximum applied torque on either torque wrench, proceed to step w.

(2) If PWA 57657 pins cannot be installed, loosen nut(8) and adjuster(9) and repeat steps o. through v.

w. Lockwire adjuster(4) and nut(5), adjuster(9) and nut(8) to bracket(6) using PN MS9226-04 wire.

4. REAR COMPRESSOR VARIABLE STATOR VANE ACTUATION SYSTEM - ACTUATION TORQUE CHECK.

(See figures 1 and 2.)

NOTE

- These instructions apply to both sides of module. Torque shall be applied to both synchronizing arms at same time.
 - These instructions apply to modules having either fixed or variable 6th stage vanes. Refer to applicable figure 1 or 2 when required.
- a. Attach PWA 57657 adapters to rear flange of intermediate case. Dowel pins at 9 o'clock on intermediate case fit in cutout location of support plate on PWA 57657 adapter. Rear flange of intermediate case shall be located between grip handles and support plate of PWA 57657 adapter.
 - b. Align tapered fitting (positive locking feature) of PWA 57657 adapter with tapered ID of internal bellcrank assembly. Secure fitting by tightening bolt.
 - c. Attach torque wrench to hex nut on both PWA 57657 adapters and cycle synchronizing system a minimum of three times. Do not exceed 650 pound-inches maximum applied torque on either torque wrench.
 - d. Synchronizing system shall actuate freely at less than 550 pound-inches maximum applied torque in closed direction. Record torque required for synchronizing arms(7, figure 1 or 2) to contact closed adjuster(4).
 - e. Synchronizing system shall actuate freely at less than 400 pound-inches maximum applied torque in open direction. Record torque required for synchronizing arms(7) to contact open adjuster(13, figure 1, or 9, figure 2).
 - f. If torque required to contact synchronizing arms with open and closed adjusters exceed values specified in steps d. and e., determine cause of binding as follows:
 - (1) Check that variable vane bushings are properly seated using 0.002 inch feeler gage per WP 621 00, figure 1A. If not seated, disassemble linkage per WP 014 00 and replace bushings per WP 621 00.
 - (2) Check that connecting links(15, figure 1, or 11, figure 2) are installed properly with long rectangular opening toward synchronizing arm(7). If required, reinstall per WP 701 00.



Exceeding specified applied torque limit on either torque wrench while cycling synchronizing system may result in engine malfunction.

- (3) Check for interference between vane arms and underside of rear compressor linkage bracket(6). If interference is noted, verify proper linkage assembly.
- (4) For core modules with fixed 6th stage vanes, verify bellcrank assembly(11, figure 1) is not contacting adjuster(8) before synchronizing arm rigging slot(2) aligns with closed rigging hole(3).

g. Remove PWA 57657 adapters.

WORK PACKAGE

TECHNICAL PROCEDURES

OIL NOZZLES, NO. 2 AND 3 BEARING -

AIR FLOW CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

This Work Package Supersedes WP 703 00 Through and Including Change 0.

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	18	6 Blank	18		

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Air Flow Check Using PWA 50047 Pneumatic Test Set - General Procedures - - - - -	WP 025 00
Air Flow Check Using Habco 1093005 Portable Air Flow Checker - General Procedures - - - - -	SWP 025 01

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

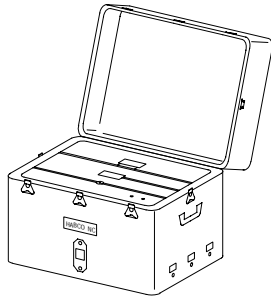
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

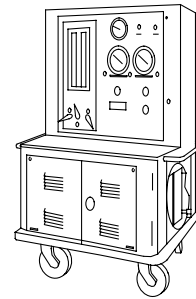
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 2 AND 3 BEARING OIL NOZZLES - AIR FLOW CHECK	
	TEST SET, PNEUMATIC - - - - -	PWA 50047
		OR
	CHECKER, PORTABLE AIR FLOW - - - - -	HABCO 1093005
	CONNECTOR, NO. 2 AND NO. 3 BEARING NOZZLE AIR INLET - - - - -	PWA 51583

ILLUSTRATED SUPPORT EQUIPMENT



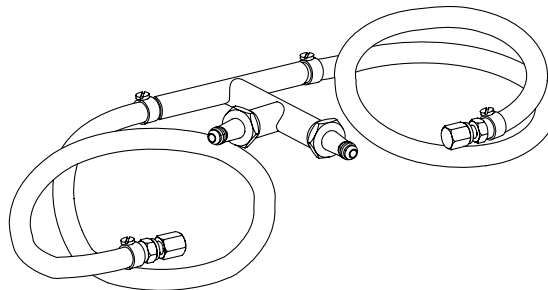
HABCO 1093005 -C

Figure T1. HABCO 1093005 CHECKER



PWA 50047 -C

Figure T2. PWA 50047 TEST SET



PWA 51583

Figure T3. PWA 51583 CONNECTOR

1. INTRODUCTION.

- a. This work package contains instructions for performing air flow check of No. 2 and 3 bearing oil nozzles.

2. NO. 2 AND 3 BEARING OIL NOZZLES - AIR FLOW CHECK.

(See Figure 1.)

- a. If PWA 50047 test set is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 025 00.
- b. Install PWA 51583 connector with AN919-15 reducers in connectors on oil pressure tubes located at 10 o'clock and 2 o'clock positions on compressor intermediate case per figure 1.
- c. Install standard metal cap on tube at 2:30 o'clock position.

- d. Perform air flow check using PWA 50047 test set or Habco 1093005 checker as follows:

- (1) Attach hoses from PWA 50047 test set or Habco 1093005 checker to PWA 51583 connector per figure 1.

- (2) Refer to T.O. 2J-F100-53-1, WP 025 00 for PWA 50047 test set operating instructions or SWP 025 01 for Habco 1093005 checker operating instructions.

- (3) Apply 10 psig air to No. 2 and 3 bearing oil pressure nozzles.

- (4) Check air flow. Air flow shall be 65 to 83 pounds per hour.

- e. If limits cannot be met, ensure caps are free of leakage. If limits still cannot be met, disassemble as required to determine cause of incorrect air flow. Replace parts as required and repeat air flow check.

- f. Shut down test set and remove tooling.

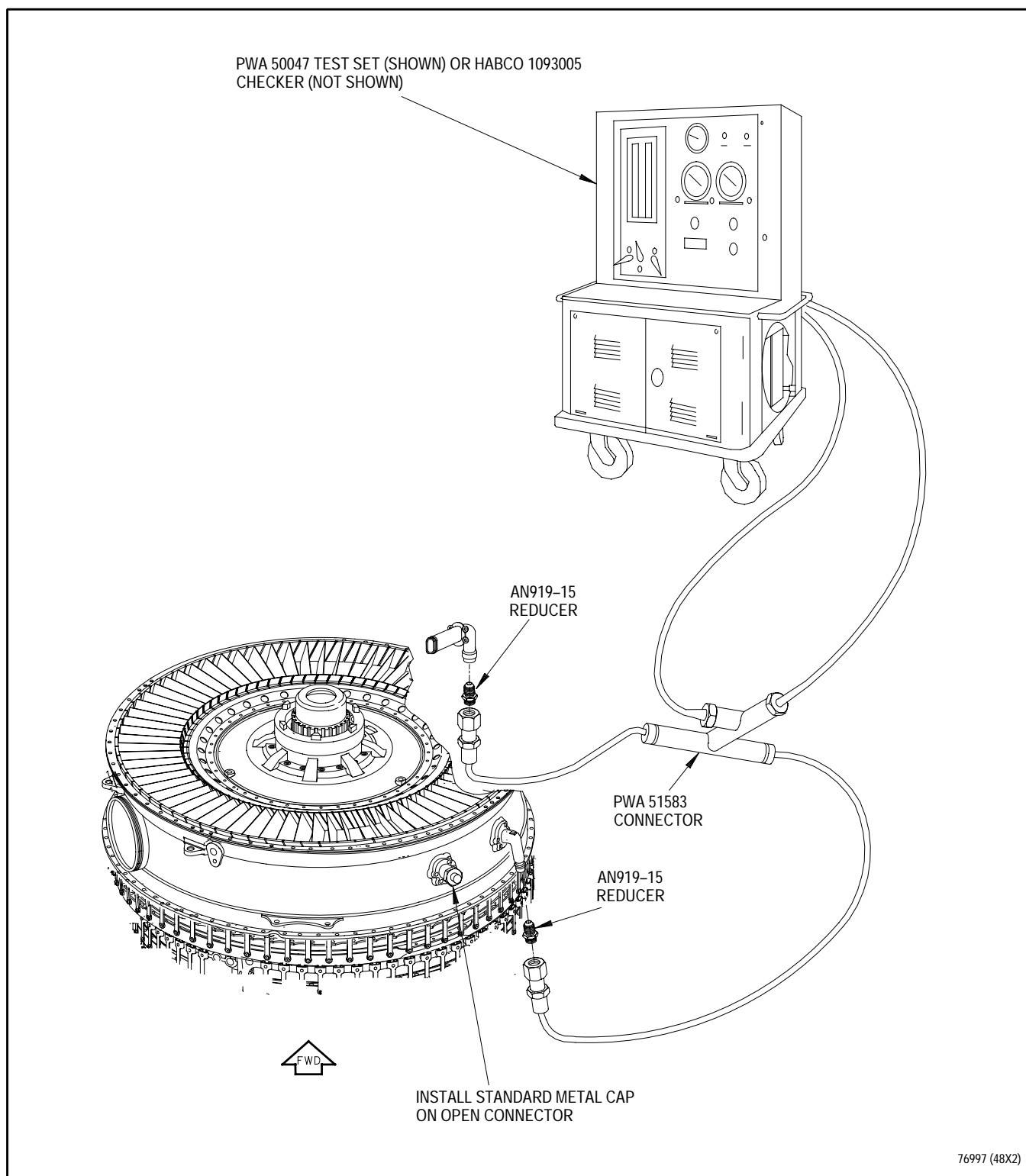


Figure 1. No. 2 and 3 Bearing Oil Nozzles - Air Flow Check Tool Installation

WORK PACKAGE

TECHNICAL PROCEDURES

COMPARTMENT, NO. 2 AND 3 BEARING -

VACUUM CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	18	6 Blank	18		

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Vacuum Leak Check Using PWA 50003 Carbon Seal Tester - General Procedures - - - - -	WP 024 00
Vacuum Leak Check Using Habco 1543003 Vacuum Air Flow Cart - General Procedures - - - - -	SWP 024 01

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

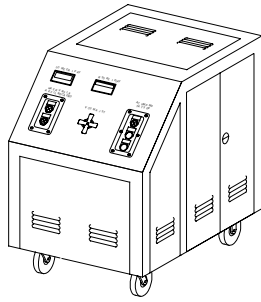
EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
PACKING	ST1000-256	1

APPLICABLE SUPPORT EQUIPMENT

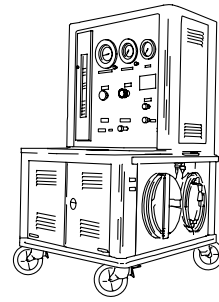
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 2 AND 3 BEARING COMPARTMENT - VACUUM CHECK	
	CONNECTOR, MAIN GEARBOX BREATHER ADAPTER - - - - -	PWA 51372
	ADAPTER, INTERMEDIATE CASE TOWERSHAFT NO. 2 AND NO. 3 BEARING COMPARTMENT, VACUUM CHECK - - - - -	PWA 50569
	TESTER, CARBON SEAL - - - - -	PWA 50003
		OR
	CART, VACUUM AIR FLOW - - - - -	HABCO 1543003

ILLUSTRATED SUPPORT EQUIPMENT



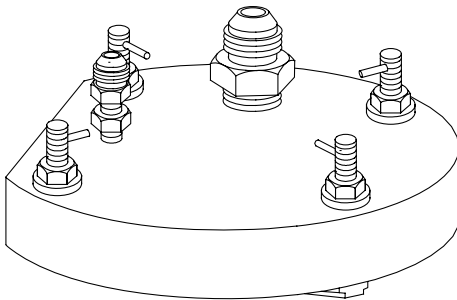
HABCO 1543003 -C

Figure T1. HABCO 1543003 CART



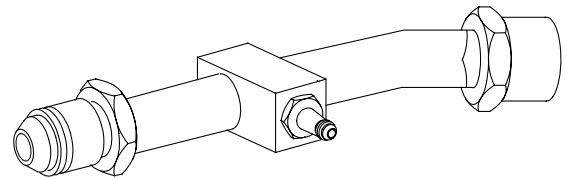
PWA 50003 -C

Figure T2. PWA 50003 TESTER



PWA 50569 -C

Figure T3. PWA 50569 ADAPTER



PWA 51372 -C

Figure T4. PWA 51372 CONNECTOR

1. INTRODUCTION.

- a. This work package contains instructions for vacuum check of No. 2 and 3 bearing compartment.

2. NO. 2 AND 3 BEARING COMPARTMENT - VACUUM CHECK.

(See Figure 1.)

- a. Block openings in compressor intermediate case to prevent leakage during vacuum check as follows: (See figure 1.)
 - (1) Install standard metal plugs in connectors on oil pressure tubes located at 10 o'clock and 2 o'clock positions on intermediate case.
 - (2) Install standard metal cap on tube at 2:30 o'clock position on intermediate case.
- b. Install tooling for vacuum check as follows: (See figure 1.)
 - (1) Install PN ST1000-256 packing in outer groove of towershaft opening on compressor intermediate case.
 - (2) Install PWA 51372 connector on PWA 50569 adapter.
 - (3) Position PWA 50569 adapter over towershaft opening. Secure adapter hook clamps in inner groove of towershaft opening with nuts.

- c. Perform vacuum check using PWA 50003 tester or Habco 1543003 cart as follows:

- (1) If PWA 50003 tester is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 024 00.
- (2) Attach hoses from PWA 50003 tester or Habco 1543003 cart to connections on PWA 51372 connector per figure 1.
- (3) Refer to T.O. 2J-F100-53-1, WP 024 00 for PWA 50003 tester operating instructions or SWP 024 01 for Habco 1543003 cart operating instructions.
- (4) Air flow leakage shall not exceed 6.0 pounds per hour.

- d. Remove vacuum check tooling.



WORK PACKAGE

TECHNICAL PROCEDURES

CORE ENGINE MODULE -

ROTATING TO FRONT END DOWN POSITION

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	29	4 - 5	29	6 Blank	0
3	0				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

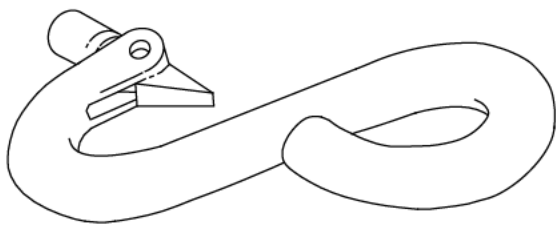
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

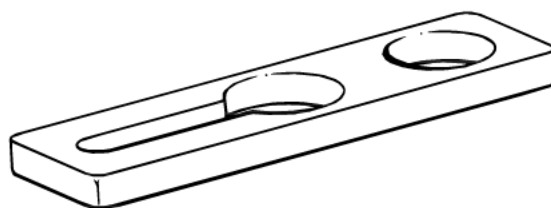
Paragraph	Function - Tool Nomenclature	Tool Number
2	PRELIMINARY INSTRUCTIONS	
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
		OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - - -	PWA 50775
	ADAPTER, TRUNNION, CORE ENGINE REAR - - - - -	PWA 57635
	RETAINER, SET, CASE SIMULATOR, HP TURB AND TURBINE	
	FRONT - - - - -	PWA 57933
3	CORE ENGINE MODULE - ROTATING TO FRONT END DOWN POSITION	
	ADAPTER, TRUNNION, CORE ENGINE FRONT - - - - -	PWA 57623
	ADAPTER, LIFT AND TRUNNION (FOUR REQUIRED) - - - - -	PWA 26147
	SLING, HANDLING - - - - -	PWA 56336
	HOOK, SAFETY (TWO REQUIRED) - - - - -	PWA 2388
	ADAPTER, TRUNNION, CORE ENGINE REAR - - - - -	PWA 57635
	ADAPTER, STAND - - - - -	PWA 50992
	STAND, INLET FAN MODULE, STORAGE AND DISASSEMBLY - -	PWA 56338
		OR
	STAND, INLET FAN MODULE, STORAGE AND DISASSEMBLY - -	PWA 50775

ILLUSTRATED SUPPORT EQUIPMENT



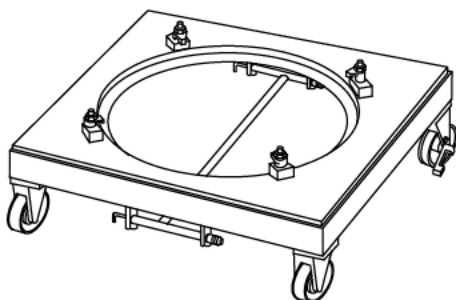
PWA 2388 -C

Figure T1. PWA 2388 HOOK



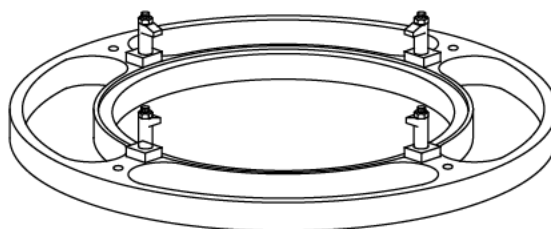
PWA 26147 -C

Figure T2. PWA 26147 ADAPTER



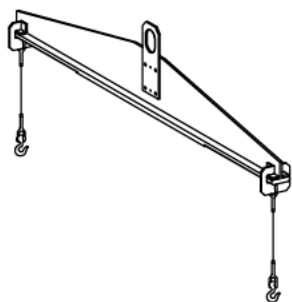
PWA 50775 -C

Figure T3. PWA 50775 STAND



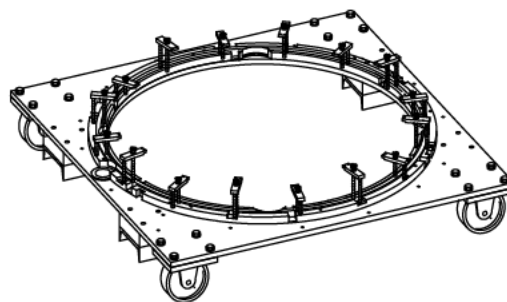
PWA 50992 -C

Figure T4. PWA 50992 ADAPTER



PWA 56336 -C

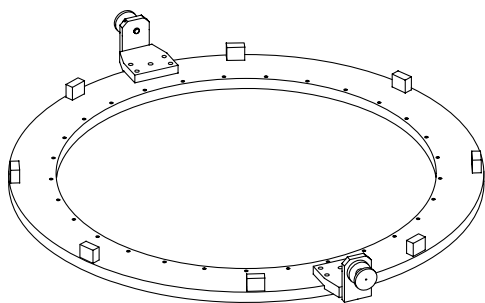
Figure T5. PWA 56336 SLING



PWA 56338 -C

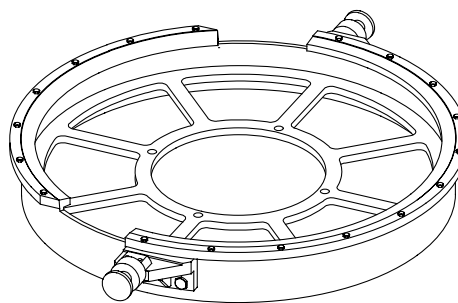
Figure T6. PWA 56338 STAND

ILLUSTRATED SUPPORT EQUIPMENT (continued)



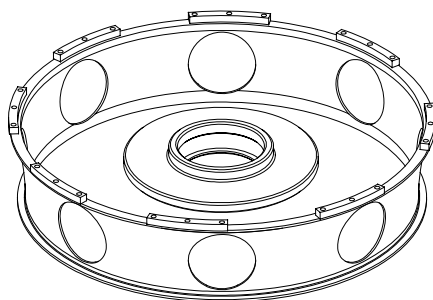
PWA 57623 -C

Figure T7. PWA 57623 ADAPTER



PWA 57635 -C

Figure T8. PWA 57635 ADAPTER



PWA 57933 -C

Figure T9. PWA 57933 RETAINER

1. INTRODUCTION.

- a. This work package contains instructions for rotating core engine module from front end up to a front end down position.

2. PRELIMINARY INSTRUCTIONS.

- a. At beginning of this procedure core engine module is sitting in PWA 56338 or PWA 50775 stand, front end up. Rear of module is supported by PWA 57635 adapter if fully assembled (rear compressor drive turbine installed). Rear of module is supported by PWA 57635 adapter and PWA 57933 retainer set if in various states of partial disassembly (rear compressor drive turbine rotor removed with or without other turbine and combustor hardware).
- c. Release clamps securing rear of module to workstand. Work overhead hoist to raise module.
- d. Install a second pair of PWA 26147 adapters on trunnion spools at PWA 57635 adapter on rear of module. Connect a second PWA 56336 sling and PWA 2388 hook to PWA 26147 adapters.
- e. Work hoists and rotate module to front end down position.

3. CORE ENGINE MODULE - ROTATING TO FRONT END DOWN POSITION.



Failure to verify installation of No. 3 bearing package before rotating core engine module can result in damage to engine hardware.

- a. Verify No. 3 bearing package is installed and No. 3 bearing retaining nut properly torqued.
- b. Install PWA 57623 adapter ring as follows:
 - (1) Install PWA 26147 adapter on trunnion spools of PWA 57623 adapter.
 - (2) Connect PWA 56336 sling and PWA 2388 hook from overhead hoist to PWA 26147 adapters.
- (3) Install PWA 57623 adapter ring on front flange of intermediate case, aligning pin so trunnion spools are located at 3 o'clock and 9 o'clock positions. Install locking rings and bolts. Torque bolts 110 to 135 pound-inches.
- f. Remove PWA 50992 adapter from PWA 50775 stand.
- g. Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- h. Lower module down into PWA 56338 or 50775 stand. If PWA 50775 stand is used, line up blocks on PWA 57623 adapter with clamps on PWA 50775 stand. Engage clamps with blocks and tighten clamps.
- i. Remove hoist and adapter from rear of module.

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****FINAL ASSEMBLY (REAR)****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 108

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	31	25	0	46 - 47	0
2A - 2B	29	26	31	48	31
3	31	27 - 28	26	49 - 50	27
4 - 6	29	29 - 30	30	51	31
7 - 8B	31	31	0	52 - 52B	27
9 - 10A	31	32	20	53 - 58	27
10B Added	23	33	0	58A - 58J Added	27
11 - 13	23	34	30	58K Blank Added	27
14 - 14B	29	35 - 36	14	59	9
15	1	37 - 41	0	60	29
16	31	42	23	61 - 66 Deleted	29
16A Added	31	42A Added	23	67 - 74	23
16B Blank Added	31	42B	29	74A - 74C Added	23
17 - 19	0	42C - 42F Added	23	74D Blank Added	23
20 - 21	31	42G	29	75	23
22	29	42H Blank	23	76	20
23	0	43	0	77 - 79	26
24	1	44 - 45	12	80	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Vacuum Leak Check Using PWA 50003 Carbon Seal Tester - General Procedures - - - - -	WP 024 00
Vacuum Leak Check Using Habco 1543003 Vacuum Air Flow Cart - General Procedures - - - - -	SWP 024 01
General Repair Procedures - Lapping of Main Bearing Carbon Seals, Seal Plates, and Spacers - - - - -	SWP 091 05
General Repair Procedures - Optical Flatness Check of Main Bearing Carbon Seals, Seal Plates, and Spacers - -	SWP 091 06
General Repair Procedures - Compound, Antigalling (PWA 550) Application (SPOP 156) - - - - -	SWP 098 03
General Repair Procedures - Compound, Antigalling (PWA 36545) Application (SPOP 748) - - - - -	SWP 098 07
Depot Engine Accessories and Rigging Procedures - - - - -	T.O. 2J-F100-53-4
Igniter - Spark, Gas Turbine Engine, Main - - - - -	WP 024 00
Depot Core Engine Module - - - - -	T.O. 2J-F100-53-7
Nut, Rear Compressor Driveshaft - Inspection - - - - -	WP 350 00
Manifolds, Left and Right Fuel Supply - Pressure Leak Check and Preservation - - - - -	WP 707 00
Compartment, No. 4 Bearing - Vacuum Check - - - - -	WP 708 00
Propeller and Engine Shaft Wrenches - - - - -	T.O. 32A5-2-2-1
Operating and Maintenance Instructions - Hydraulic Wrench - PWA 50308 - - - - -	T.O. 32B14-5-2-1

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100(II)-521	08 JUL 93	O/I	Retorque of Left and Right Fuel Supply Tubes and Replacement of Lockwire, F100-PW-229 Engine, F-16 Aircraft
2J-F100(II)-522	15 AUG 93	O/I	Retorque of Left and Right Fuel Supply Tubes and Replace Safety Wire, F100-PW-229 Engines, F-15 Aircraft
2J-F100(II)-606	15 OCT 91	O/I	Remove and Replace No. 4 Bearing Air Supply Tube Adapter Bolts PN ST2151-012, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 90QB134)
2J-F100229(II)-502	30 OCT 91	O/I	Retrofit of Fuel Manifold Brackets and Clamps Core Module, F100-PW-229 Engines, F-15/F-16 Aircraft (ECP 89QA694)
2J-F100229(II)-548	30 MAY 97	D	Reoperation of Diffuser Case Assembly OD Rear Flange to Incorporate a New Short Skirt Configuration, F100-PW-229, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-550	15 MAY 98	D	Final Assembly of Core Module Featuring '97 Enhancement Package, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-552	31 OCT 97	D	Reoperation of Combustion Chamber Assembly to Incorporate Inner and Outer Brush Seals, F100-PW-229 Engine, F-15/F-16 Aircraft (ECP 96QA053)
2J-F100229(II)-559	15 OCT 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-15 Aircraft (ECP 96QA179)
2J-F100229(II)-560	01 MAY 98	O/I	Retrofit of New Right and Left Fuel Supply Tube Assemblies and Attaching Hardware, F100-PW-229 Engines, F-16 Aircraft (ECP 96QA179)

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
BRUSH, BRASS	-
CABLE, SAFETY, KIT - CORROSION AND HEAT RESISTANT STEEL, UNS S32100	AS3510-0318K
CLOTH, EMERY	400 TO 600 GRIT
COMPOUND, ANTIGALLING (PWA 36545)	ESNALUBE 382
COMPOUND, ANTIGALLING (PWA 550)	HI-T-650 OR LUBRI-BOND HT
COMPOUND, ANTISEIZE (PWA 36053-3)	LOCTITE NICKEL ANTISEIZE 771
GLOVES, NYLON, LINT-FREE	STYLE NO. 4312
LOCKWIRE (0.025 INCH DIAMETER)	MS9226-03
LOCKWIRE (0.032 INCH DIAMETER)	MS9226-04
LOCKWIRE (0.039 INCH DIAMETER)	AS3214-03
METHYL ETHYL KETONE	ASTM-D-740
OIL, LUBRICATING	MIL-L-23699
OIL, LUBRICATING	MIL-L-7808
PEN, MARKING	PMC 4092-2
PETROLEUM, SOLVENT	P-D-680, TYPE II OR III
TOLUENE (PMC 9072)	AM3180 OR TT-T-548

EXPENDABLE ITEMS

Nomenclature	Part Number	Quantity
GASKET	4035921	2
GASKET	ST2310-36	24
KEY WASHER	4002452	1
METAL SEAL RING	4036955	1
SEAL, PLAIN (C-SEAL)	4083151	1

APPLICABLE SUPPORT EQUIPMENT

Paragraph	Function - Tool Nomenclature	Tool Number
3	COMPRESSOR DISCHARGE MANIFOLDS - INSTALLATION	
	SLING, THREE CABLE LIFTING - - - - -	PWA 14175
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
3A	DIFFUSER CASE ASSEMBLY, AND COMPRESSOR STATOR HEAT SHIELD - INSTALLATION	
	PIN, ALIGNMENT, DIFFUSER CASE TO HPC REAR SUPPORT, -229 ONLY - - - - -	LM 1106
3B	NO. 4 BEARING FRONT CARBON SEAL - VACUUM LEAK CHECK	
	FIXTURE, VACUUM, NO. 4 BEARING FRONT CARBON SEAL - -	PWA 56751
	PLUG, VACUUM CHECK, NO. 4 BEARING COMPARTMENT - - - -	PWA 55134
	TESTER, CARBON SEAL - - - - -	PWA 50003
		OR
	TESTER, CARBON SEAL - - - - -	HABCO 1543003
5	NO. 4 BEARING FRONT SEAL SEAT, NO. 4 BEARING INTERNAL PRESSURE MANIFOLD, NO. 4 BEARING OIL SCOOP, NO. 4 BEARING INNER RACE AND ROLLERS, NO. 4 BEARING REAR SEAL SEAT - INSTALLATION	
	RETAINER, NO. 4 BEARING INNER RACE ROLLERS - - - - -	PWA 51790
	HOLDER, COMPRESSION, NO. 4 BEARING FRONT CARBON SEAL - - - - -	LM 1097
		OR
	HOLDER, COMPRESSION, NO. 4 BEARING FRONT CARBON SEAL - - - - -	PWA 55594
	DRIFT, NO. 4 BEARING SEALS AND OIL SCOOP - - - - -	PWA 50975
6	NO. 4 BEARING RETAINING NUT - INSTALLATION	
	EQUIPMENT SET - - - - -	PWA 57664
	ADAPTER SET, HYDRAULIC WRENCH TO WRENCH - - - - -	PWA 57806
	SPACER - - - - -	LM 1022
	SLING - - - - -	SWE 81001/81002
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	WRENCH, HYDRAULIC - - - - -	PWA 50308
		OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200

APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
7	NO. 4 BEARING HOUSING - INSTALLATION	
	PIN, ALIGNING - - - - -	PWA 14383
	HEATER, NO. 4 BEARING FRONT SEAL ASSEMBLY INNER FLANGE - - - - -	PWA 57885 OR
	HEATER, NO. 4 BEARING FRONT SEAL ASSEMBLY INNER FLANGE - - - - -	PWA 57401 OR
	HEATER, NO. 4 BEARING FRONT SEAL ASSEMBLY INNER FLANGE - - - - -	PWA 52890
	CONTROL, HEATER - - - - -	PWA 61685 OR
	CONTROL, HEATER - - - - -	PWA 25672
	ROTATOR, REAR COMPRESSOR ROTOR AND STATOR - - - - -	PWA 57538 OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852
8	NO. 4 BEARING REAR SEAL SUPPORT ASSEMBLY - INSTALLATION	
	HEATER, NO. 4 BEARING REAR SEAL ASSEMBLY - - - - -	PWA 56325 OR
	HEATER, NO. 4 BEARING FRONT HEATSHIELD REAR FLANGE -	PWA 52454
	CONTROL, HEATER - - - - -	PWA 61685 OR
	CONTROL, HEATER - - - - -	PWA 25672
9	NO. 4 BEARING REAR AIR SEAL RING - INSTALLATION	
	DRIFT, NO. 4 BEARING REAR HEAT SHIELD - - - - -	PWA 52467

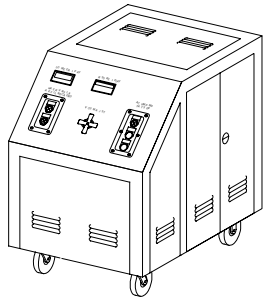
APPLICABLE SUPPORT EQUIPMENT (continued)

Paragraph	Function - Tool Nomenclature	Tool Number
9A	FRONT TURBINE CASE, FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER AND FIRST STAGE TURBINE INNER AIR SEALING RING - INSTALLATION	
	FIXTURE, ASSEMBLY - - - - -	PWA 57918
	FIXTURE, LIFT - - - - -	PWA 57919
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	HEATER, NO. 4 BEARING FRONT AIR SEAL RING OUTER DIAMETER - - - - -	PWA 57862 OR
	HEATER - - - - -	PWA 51932
	CONTROL, HEATER - - - - -	PWA 61685 OR
	CONTROL, HEATER - - - - -	PWA 25672
10	FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER AND FIRST STAGE TURBINE INNER AIR SEALING RING - INSTALLATION	
	FIXTURE, GUIDE TOBI COMBUSTOR AND 1ST VANE INSTALLATION AND REMOVAL - - - - -	PWA 57506
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	HEATER, NO. 4 BEARING FRONT AIR SEAL RING OUTER DIAMETER - - - - -	PWA 57862 OR
	HEATER - - - - -	PWA 51932
	CONTROL, HEATER - - - - -	PWA 61685 OR
	CONTROL, HEATER - - - - -	PWA 25672

APPLICABLE SUPPORT EQUIPMENT (continued)

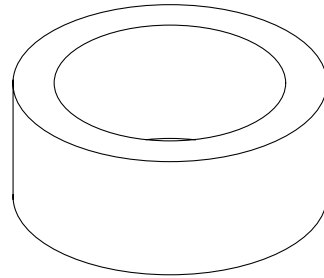
Paragraph	Function - Tool Nomenclature	Tool Number
16	REAR COMPRESSOR DRIVE TURBINE ROTOR AND STATOR - INSTALLATION	
	FIXTURE, LIFT - - - - -	PWA 57920 OR
	ADAPTER, REMOVAL/INSTALLATION HIGH TURBINE ROTOR/ STATOR - - - - -	PWA 57712
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	SLING, LIFT AND TRUNNION - - - - -	PWA 56336
	HOOK, SAFETY, 2200 POUND CAPACITY - - - - -	PWA 2388
	HEATER, HIGH PRESSURE TURBINE HUB ID, REAR - - - - -	PWA 57495 OR
	HEATER, REAR COMPRESSOR DRIVE TURBINE BORE - - - - -	PWA 57151
	CONTROL, HEATER - - - - -	PWA 61685 OR
	CONTROL, HEATER - - - - -	PWA 25672
	ROTATOR, REAR COMPRESSOR ROTOR AND STATOR - - - - -	PWA 57538 OR
	ADAPTER, TURNING, REAR COMPRESSOR ROTOR AND STATOR -	PWA 51852
	PUSHER/PULLER, REAR COMPRESSOR DRIVE TURBINE ROTOR AND STATOR - - - - -	PWA 57530
	PUMP, HYDRAULIC - - - - -	PWA 55380
	EQUIPMENT SET - - - - -	PWA 57664
	ADAPTER SET, HYDRAULIC WRENCH TO WRENCH - - - - -	PWA 57806
	SPACER - - - - -	LM 1022
	SLING - - - - -	SWE 81001/81002
	WRENCH, HYDRAULIC - - - - -	PWA 50308 OR
	TORQUE MULTIPLIER - - - - -	SWE 8100/8200

ILLUSTRATED SUPPORT EQUIPMENT



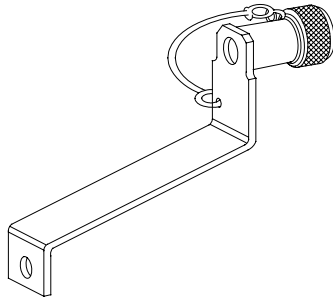
HABCO 1543003 -C

Figure T1. HABCO 1543003 TESTER



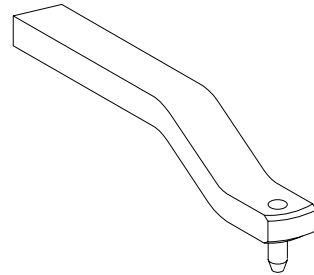
LM1022 (12X1)

Figure T2. LM 1022 SPACER



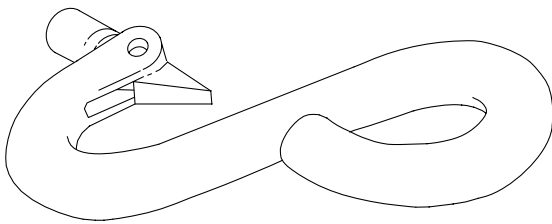
LM1097 -C

Figure T3. LM 1097 HOLDER



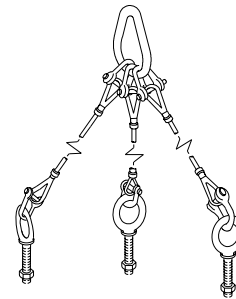
LM 1106 -C

Figure T4. LM 1106 PIN



PWA 2388 -C

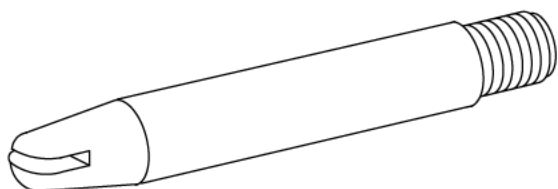
Figure T5. PWA 2388 HOOK



PWA14175-C

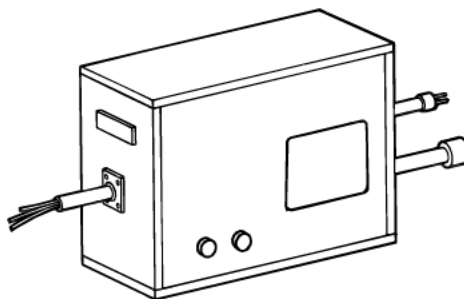
Figure T6. PWA 14175 SLING

ILLUSTRATED SUPPORT EQUIPMENT (continued)



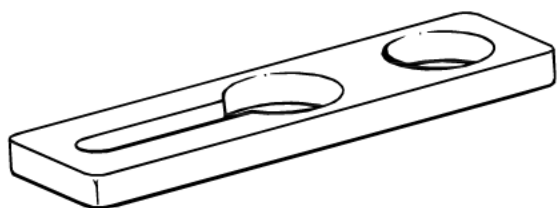
PWA 14383 -C

Figure T7. PWA 14383 PIN



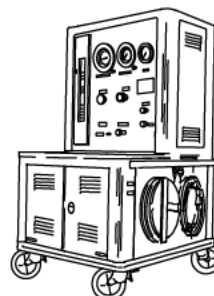
PWA 25672 -C

Figure T8. PWA 25672 CONTROL



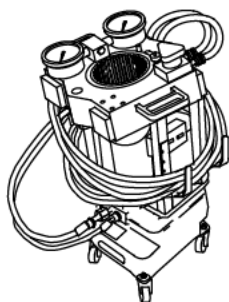
PWA 26147 -C

Figure T9. PWA 26147 ADAPTER



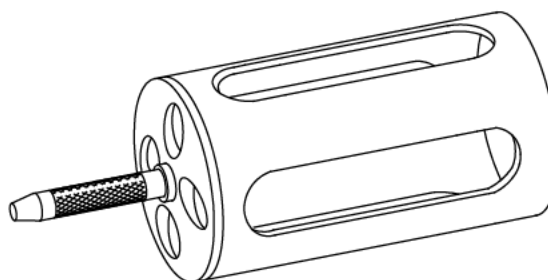
PWA 50003 -C

Figure T10. PWA 50003 TESTER



PWA 50308 -C

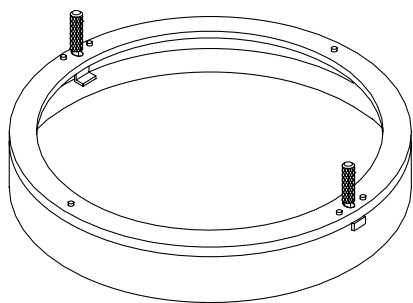
Figure T11. PWA 50308 WRENCH



PWA 50975 -C

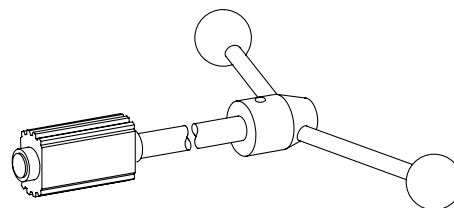
Figure T12. PWA 50975 DRIFT

ILLUSTRATED SUPPORT EQUIPMENT (continued)



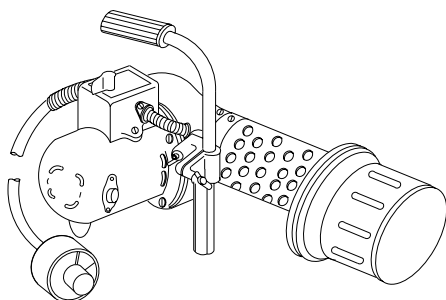
PWA 51790 -C

Figure T13. PWA 51790 RETAINER



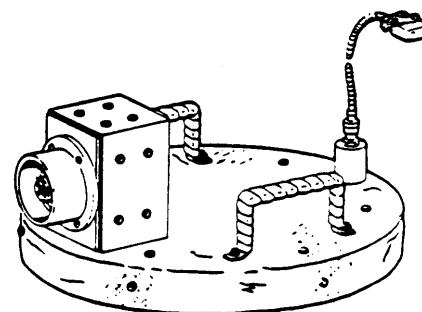
PWA 51852 -C

Figure T14. PWA 51852 ADAPTER



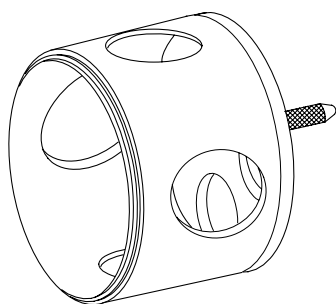
PWA 51932 -C

Figure T15. PWA 51932 HEATER



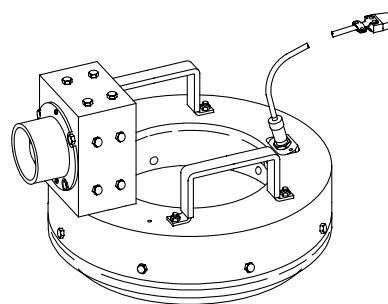
PWA 52454 -C

Figure T16. PWA 52454 HEATER



PWA 52467 -C

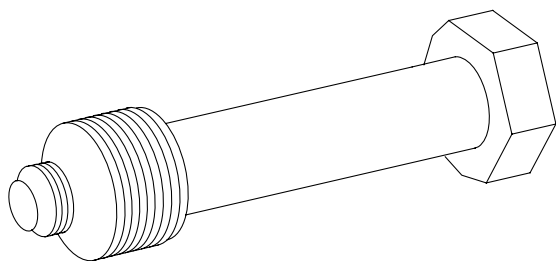
Figure T17. PWA 52467 DRIFT



PWA 52890 -C

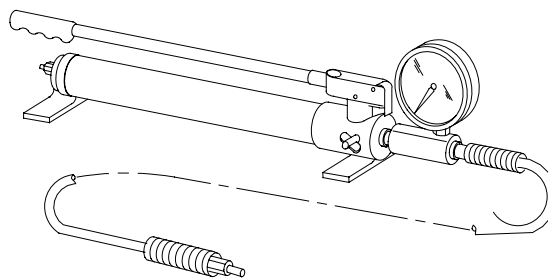
Figure T18. PWA 52890 HEATER

ILLUSTRATED SUPPORT EQUIPMENT (continued)



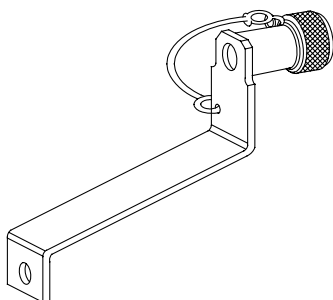
PWA 55134 -C

Figure T19. PWA 55134 PLUG



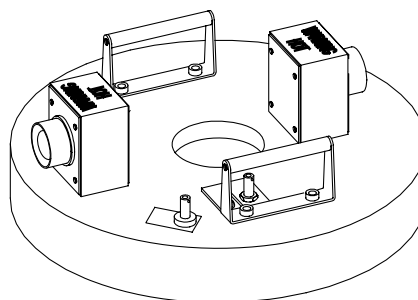
PWA 55380 -C

Figure T20. PWA 55380 PUMP



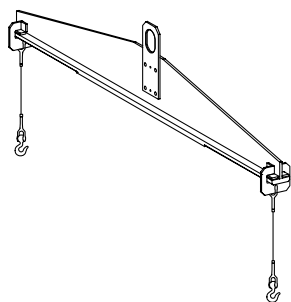
PWA 55594 -C

Figure T21. PWA 55594 HOLDER



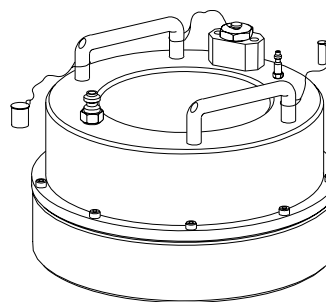
PWA 56325 -C

Figure T22. PWA 56325 HEATER



PWA 56336 -C

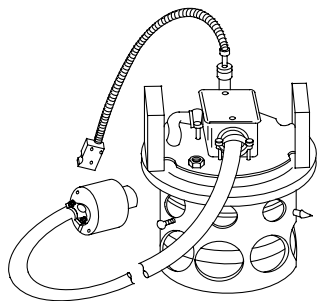
Figure T23. PWA 56336 SLING



PWA 56751 -C

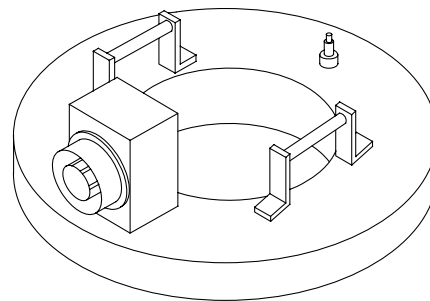
Figure T24. PWA 56751 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



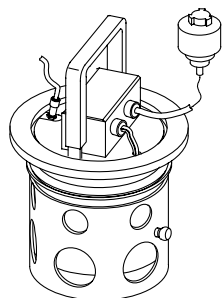
PWA 57151 -C

Figure T25. PWA 57151 HEATER



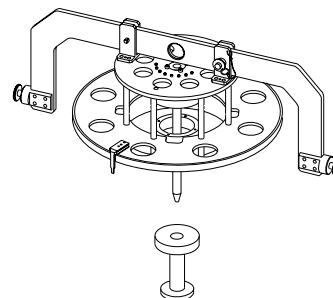
PWA 57401 -C

Figure T26. PWA 57401 HEATER



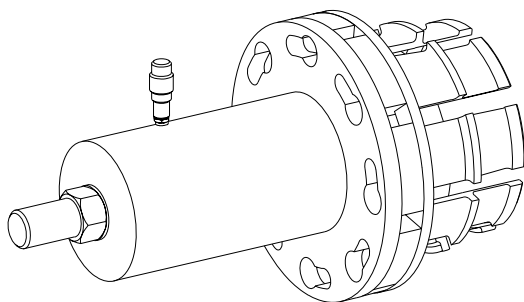
PWA 57495 -C

Figure T27. PWA 57495 HEATER



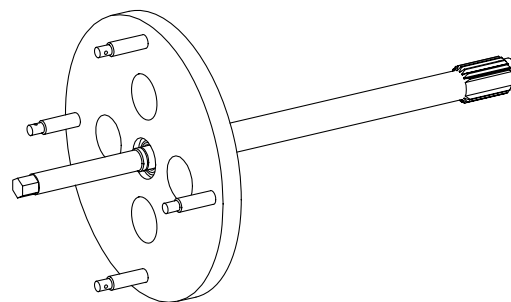
PWA 57506 -C

Figure T28. PWA 57506 FIXTURE



PWA 57530 -C

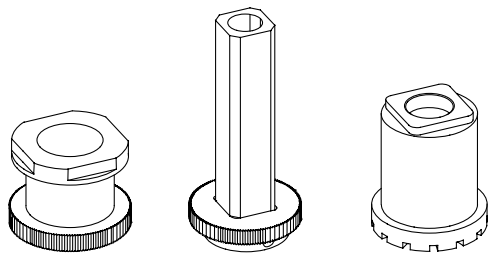
Figure T29. PWA 57530 PUSHHER/PULLER



PWA 57538 -C

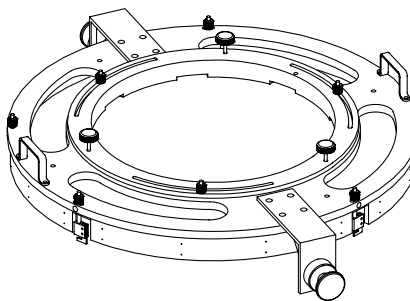
Figure T30. PWA 57538 ROTATOR

ILLUSTRATED SUPPORT EQUIPMENT (continued)



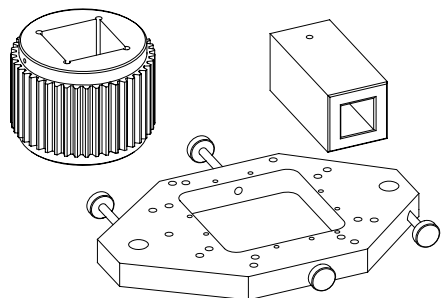
PWA 57664 -C

Figure T31. PWA 57664 EQUIPMENT SET



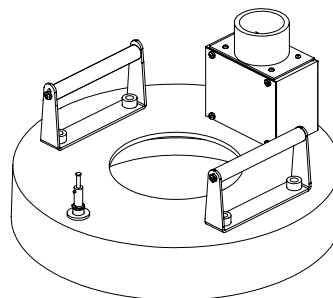
PWA 57712 -C

Figure T32. PWA 57712 ADAPTER



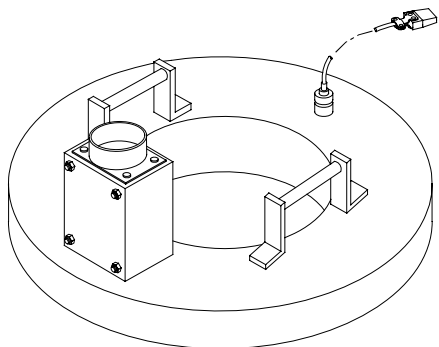
PWA 57806 -C

Figure T33. PWA 57806 ADAPTER SET



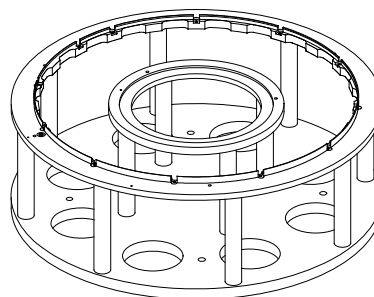
PWA 57862 -C

Figure T34. PWA 57862 HEATER



PWA 57885 -C

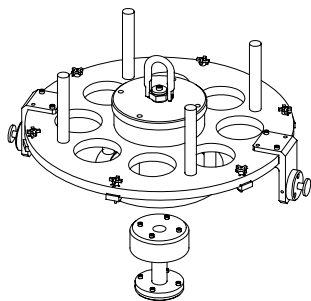
Figure T35. PWA 57885 HEATER



PWA 57918 -C

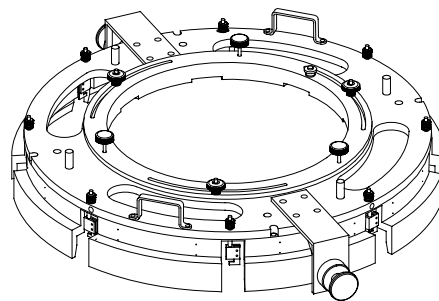
Figure T36. PWA 57918 FIXTURE

ILLUSTRATED SUPPORT EQUIPMENT (continued)



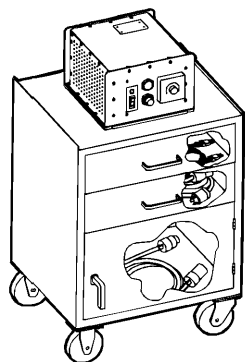
PWA 57919 -C

Figure T37. PWA 57919 FIXTURE



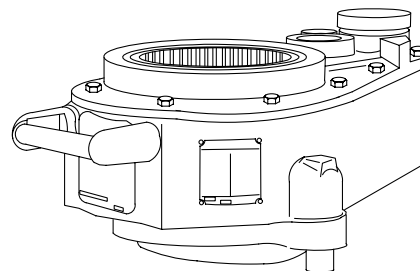
PWA 57920 -C

Figure T38. PWA 57920 FIXTURE



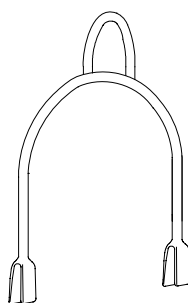
PWA 61685 -C

Figure T39. PWA 61685 CONTROL



SWE 8200 -C

Figure T40. SWE 8100/8200 TORQUE MULTIPLIER



SWE 81001 -C

Figure T41. SWE 81001/81002 SLING

1. INTRODUCTION.

a. This work package contains instructions for vertical assembly of rear of core engine module. The following major components and sections are installed:

- Compressor discharge manifolds
- Diffuser case assembly, and compressor stator heat shield
- No. 4 bearing
- No. 4 bearing front seal seat, No. 4 bearing internal pressure manifold No. 4 bearing oil scoop, No. 4 bearing inner race and rollers
- No. 4 bearing retaining nut
- No. 4 bearing housing
- No. 4 bearing rear seal assembly
- No. 4 bearing rear air sealing ring
- First stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring; and if applicable, front turbine case
- Static pressure probe
- Fuel nozzles
- Left and right fuel supply manifolds
- No. 4 bearing seal air supply manifold assembly
- Igniter plug depth check
- Rear compressor drive turbine rotor and stator

b. There are two rear core engine module configurations described as follows:

- (1) One configuration incorporates short diffuser case designed to accept separately installed front turbine case along with 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring.
- (2) Second configuration incorporates long diffuser case which does not require front turbine case.
- (3) Short diffuser case has inner and outer rear flanges in approximately same plane. Long diffuser case has outer rear flange approximately 6 inches aft of inner rear flange.

2. PRELIMINARY INSTRUCTIONS.

a. If required, rotate core engine module to front end down position per WP 709 00.

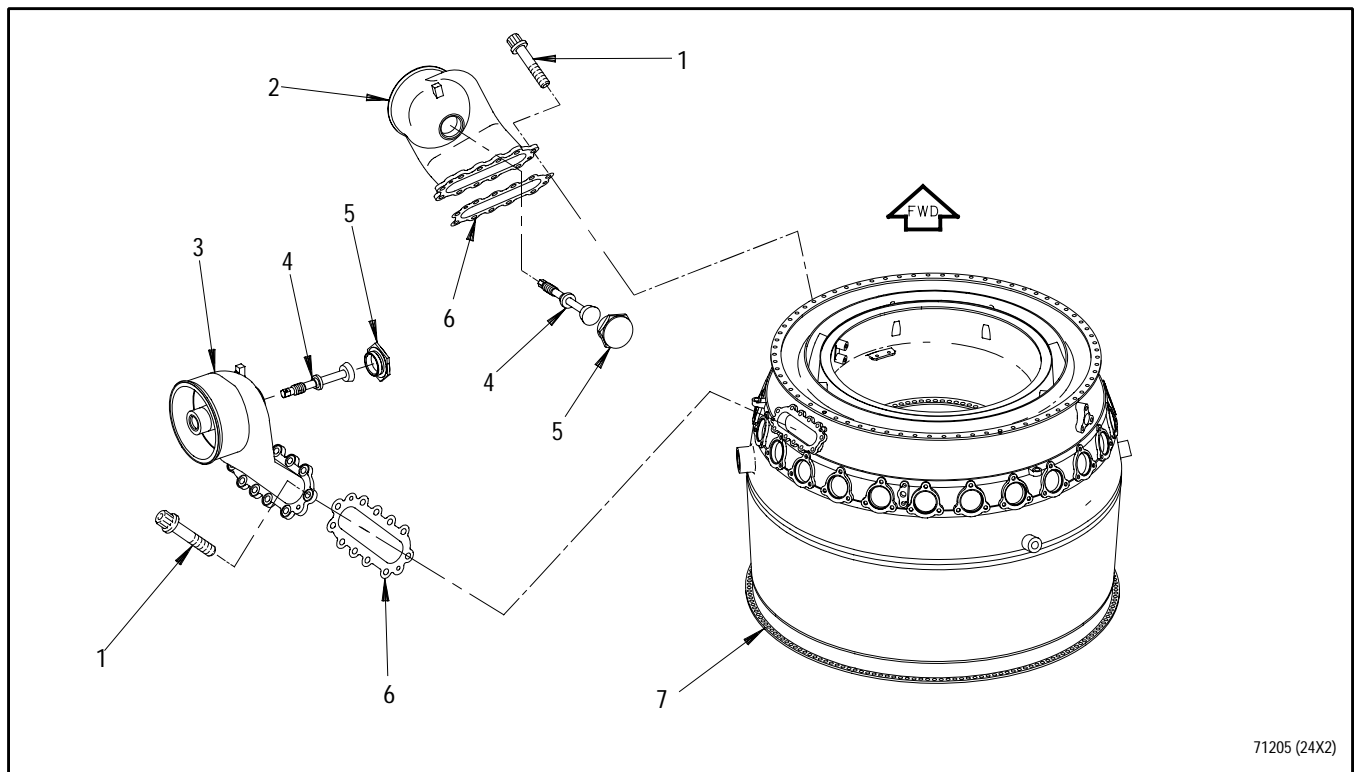
3. COMPRESSOR DISCHARGE MANIFOLDS - INSTALLATION.

(See Figures 1 and 2.)

- a. Install eyebolts of PWA 14175 sling equally spaced on outer rear flange of diffuser case(1 or 1A, figure 2). Secure eyebolts with nuts.
- b. Connect PWA 2388 hook to overhead hoist and to PWA 14175 sling. Raise diffuser case(1) and position on bench.

c. Install discharge manifolds(2 and 3, figure 1) as follows:

- (1) Install rod(4) in compressor discharge manifolds(2 and 3).
- (2) Install caps(5) to manifolds and torque 100 to 200 pound-inches.
- (3) Lockwire caps(5) using PN MS9226-04 wire.
- (4) Coat bolts(1) with MIL-L-7808 lubricating oil.
- (5) Install gaskets(6) to compressor discharge manifold bosses.
- (6) Install manifolds(2 and 3) and secure with bolts(1).
- (7) Torque bolts 75 to 85 pound-inches.
- (8) Lockwire bolts using PN MS9226-04 wire.



71205 (24X2)

1. Bolts
2. Compressor discharge manifold (right)
3. Compressor discharge manifold (left)
4. Rod
5. Cap
6. Gasket
7. Diffuser case

Figure 1. Compressor Discharge Manifolds - Installation

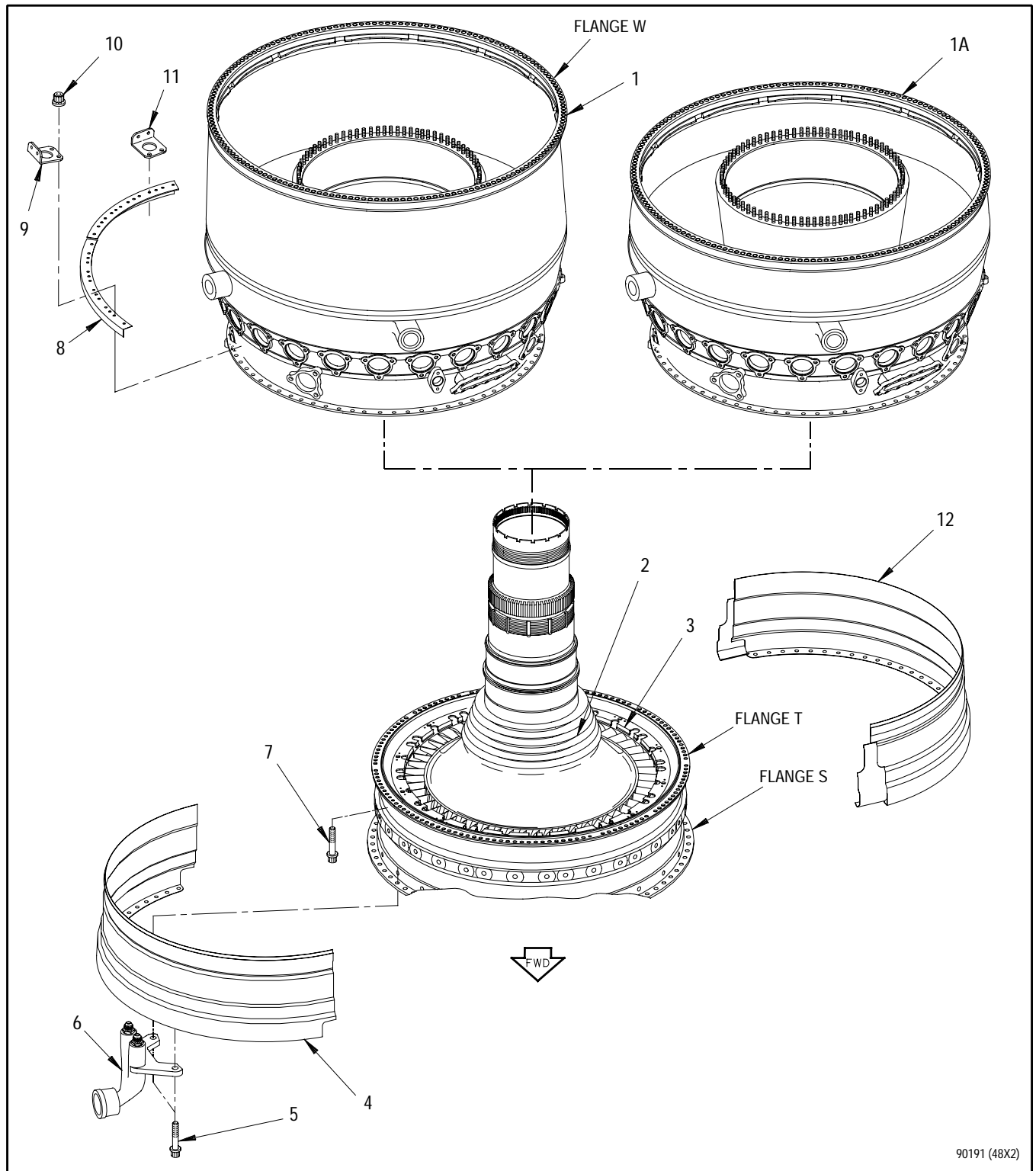
**3A. DIFFUSER CASE ASSEMBLY, AND
COMPRESSOR STATOR HEAT SHIELD -
INSTALLATION.**

(See Figures 2 through 4.)

- a. Connect PWA 2388 hook to
overhead hoist and to PWA 14175
sling.

Legend for figure 2

1. Diffuser case (long)
- 1A. Diffuser case (short)
2. No. 4 bearing front air seal
3. Compressor stator support
4. Compressor stator front heat shield (lower)
5. Bolt
6. Fuel manifold elbow
7. Bolt
8. Compressor stator rear heat shield segment
9. Bracket
10. Nut
11. Bracket
12. Compressor stator front heat shield (upper)



- b. Be careful when installing diffuser case(1 or 1A, figure 2) over rear hub. Keep case straight and level so No. 4 bearing (front) air seal(2) will not be damaged.

NOTE

Compressor stator support outer flange clocking feature (hole or pin) is just left of bottom center when viewed from front to rear. Clocking pin was installed in stator support assembly when originally delivered but may have been removed during prior maintenance.

- c. Lower diffuser case(1 or 1A) onto compressor stator support(3). Align diffuser case offset hole with clocking feature (pin or hole) in compressor stator support. If clocking pin is not installed in stator support, use LM 1106 pin to align offset hole in diffuser case with hole in stator support.

- d. Install upper and lower compressor stator front heat shields(4) and compressor stator rear heat shield segments(8) as follows:

NOTE

- No intermixing of silver plated and nonsilver plated nuts within a set allowed.
- Silver plated fasteners may be identified by thread color when new. Used parts will require part number check.

- (1) If silver plated nuts(10), typical PN 4023466, are used, the following procedures apply:

- (a) Apply MIL-L-7808 lubricating oil to bolts(7).
- (b) Install seven compressor stator rear heat shield segments(8) in clockwise direction looking forward starting at 9 o'clock position (bolt location 54), bracket(9) at bolt locations 28 and 29 and bracket(11) at bolt locations 43 and 44 with bolts(7) and nuts(10). Longer bolts are locations with brackets(9) and (11).
- (c) Torque nuts(10), 75 to 85 pound-inches in sequence shown in figure 3.

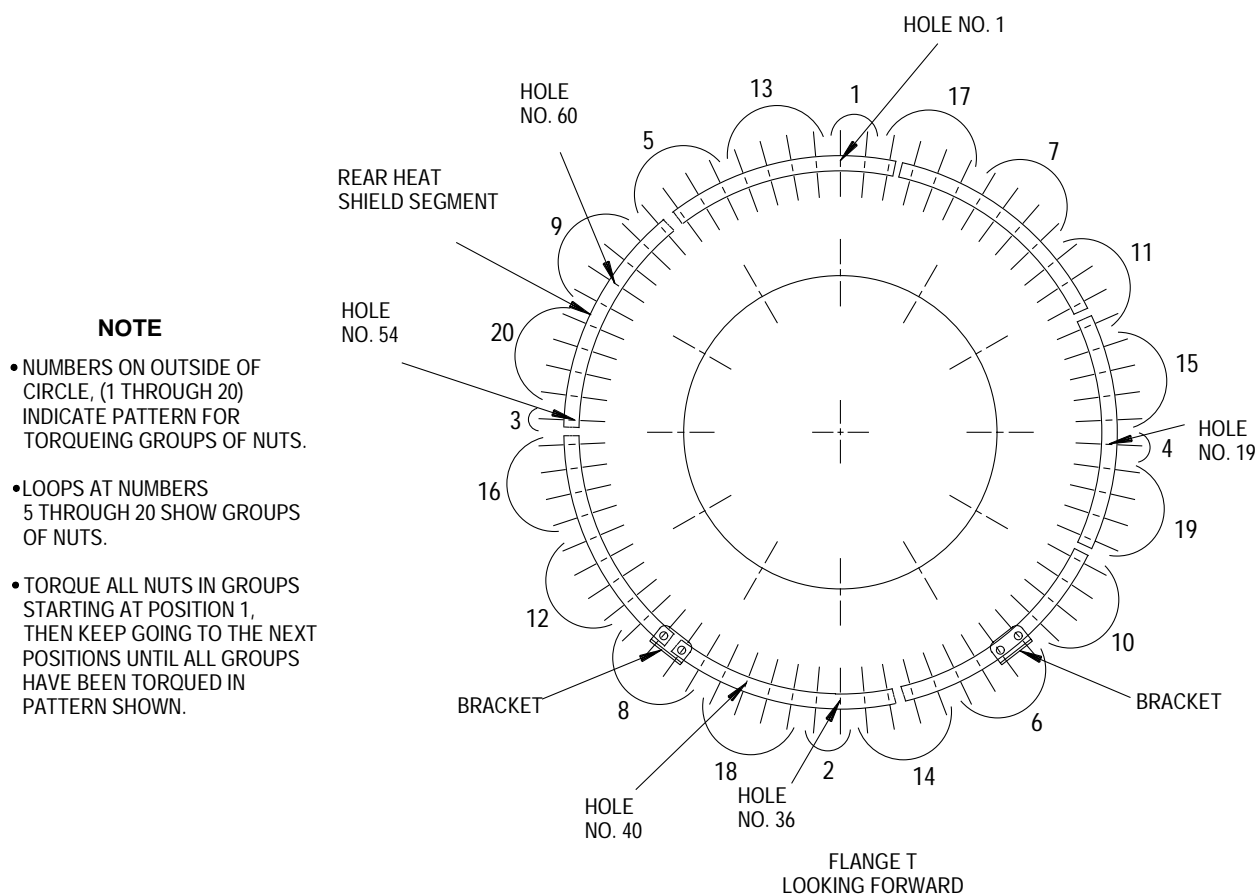


Figure 3. Flange T Bracket Locations and Bolt Torquing Sequence

- (2) If non-silver plated nuts(10, figure 2), typical PN ST2745-10, are used, the following procedures apply:
 - (a) Apply PWA 36545 antigalling compound to threads of bolts(7) per SPOP 748. Refer to T.O. 2-1-111.
 - (b) Install seven compressor stator rear heat shield segments(8) in clockwise direction looking forward starting at 9 o'clock position (bolt location 54), bracket(9) at bolt locations 28 and 29 and bracket(11) at bolt locations 43 and 44, with bolts(7) and nuts(10). Longer bolts at locations with brackets(9) and (11).
 - (c) Torque nuts(10), 54 to 60 pound-inches in sequence shown in figure 3.
- (3) Remove eight bolts from flange S.
- (4) If silver plated clinch nuts were used on the 10th through 12th case, install as follows:
 - (a) Apply MIL-L-7808 lubricating oil to bolts(5).
 - (b) Install upper compressor stator front heat shield(12, figure 2). Ensure heat shield segments(8) fit into grooves on rear flange of upper front heat shield(12). Secure with bolts(5). Do not torque bolts(5).

- (c) Install lower compressor stator front heat shield(4, figure 2). Ensure that heat shield segments(8) fit into grooves on rear flange of lower front heat shield(4).
- (d) Position fuel manifold elbow(6) at bolt location 33 and 36 and install remaining bolts(5).
- (e) Torque bolts(5), 75 to 85 pound-inches in sequence shown in figure 4.
- (5) If non-silver plated clinch nuts were used on the 10th through 12th case, install as follows:
- (a) Apply PWA 36545 antigalling compound to threads of bolts(5).
- (b) Install upper compressor stator front heat shield(12, figure 2). Ensure heat shield segments(8) fit into grooves on rear flange of upper front heat shield(12). Secure with bolts(5). Do not torque bolts(5).
- (c) Install lower compressor stator front heat shield(4, figure 2). Ensure heat shield segments(8) fit into grooves on rear flange of lower front heat shield(4).
- (d) Position fuel manifold elbow(6) at bolt locations 33 and 36 and install remaining bolts(5).
- (e) Torque bolts(5), 54 to 60 pound-inches in sequence shown in figure 4.

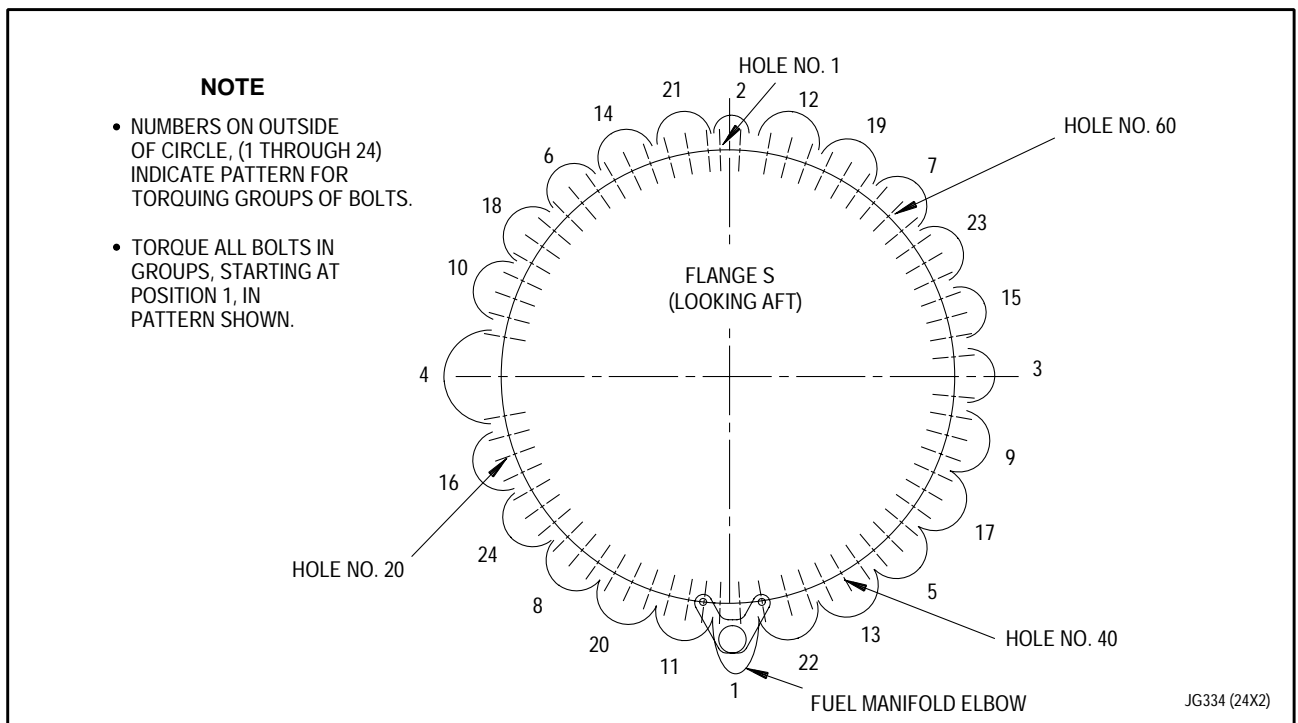


Figure 4. Flange S - Fuel Manifold Elbow Location and Bolt Torquing Sequence

**3B. NO. 4 BEARING FRONT CARBON SEAL -
VACUUM LEAK CHECK.**

- a. Vacuum leak check No. 4 bearing front carbon seal using PWA 56751 fixture, as follows:

- (1) Inspect PWA 56751 fixture packings and carbon seal contact surface for any condition that could damage carbon seal or cause vacuum leaks. Repair or replace fixture as required.
- (2) Install PWA 55134 plug in No. 4 bearing oil supply inlet at 12 o'clock position.
- (3) Remove PWA 56751 fixture detail-1 plug from storage boss on fixture.
- (4) Replace MS9020-121 packing on detail-1 plug, as required.
- (5) Install detail-1 plug in No. 4 bearing scavenge oil outlet at 6 o'clock position.



Carbon seal is fragile. Failure to handle fixture carefully may cause damage to seal or fixture.

- (6) Align PWA 56751 fixture retaining screws with bearing housing flange screw holes as fixture is lowered over compressor shaft.
- (7) Torque nine fixture retaining screws 32 to 36 pound-inches.

- (8) Perform vacuum leak check using PWA 50003 tester or Habco 1543003 tester as follows:

- (a) If PWA 50003 tester is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 024 00.
- (b) Connect vacuum and gage lines from tester to fittings on PWA 56751 fixture.
- (c) Refer to T.O. 2J-F100-53-1, WP 024 00 for PWA 50003 tester operating instructions or SWP 024 01 for Habco 1543003 tester operating instructions.
- (d) Set vacuum at 9.5 psi. Observe rate of leakage. Leakage shall not exceed 2 pounds per hour.
- (e) If leakage exceeds 2 pounds per hour, tap installed fixture with a rawhide mallet to reseal bearing seal.

- (f) Check rate of leakage.

- b. If leakage continues beyond limit, disconnect tester from PWA 56751 fixture and proceed as follows:

- (1) Remove PWA 56751 fixture.
- (2) Compress No. 4 bearing front carbon seal assembly against its springs. Ensure seal assembly does not hang on springs or internal seal ring.

- (3) Remove seal assembly from support per WP 030 00.
- (4) Clean seal assembly. Refer to T.O. 2-1-111.
- (5) Glass lap carbon seal. Refer to T.O. 2-1-111.
- (6) Ensure pressure side of metal seal ring is up per WP 612 00.
- (7) Check ring gap clearance of installed metal seal ring per WP 612 00. Ring gap clearance shall be 0.087 to 0.113 inch.
- (8) Install seal assembly per WP 612 00.
- (9) Perform vacuum leak check per step a.

4. NO. 4 BEARING - MEASUREMENT OF PARTS BEFORE INSTALLATION.

(See Figure 5.)

- a. Measure the following parts as shown in figure 5:
 - Distance from end rear compressor rear hub to rear face of No. 4 bearing front air seal.
 - Thickness of No. 4 bearing front seal seat
 - Thickness of No. 4 bearing scoop
 - Thickness of No. 4 bearing inner race
 - Thickness of No. 4 bearing rear seal seat
 - Thickness of No. 4 bearing retaining nut
- b. Measurements will be used to check seating of parts after No. 4 bearing is installed.

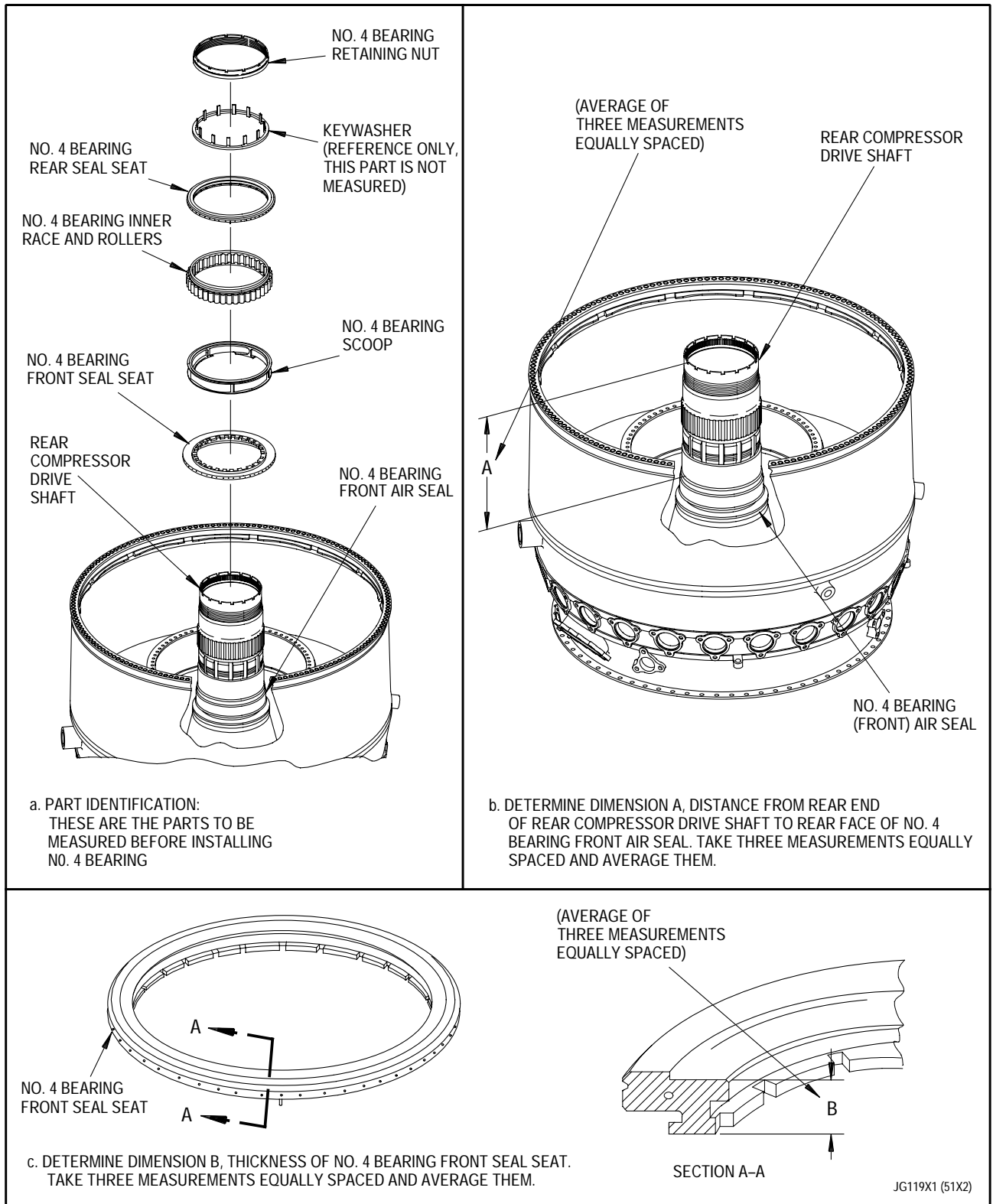


Figure 5. No. 4 Bearing Area - Measurement of Parts Before Installation (Sheet 1 of 3)

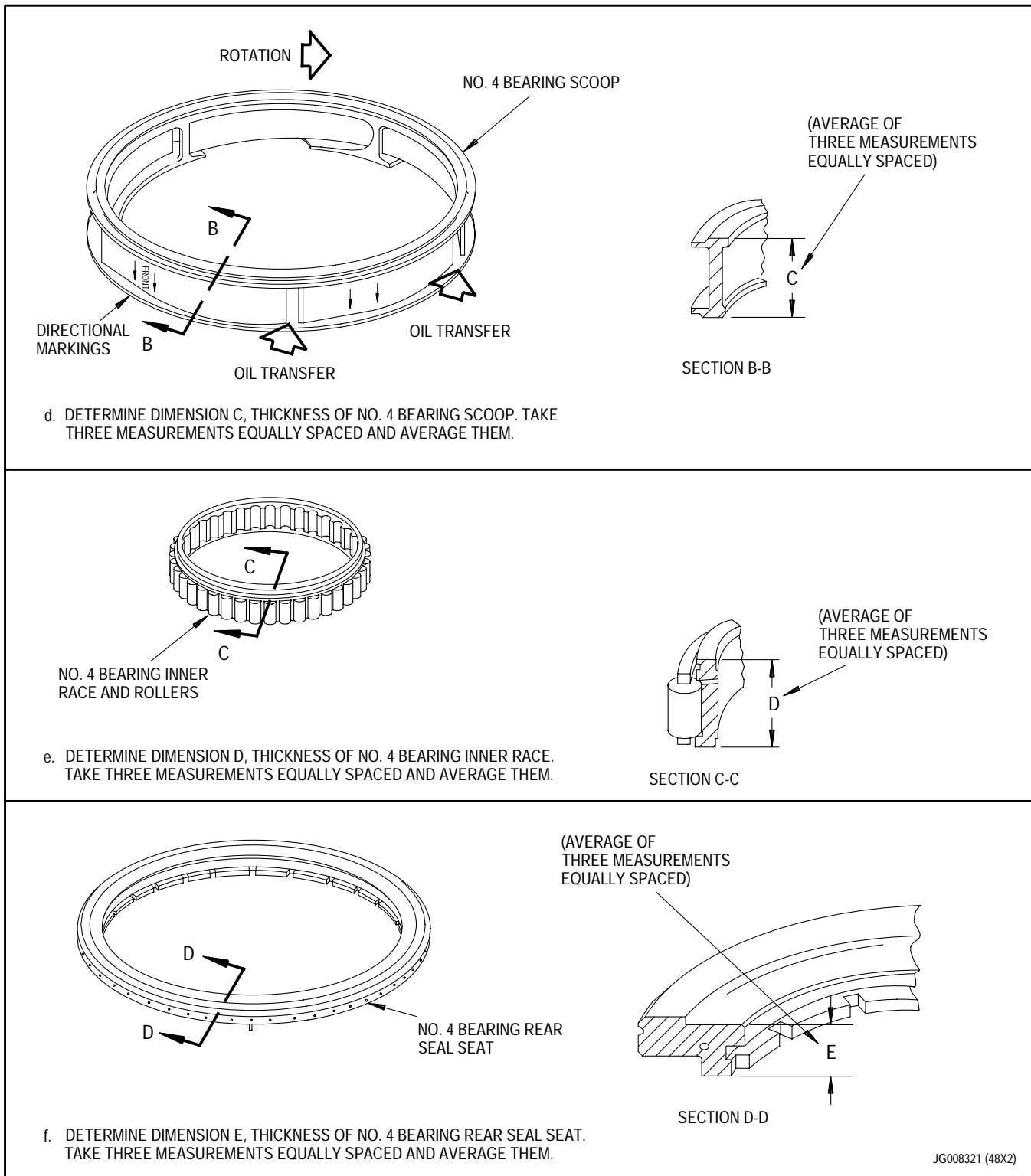


Figure 5. No. 4 Bearing Area - Measurement of Parts Before Installation (Sheet 2 of 3)

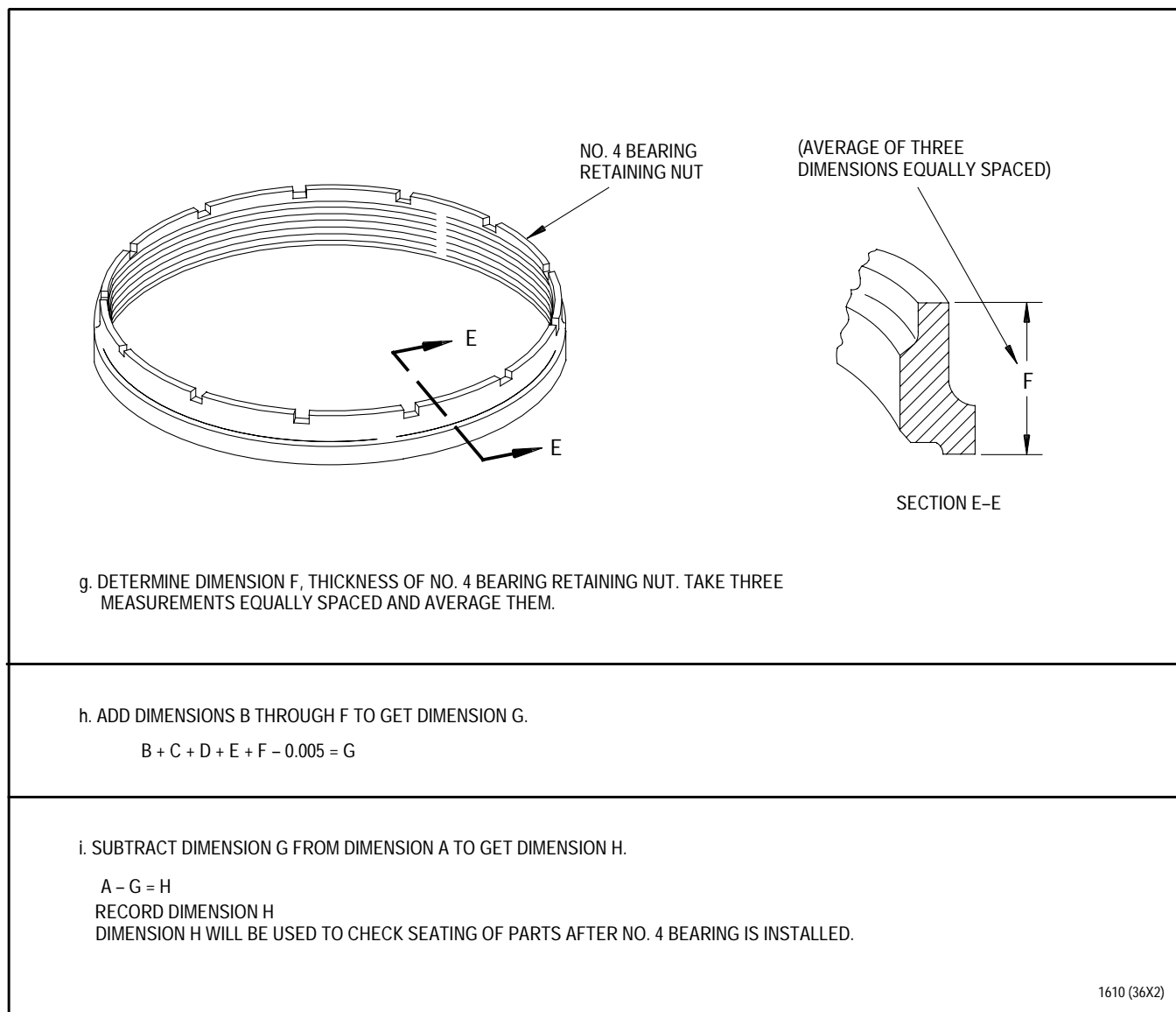


Figure 5. No. 4 Bearing Area - Measurement of Parts Before Installation (Sheet 3 of 3)

5. NO. 4 BEARING FRONT SEAL SEAT, NO. 4 BEARING INTERNAL PRESSURE MANIFOLD, NO. 4 BEARING OIL SCOOP, NO. 4 BEARING INNER RACE AND ROLLERS, NO. 4 BEARING REAR SEAL SEAT - INSTALLATION.

(See Figures 6 through 8.)

- a. Install C-seal(1A, figure 6) into ID groove of No. 4 bearing rear seal seat(1B) as follows:

- (1) Position seal seat on clean surface with sealing face up or side marked THIS SIDE FACING BEARING down.



Twisting or kinking C-seal during installation may damage C-seal.

- (2) Install C-seal into ID groove of seal seat with open side of C-seal facing up. Ensure C-seal does not get twisted or kinked.

- a1. Heat the following parts in hot oil to 225° to 275°F (107° to 135°C) for 20 minutes:

- No. 4 bearing front seal seat(4)
- No. 4 bearing scoop(3)
- No. 4 bearing inner race and rollers(2) (installed in PWA 51790 retainer)
- No. 4 bearing rear seal seat(1B) and C-seal(1A) assembly

NOTE

To permit clearance when installing No. 4 bearing front seal seat, No. 4 bearing internal oil pressure manifold must be removed.

- b. Remove bolts(1 and 2, figure 7). Remove No. 4 bearing internal oil pressure manifold(3).

- c. Install No. 4 bearing front seal seat(4, figure 6) as follows:

- (1) If front seal seat is being installed with new or different carbon seal, lap seat and perform flatness inspection. Refer to T.O. 2J-F100-53-1, WP 092 00 and 095 00.



Careless handling of No. 4 bearing front carbon seal during installation of holders may damage carbon seal.

NOTE

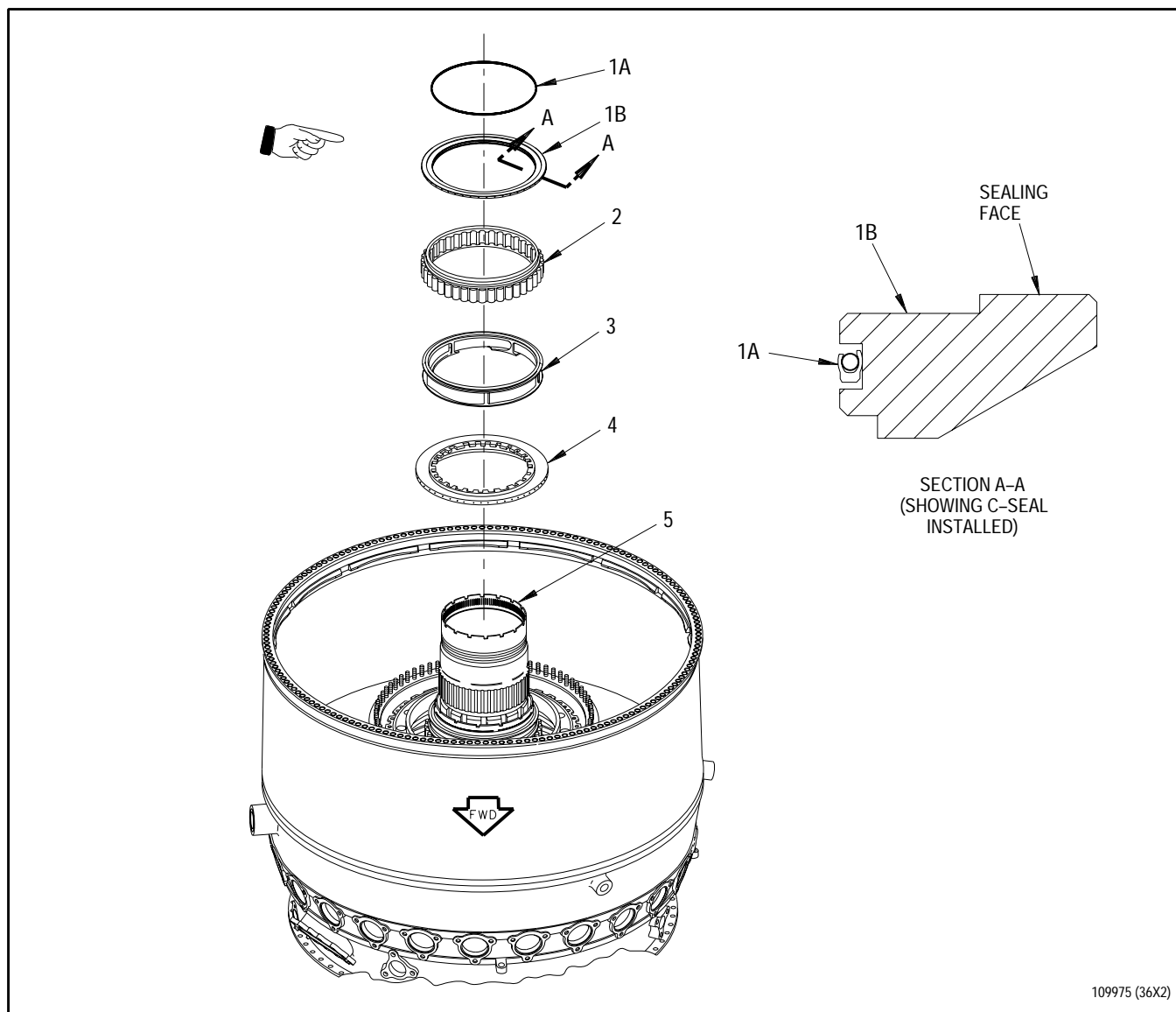
Holders are equally spaced to equalize compression force of No. 4 bearing front carbon seal.

- (1a) Install two LM 1097 holders equally spaced as follows:

- (a) Compress No. 4 bearing carbon seal manually.
- (b) Place bent, perforated end of holder over bearing compartment stud.
- (c) Secure holder with detail knurled nut.

- (2) Install front seal seat(4) on rear compressor driveshaft(5) with pin down (forward) and puller groove up (rearward).

- (3) Install PWA 50975 drift and push front seal seat(4) down to compress carbon seal.



- 1A. C-seal
- 1B. No. 4 bearing rear seal seat
- 2. No. 4 bearing inner race and rollers
- 3. No. 4 bearing scoop
- 4. No. 4 bearing front seal seat
- 5. Rear compressor driveshaft

Figure 6. No. 4 Bearing Front Seal Seat, No. 4 Bearing Oil Scoop, No. 4 Bearing Inner Race and Rollers, No. 4 Bearing Rear Seal Seat - Installation

- (4) Hold drift down on front seal seat(4) until seat cools enough to grip rear compressor driveshaft(5).



Careless handling of holders during removal may damage No. 4 bearing front carbon seal and seal seat.

- (5) Remove LM 1097 holders.

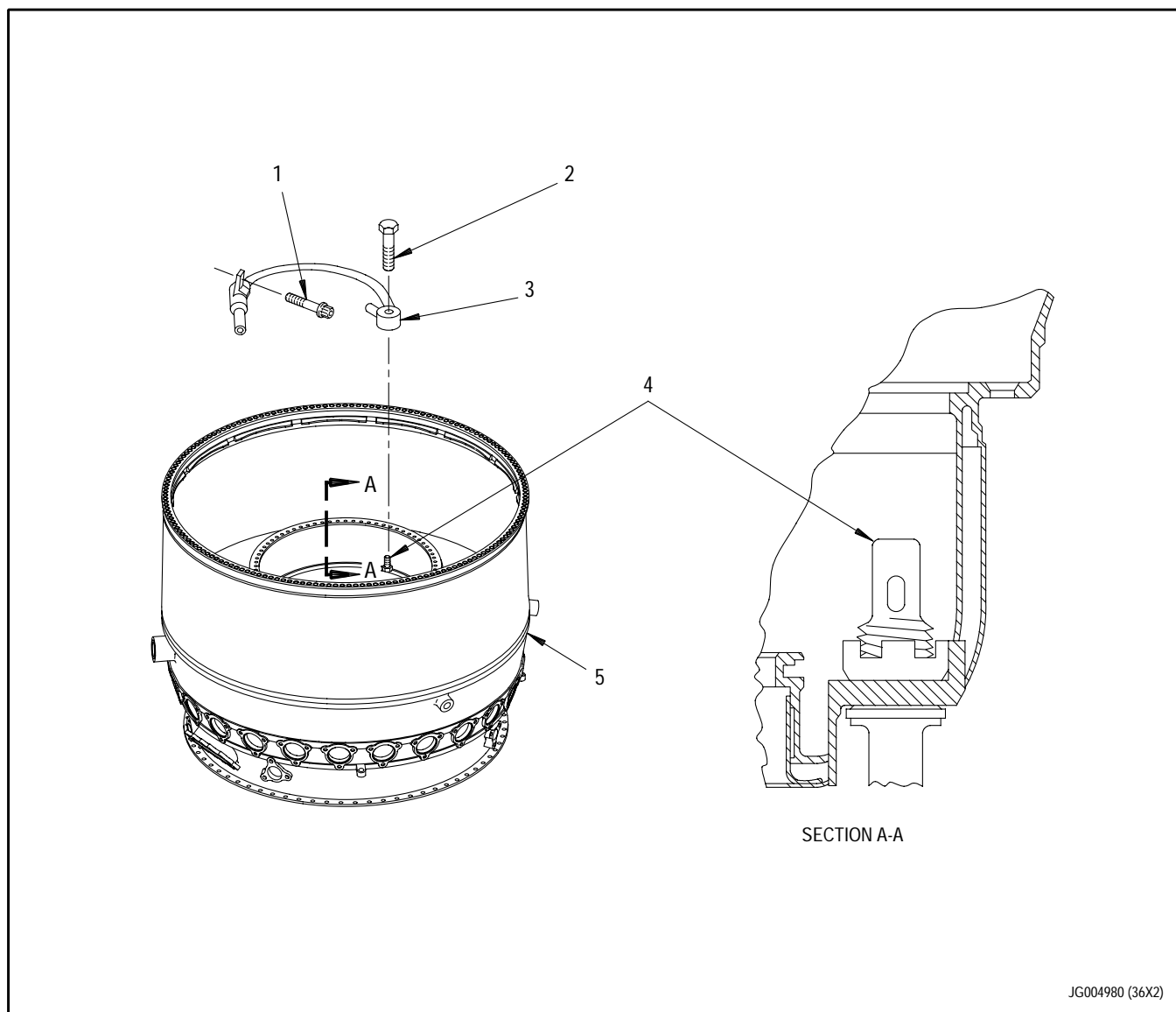
- d. Install No. 4 bearing internal oil pressure manifold(3, figure 7) as follows:

NOTE

No. 4 bearing internal oil pressure manifold(3) is installed at this time. It cannot be installed after No. 4 bearing is in place.

- (1) Install No. 4 bearing internal oil pressure manifold(3) (with oil jets pointing up) so larger end fits onto end of No. 4 bearing internal pressure tube assembly(4).
- (2) Coat bolts(1) and (2) with MIL-L-7808 lubricating oil.
- (3) Secure manifold(3) to No. 4 bearing seal support using bolt(1).
- (4) Torque bolt 24 to 36 pound-inches.

- (5) Secure manifold(3) to end of tube assembly(4) using bolt(2).
- (6) Torque bolt 24 to 36 pound-inches.
- (7) Lockwire bolt(1) using PN MS9226-04 wire.
- (8) Lockwire bolt(2) using PN MS9226-04 wire.



JG004980 (36X2)

Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Bolt	MIL-L-7808 Oil	24 to 36	MS9226-04
2.	Bolt	MIL-L-7808 Oil	24 to 36	MS9226-03
3.	No. 4 Bearing Internal Oil Pressure Manifold	-	-	-
4.	No. 4 Bearing Internal Pressure Tube Assembly	-	-	-
5.	Diffuser Case	-	-	-

Figure 7. No. 4 Bearing Internal Oil Pressure Manifold - Installation

- e. Install No. 4 bearing scoop(3, figure 6) as follows:
- (1) Remove scoop(3) from hot oil tank.
 - (2) Install scoop(3) onto rear compressor driveshaft(5). Ensure arrows point down. (See figure 8.)
 - (3) Seat scoop against No. 4 bearing front seal seat with PWA 50975 drift.

- f. Install No. 4 bearing inner race and rollers(2, figure 6) as follows:

NOTE

Inner race and rollers are held together with PWA 51790 retainer. Install bearing with retainer in place.

- (1) Install inner race and rollers(2) and PWA 51790 retainer onto rear compressor driveshaft(5). Be sure that puller groove of race is up (rearward).

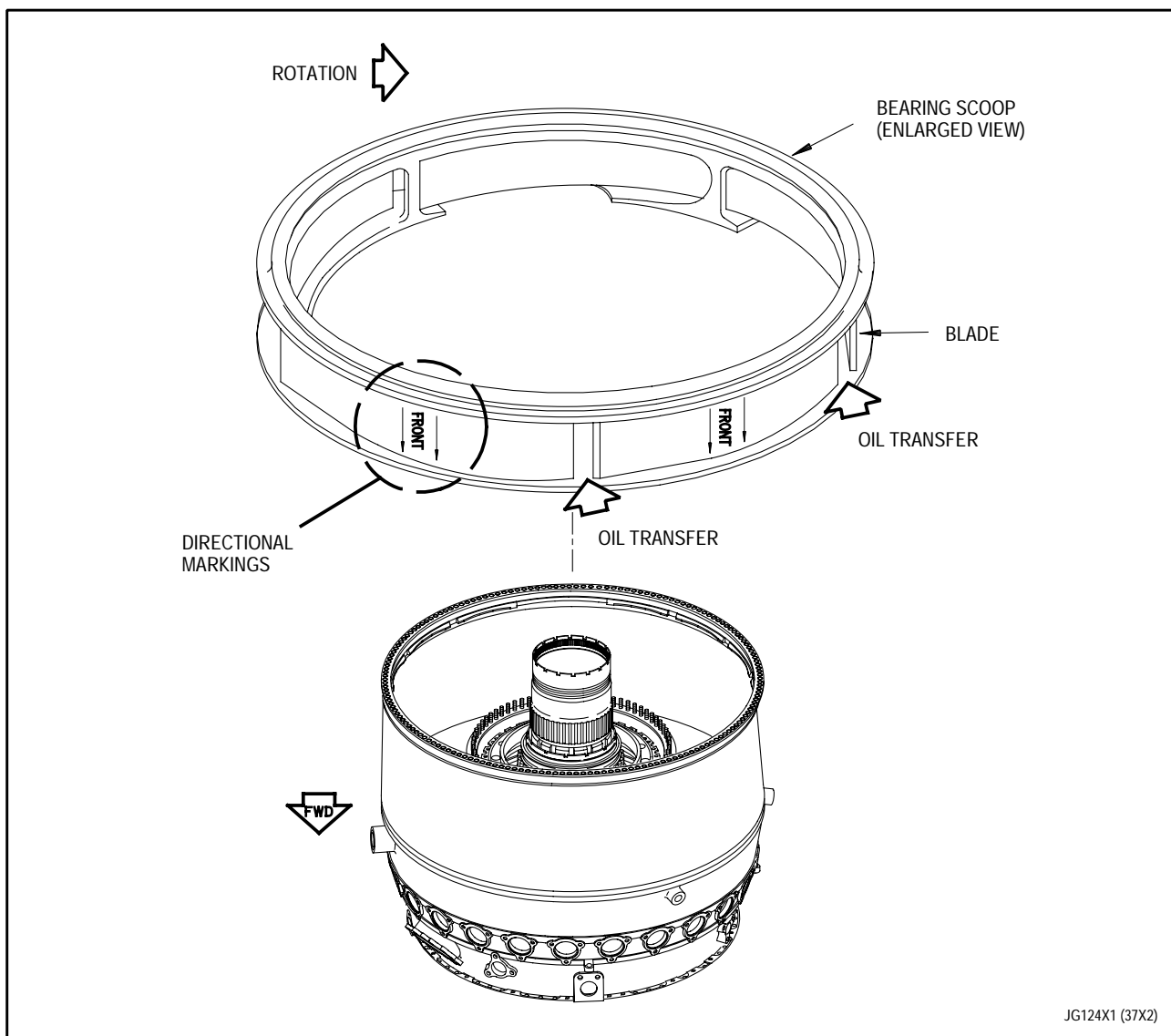


Figure 8. No. 4 Bearing Scoop - Installation

- (2) Seat inner race and rollers(2) against No. 4 bearing scoop(3) with PWA 50975 drift. Leave drift in place until inner race has cooled enough to grip shaft.

- (3) Remove PWA 50975 drift and PWA 51790 retainer.

g. Install No. 4 bearing rear seal seat(1B) and C-seal(1A) assembly as follows:

- (1) If seal seat is being installed with new or different carbon seal, lap seat and perform flatness inspection. Refer to T.O. 2J-F100-53-1, WP 092 00 and 095 00.
- (2) Install rear seal seat(1B) and C-seal(1A) assembly onto rear compressor driveshaft(5) with sealing face up (rearward).
- (3) Install PWA 50975 drift over seal seat(1 or 1B), tap to seat rear seal seat. Leave drift in place until rear seal seat has cooled enough to grip shaft.
- (4) Remove PWA 50975 drift.

6. NO. 4 BEARING RETAINING NUT - INSTALLATION.

(See Figures 9 and 10.)

- a. Install PN 4002452 key washer(7, figure 9) onto rear compressor driveshaft so tabs are facing up (rearward).

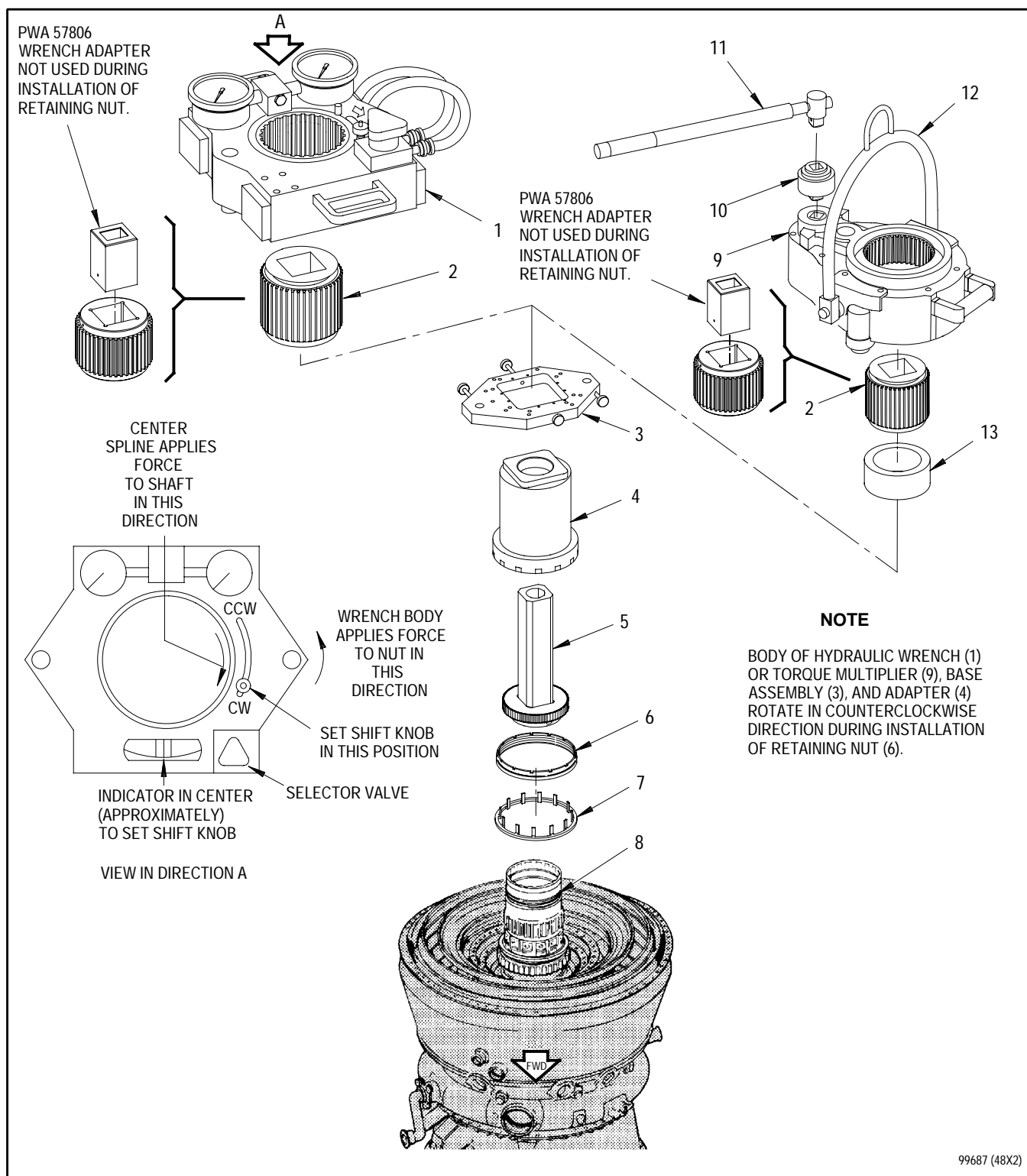


Figure 9. No. 4 Bearing Retaining Nut - Installation Tooling

Legend for figure 9

- | | |
|--------------------------------|--|
| 1. PWA 50308 hydraulic wrench | 8. Rear compressor driveshaft (rear hub) |
| 2. PWA 57806 adapter assembly | 9. SWE 8100/8200 torque multiplier |
| 3. PWA 57806 base assembly | 10. 0.750 inch drive ratchet adapter |
| 4. PWA 57664 adapter assembly | 11. 0.750 inch drive work handle |
| 5. PWA 57664 immobilizer | 12. SWE 81001/81002 sling |
| 6. No. 4 bearing retaining nut | 13. LM 1022 spacer |
| 7. Key washer | |

NOTE

Retaining nut has left-hand thread.

- b. Install No. 4 bearing retaining nut(6) counterclockwise on rear compressor drive turbine so that slots are up.

NOTE

PWA 57664 detail-2 immobilizer spline and detail-9 immobilizer shaft are installed as an assembly, and are referred to as PWA 57664 detail immobilizer.

- c. Install PWA 57664 detail immobilizer(5) to engage splines in rear compressor driveshaft.
- d. Install PWA 57664 detail-1 adapter assembly(4) to engage in slots of No. 4 bearing retaining nut(6).
- e. Install PWA 57806 detail-3 base assembly(3) onto PWA 57664 detail-1 adapter assembly(4).
- f. Ensure PWA 57806 wrench adapter assembly is disengaged from PWA 57806 adapter assembly(2) prior to use as illustrated in figure 9. Install PWA 57806 adapter assembly(2) onto PWA 57664 adapter assembly(4). If SWE 8100/8200 torque multiplier(9) is used, install LM 1022 spacer(13) between adapter assembly(2) and adapter assembly(4).
- f1. If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling(12) onto torque multiplier.
- f2. Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 hydraulic wrench(1) or connect PWA 2388 hook to SWE 81001/81002 sling(12).
- g. Install PWA 50308 hydraulic wrench(1) or SWE 8100/8200 torque multiplier(9) onto PWA 57806 base assembly(3). Tighten knurled knobs.
- h. Connect hoses to hydraulic wrench(1) or attach ratchet adapter(10) and work handle(11) to torque multiplier.
- i. Turn on hydraulic wrench. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.

- j. Torque No. 4 bearing retaining nut as follows:

NOTE

Retaining nut has left-hand thread.

- (1) Set hydraulic wrench or torque multiplier to actuate splines clockwise. Body of wrench or torque multiplier will move counterclockwise to tighten nut while splines at center of wrench or torque multiplier remain stationary.
- (1a) Actuate hydraulic wrench or torque multiplier to torque nut 9,900 to 10,100 pound-inches.
- (2) Align zero degree marks on scales of hydraulic wrench or torque multiplier.
- (3) Continue tightening nut by turning through angle of 52 to 56 degrees.



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut causing damage to engine components.

- (4) Loosen nut to zero torque.
- (5) Torque nut 9,900 to 10,100 pound-inches.
- (6) Align zero degree marks on scales of hydraulic wrench or torque multiplier.
- (7) Continue tightening nut by turning through angle of 52 to 56 degrees.

- (8) Loosen nut to zero torque.
- (9) Torque nut 9,900 to 10,100 pound-inches.
- (10) Check zero degree marks on scales of hydraulic wrench or torque multiplier.
 - (a) If marks are aligned, or if mark on outer scale is beyond mark on inner scale within one degree go to step (11).
 - (b) If marks are not aligned, repeat steps (6) through (9); then perform step (11).
- (11) Continue tightening nut by turning through angle of 52 to 56 degrees.
- (12) Turn off hydraulic wrench and disconnect hoses or remove ratchet adapter and work handle from torque multiplier.
- (13) Loosen knurled knobs on base assembly(3).
- (14) Remove hydraulic wrench or torque multiplier using hoist with nylon strap or sling respectively. Remove tooling.
- (15) Check to see if tabs of key washer(7) are lined up with slots of nut. If necessary, further tighten nut up to 2°19' more to line up key washer tab. Do not bend key washer tabs.

- k. Check to see that No. 4 bearing is seated per figure 10.

l. Deleted.

7. NO. 4 BEARING HOUSING - INSTALLATION.

(See Figures 11 and 12.)

NOTE

The 12 o'clock position is located by an X mark on diffuser case OD flange.

- a. Install two PWA 14383 aligning pins in flange of No. 4 bearing seal support(4, figure 11). Install one pin in offset hole at 12 o'clock position. Install second pin 180 degrees opposite.

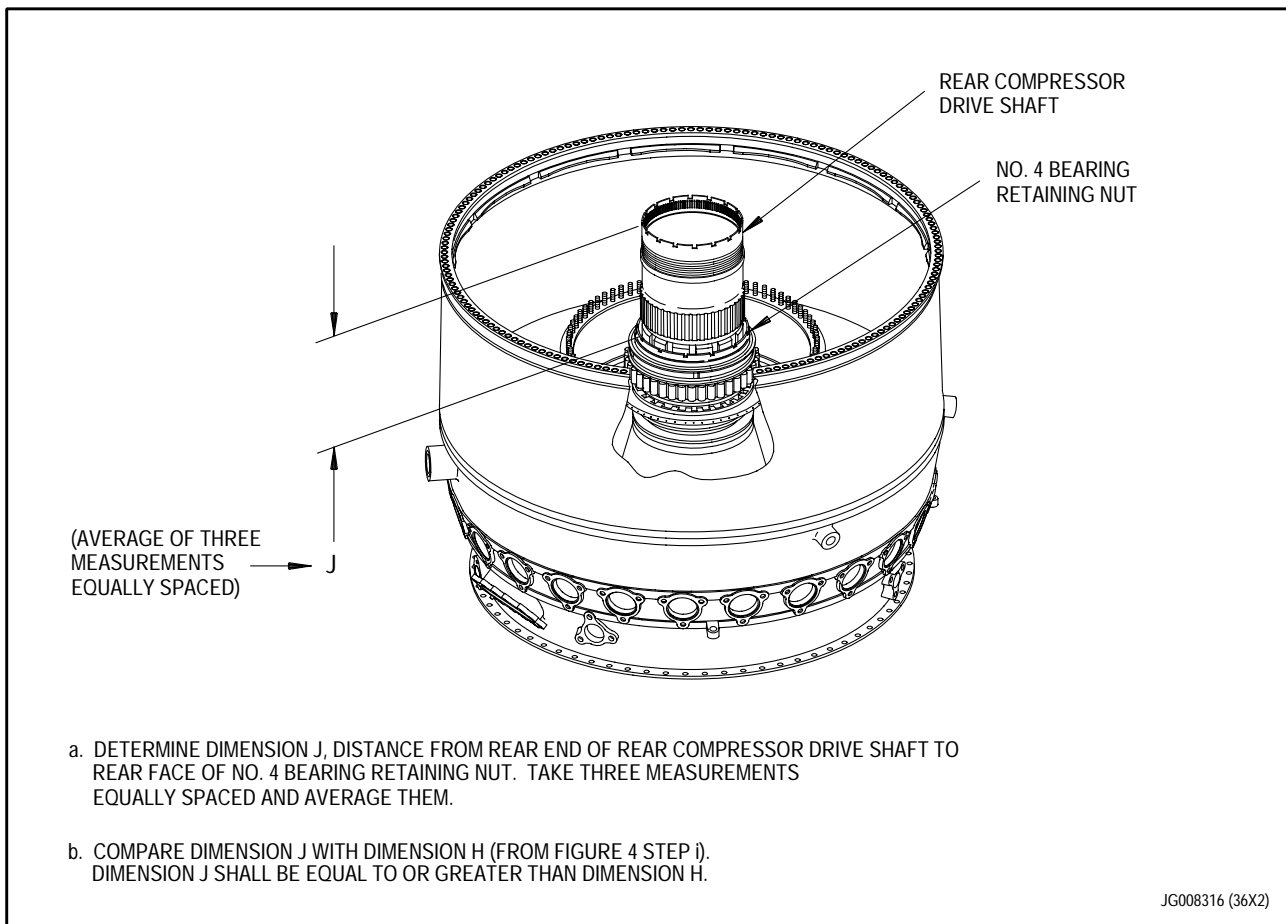


Figure 10. No. 4 Bearing - Final Seating Check

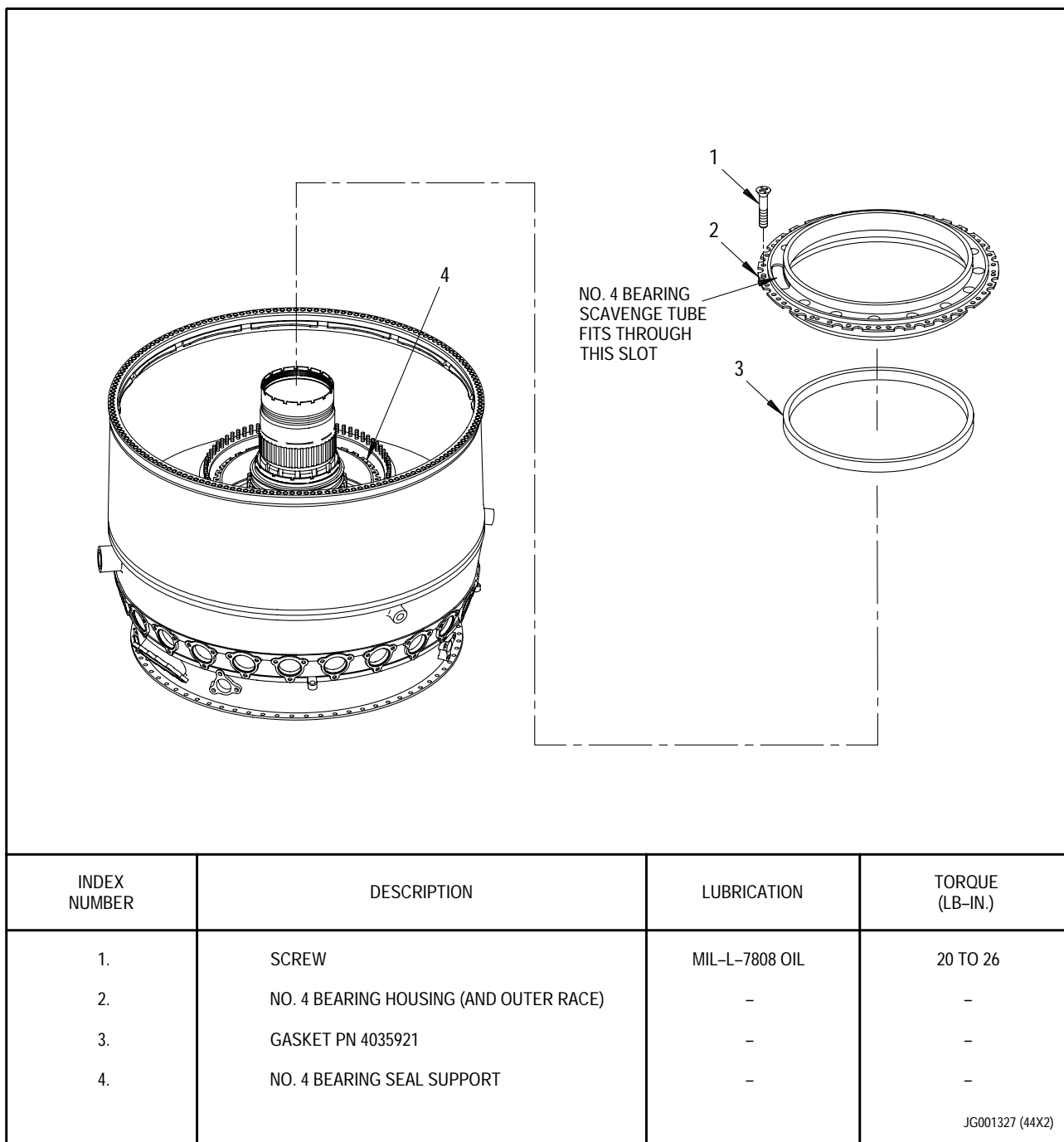


Figure 11. No. 4 Bearing Housing and No. 4 Bearing Rear Seal Support - Installation

- b. Install PWA 57885 heater over rear compressor driveshaft so it sits on inner flange of No. 4 bearing seal support. Ensure thermocouple touches flange of seal support.
- c. Connect PWA 61685 heater control to PWA 57885 heater. Heat flange 200° to 210°F (93° to 98°C) for minimum of 5 minutes.
- d. Install PWA 57538 rotator through 6 o'clock strut of intermediate case. Engage rotator with gearbox drive coupling.
- e. Turn off and remove PWA 57885 heater and PWA 61685 heater control.
- f. Install gasket(3) on No. 4 bearing seal support(4).

- g. Install No. 4 bearing housing as follows:

NOTE

- No. 4 bearing outer race retaining nut is in front side of No. 4 bearing housing.
- No. 4 bearing scavenge tube fits through slot in No. 4 bearing housing.
 - (1) Install No. 4 bearing housing(2), front side down, while rotating rear compressor with PWA 57538 rotator, over No. 4 bearing rollers on rear compressor driveshaft to prevent rollers from skidding against outer race.
 - (2) Align offset hole at 12 o'clock position in bearing housing with aligning pin in offset hole in No. 4 bearing seal support.

- h. Seat No. 4 bearing housing as follows:



Do not install workbolts in center hole where three holes are grouped together (1, figure 12). These holes could be stripped if used to seat support.

NOTE

0.190-32UNJF workbolts,
0.625 inch long.

- (1) Install 12 workbolts, equally spaced around flange of No. 4 bearing support at Locations A per figure 12. Do not install workbolts in center hole where three holes are grouped together (1).

- (2) Torque workbolts 32 to 36 pound-inches as follows:

- (a) Torque bolts at 12 o'clock and 6 o'clock position.
- (b) Torque bolts at 3 o'clock and 9 o'clock position.
- (c) Torque all remaining bolts.
- (d) Continue torquing all bolts, until they maintain 32 to 36 pound-inches torque.

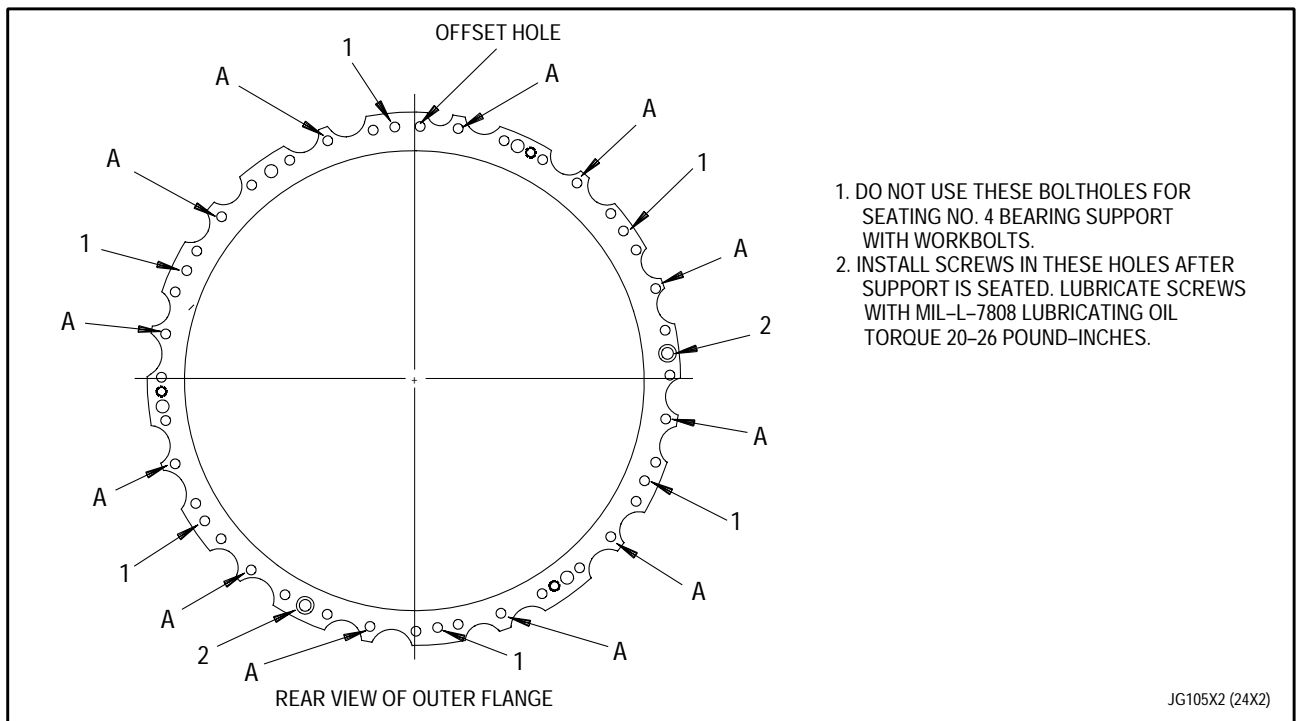


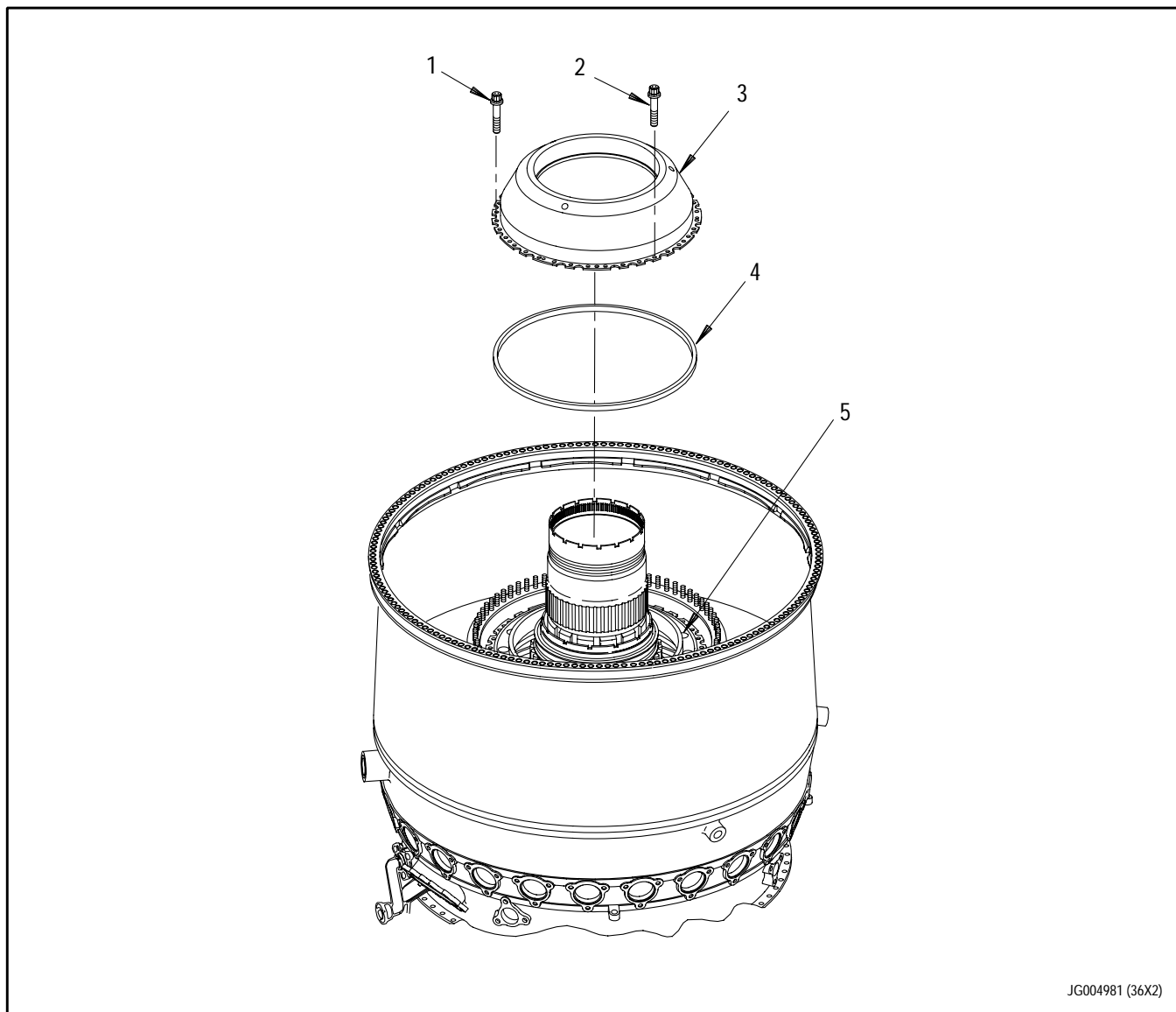
Figure 12. No. 4 Bearing Housing Bolthole Flange

- (2a) Using dial indicator, measure flatness runout on surface of No. 4 bearing rear seal seat as follows:
 - (a) Secure dial indicator and place tip of stylus on rear seal seat.
 - (b) Slowly turn rear compressor rear hub. Measurement on dial indicator gage shall not vary more than 0.001 inch.
 - (c) It is permissible to remove and re-index rear seal seat to gain correct flatness runout.
- (2b) Bend key washer tabs to secure No. 4 bearing retaining nut.
- (3) Lubricate two screws(1, figure 11) with MIL-L-7808 lubricating oil.
- (4) Install screws in countersunk holes at locations shown(2, figure 12). Torque screws 20 to 26 pound-inches.
- (5) Ensure screw heads are flush with or below surface of No. 4 bearing support.
- (6) Remove workbolts.
- (7) Remove PWA 57538 adapter.

8. NO. 4 BEARING REAR SEAL SUPPORT ASSEMBLY - INSTALLATION.

(See Figures 13 and 14.)

- a. Heat No. 4 bearing rear seal support assembly(3, figure 13) as follows:
 - (1) Position rear seal support assembly on bench so flange of support is up.
 - (2) Position PWA 56325 or PWA 52454 heater on snap diameter of rear seal support. Ensure thermocouple of heater touches rear seal support.
 - (3) Connect PWA 61685 or PWA 25672 control and thermocouple to receptacles marked detail-3 heating element on heater.
 - (4) Heat snap diameter of rear seal assembly to 200°F (93°C) for 10 minutes.



Index Number	Description	Lubrication	Torque (lb-in.)	Lockwire
1.	Bolt	PWA 36053-3 Antiseize	20 to 26	MS9226-04
2.	Bolt (PN MS9565-08)	-	36 to 40	-
3.	No. 4 Bearing Rear Seal Support	-	-	-
4.	PN 4035921 Gasket	-	-	-
5.	No. 4 Bearing Housing	-	-	-

Figure 13. No. 4 Bearing Rear Seal Assembly - Installation

- b. Install gasket(4) on front side of No. 4 bearing housing(5).
- c. Using locally manufactured X821992 handling tool, install No. 4 bearing rear seal support(3) as follows:
 - (1) Install No. 4 bearing rear seal support(3) onto No. 4 bearing housing(5). Align offset holes at 12 o'clock position.
 - (2) Remove X821992 handling tool.
 - (3) Install bolts(1) at Locations A as shown in figure 14 and seat No. 4 bearing rear seal support.
 - (4) Inspect for scrap wire that may be lodged in bolthead lockwire hole. Remove scrap wire.
 - (5) Apply PWA 36053-3 nickel antiseize compound to threads and washer face of six bolts(1).
 - (6) Remove PWA 14383 aligning pins.
 - (7) Torque bolts 180 degrees apart 20 to 26 pound-inches. Continue torquing until torque is maintained. Remove any excess antiseize compound.
 - (8) Deleted.
 - (9) Install bolts(2) in flange of No. 4 bearing rear seal support(3).
 - (10) Torque bolts per figure 13 in an alternating 180 degree pattern.
 - (11) Loosen bolts to zero torque.
 - (12) Torque bolts per figure 13 in an alternating 180 degree pattern. Continue torquing until torque is maintained.
 - (13) Check torque of six bolts installed in step (6) ensure 20 to 26 pound-inches of torque is maintained.

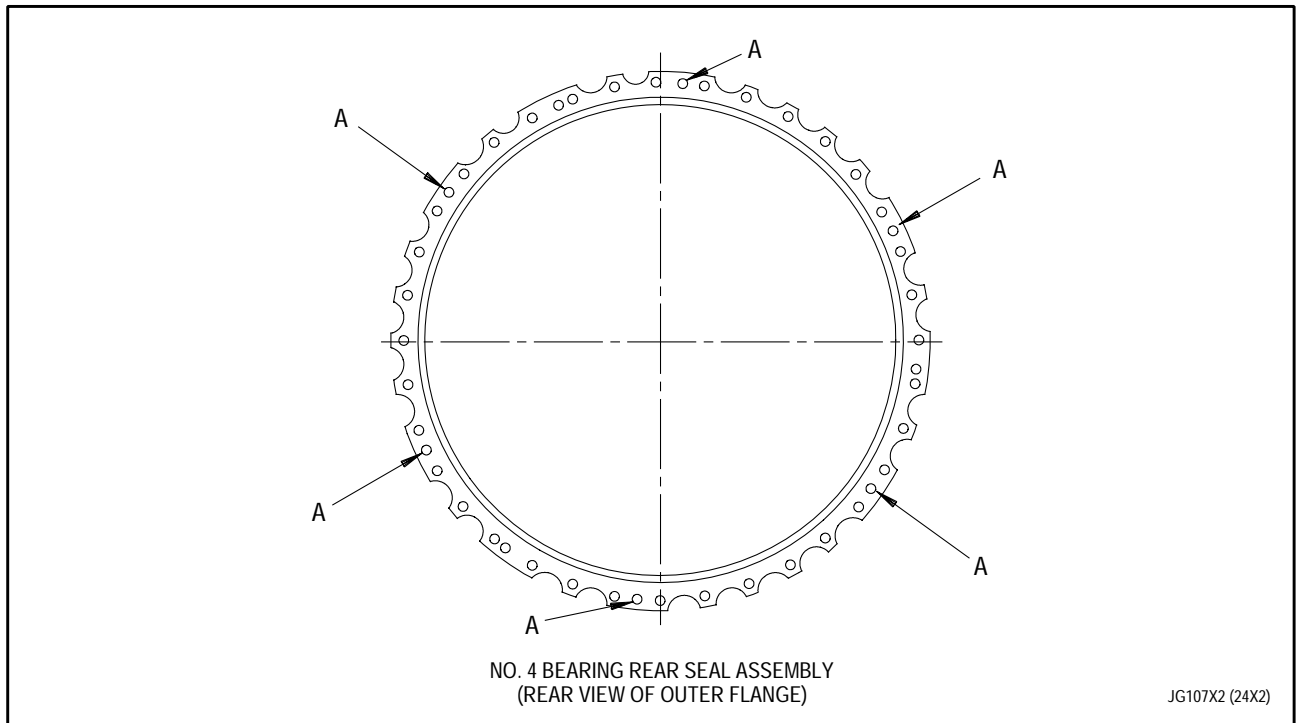


Figure 14. No. 4 Bearing Rear Seal Assembly - Bolt Installation

- d. Vacuum check No. 4 bearing compartment per WP 708 00.
- e. Lockwire six bolts(1) installed at Location A, figure 14 as follows:
 - (1) Install protector over No. 4 bearing rear seal support(3, figure 13) to prevent pieces of lockwire from entering compartment.
 - (2) Lockwire six bolts(1) at location A to an adjacent bolt using PN MS9226-03 wire.
 - (3) Clean area, remove protector.

**9. NO. 4 BEARING REAR AIR SEAL RING -
INSTALLATION.**

(See Figures 15 through 18.)

NOTE

Measurements will be used to check seating of No. 4 bearing rear air sealing ring.

- a. Determine dimension A, distance from front seating surface of first stage turbine stator support to seating surface of No. 4 bearing rear air seal ring. Take three measurements equally spaced and average them. (See figure 15.)
- b. Determine dimension B, the No. 4 bearing rear air seal ring seating flange thickness. Take three measurements equally spaced and average them. (See figure 16.)
- c. Subtract dimension B from dimension A to get dimension C.

$$A - B = C$$

- d. Chill first stage turbine inner air sealing ring in freezer for 90 minutes or in dry ice for 20 minutes.



No. 4 rear air seal ring has a thin wall. Be careful not to damage it.

- e. Install No. 4 bearing rear air seal ring over No. 4 bearing support assembly (figure 17).
- f. Seat No. 4 bearing rear air seal ring using PWA 52467 drift.
- g. Allow No. 4 bearing rear air seal ring to reach room temperature.
- h. Determine dimension D, distance from rear flange of No. 4 bearing front seal support to rear face of No. 4 bearing rear air seal ring seating flange. See figure 18. Take three measurements equally spaced and average them.
- i. Compare dimension D to dimension C. Dimension D should be equal to or greater than dimension C.
- j. If dimension D is not equal to or greater than dimension C, remove and install No. 4 bearing rear air seal ring assembly.

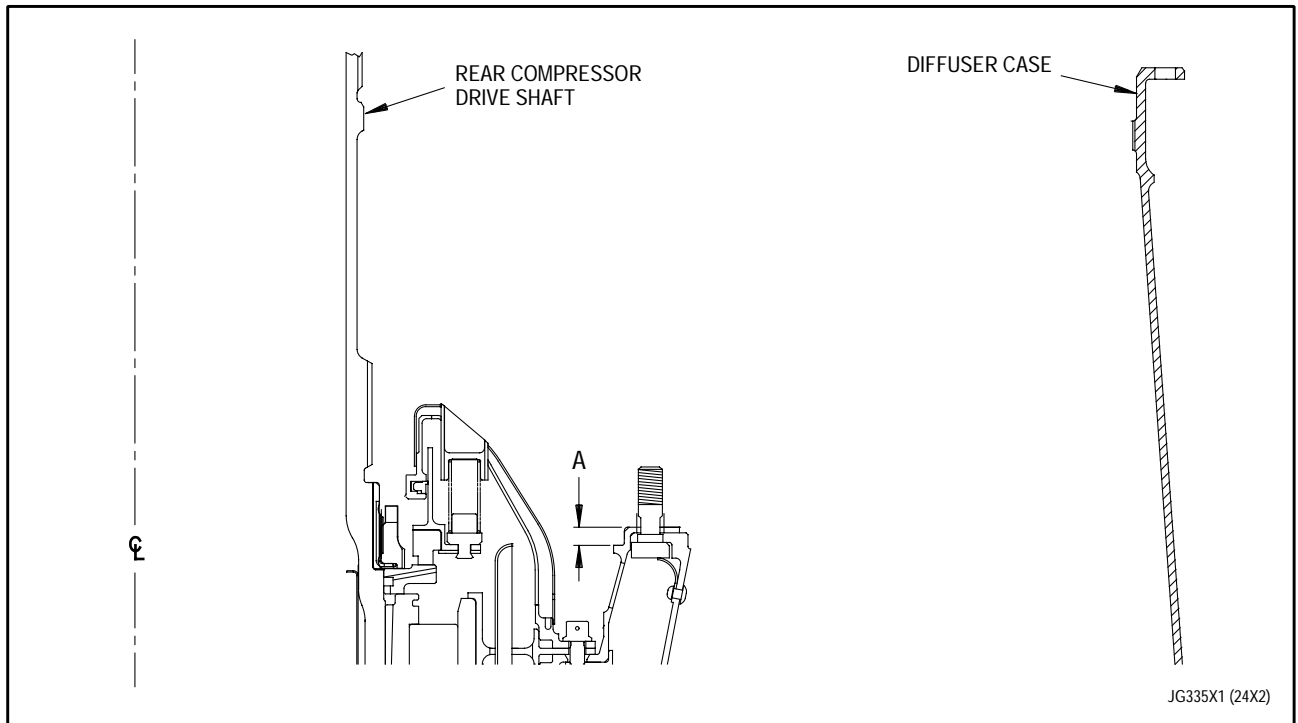


Figure 15. Dimension A- Front Seating Surface of First Stage Turbine Stator Support to the Seating Surface of No. 4 Bearing Rear Air Seal Ring

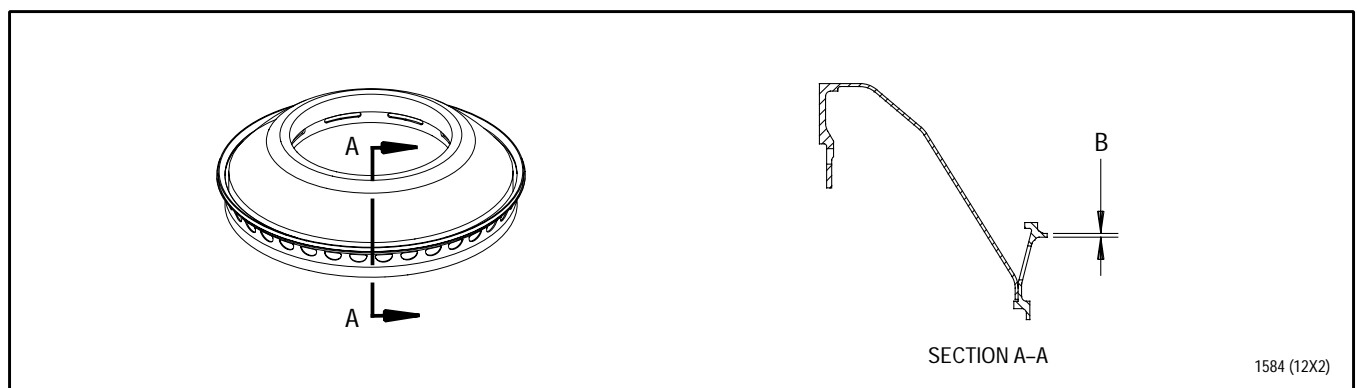


Figure 16. Dimension B- No. 4 Bearing Rear Air Seal Ring Seating Flange Thickness

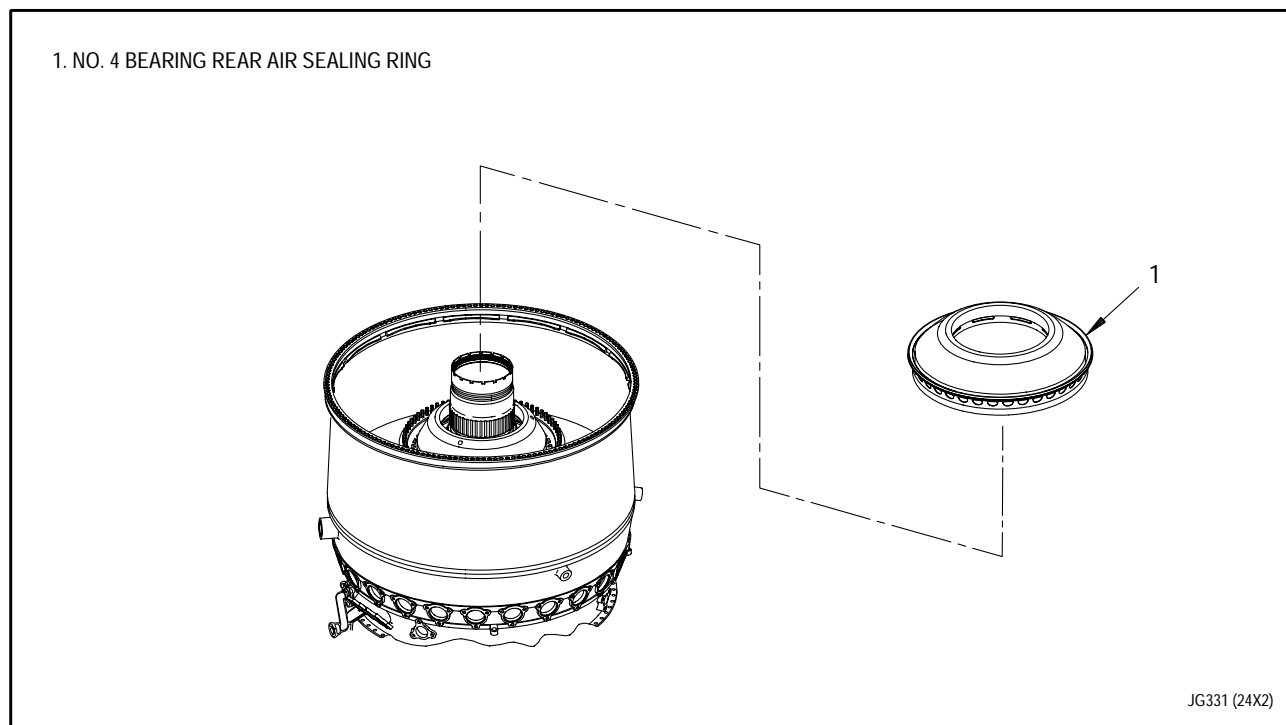


Figure 17. No. 4 Bearing Rear Air Seal Ring - Installation

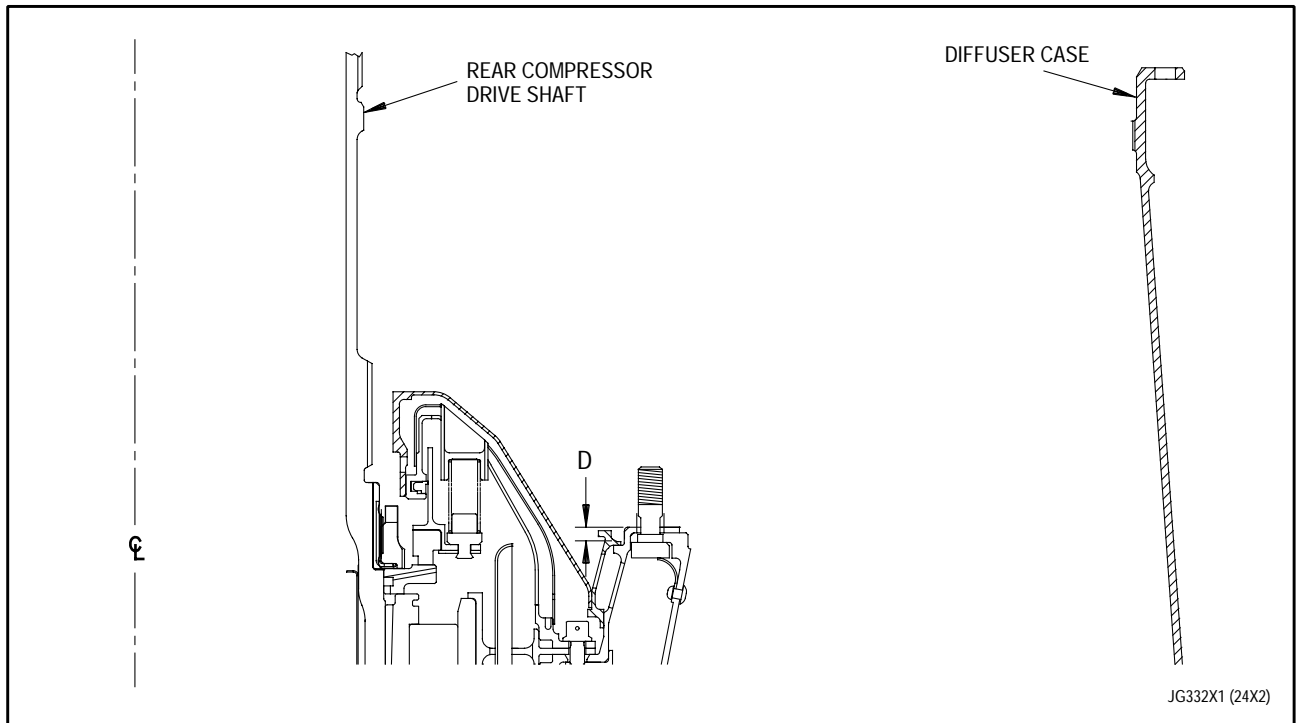


Figure 18. Dimension D- From Flange of No. 4 Bearing Front Air Seal Ring to Rear Face of No. 4 Bearing Rear Air Seal Seating Flange

**9A. FRONT TURBINE CASE, FIRST STAGE
TURBINE STATOR VANES, FIRST STAGE
TURBINE STATOR SUPPORT (TOBI),
COMBUSTION CHAMBER AND FIRST STAGE
TURBINE INNER AIR SEALING RING -
INSTALLATION.**

See figure 17 and Figures 18A, 18B, 18C and 18D.)

NOTE

- There are two core (rear) configurations. One includes front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is installed into short diffuser case assembly per this paragraph. The other includes 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is installed into diffuser case assembly per paragraph 10.
- Front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring are installed into diffuser case as an assembly.
 - a. Ensure fuel nozzles are removed from diffuser case.
 - b. Mark torque sequence on front turbine case of assembly(5, figure 18A) using marking pen (PMC 4092-2) as follows:
 - (1) Locate slotted hole(13) between two holes on forward (larger) flange of front turbine case engaging locating pin of PWA 57918 assembly fixture(6).

- (2) Ensure front turbine case forward flange is down. Facing slotted hole(13), mark first bolt hole to left of slot as No. 1. Proceed left (clockwise), marking every fifth hole as follows: 4, 7, 10, 13, 2, 5, 8, 11, 14, 3, 6, 9, 12, 15.

- c. Install PWA 57919 lift fixture as follows:

NOTE

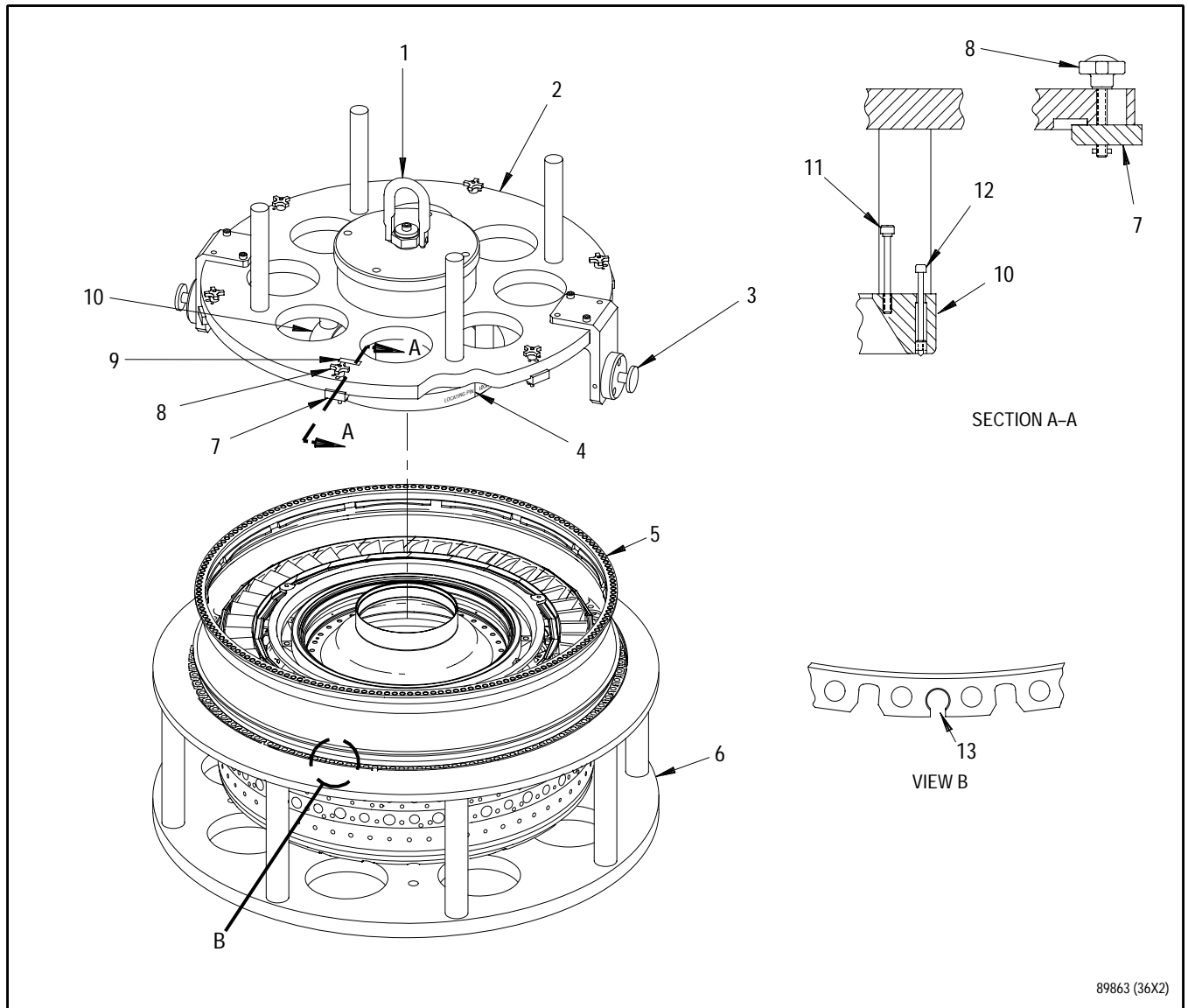
Rear compressor driveshaft has left-hand threads.

- (1) Thread PWA 57919 centering assembly detail(3, figure 18B) counterclockwise on rear compressor driveshaft(4) until it bottoms out, then back off 1/2 turn.

NOTE

There are two types of jackscrews(11 and 12, figure 18A) on PWA 57919 lift fixture. Jackscrews(11) for removal can be identified by presence of longer threads and shoulder beneath socket head. Jackscrews(12) for this installation procedure have shorter threads and no shoulder beneath socket head.

- (2) Install short thread installation jackscrews(12) in outer position of lift/puller plate(10). Install long thread removal jackscrews(11) in inner storage position of plate(10).



89863 (36X2)

1. Swivel ring
2. PWA 57919 lift fixture
3. Trunnion
4. Scribed line
5. Front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, assembly
6. PWA 57918 assembly fixture
7. Clamp
8. Hand knob
9. TDC marking
10. Lift/puller plate
11. Jackscrew (removal)
12. Jackscrew (installation)
13. Case slotted hole and fixture alignment pin

Figure 18A. Installation of PWA 57919 Lift Fixture

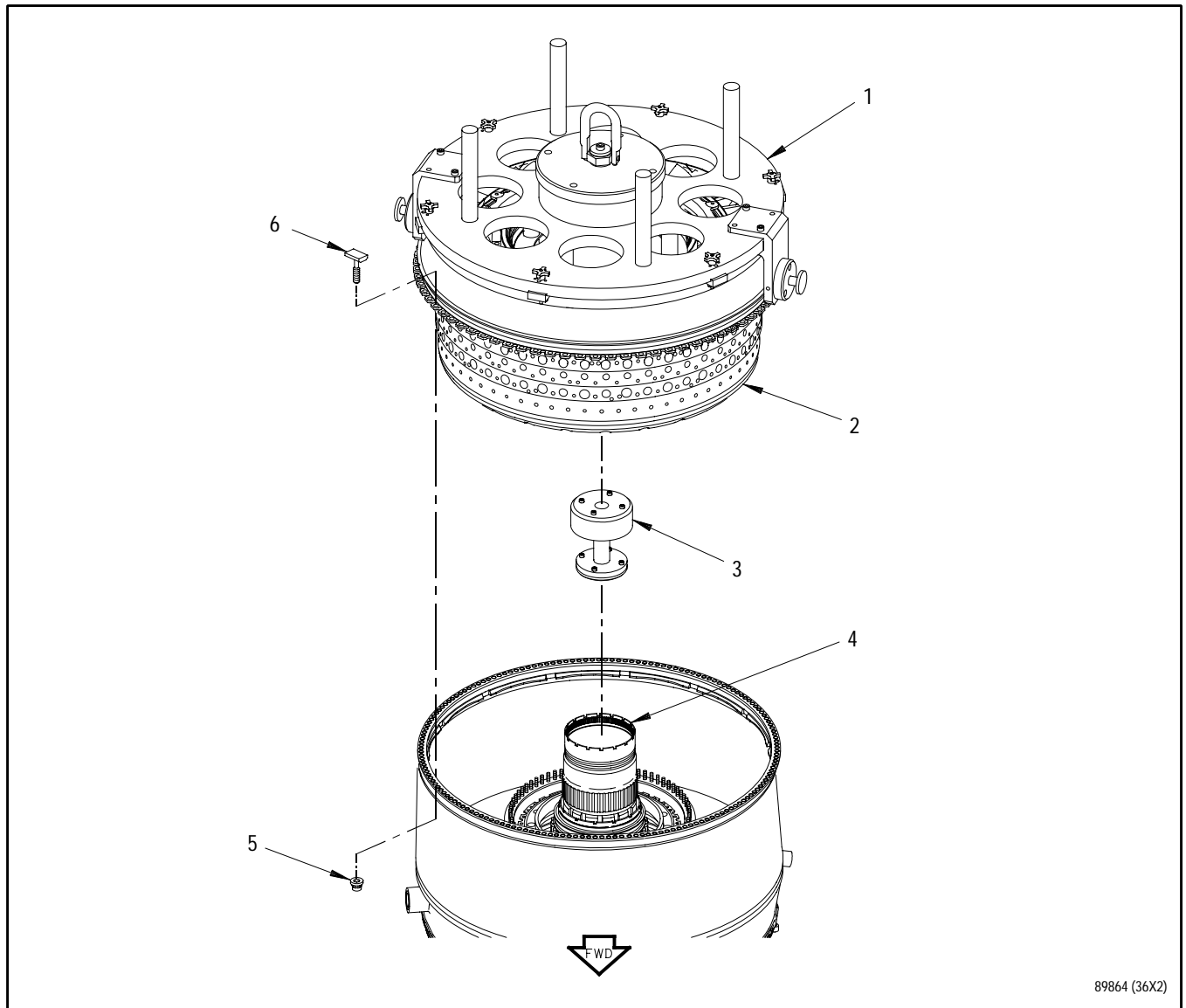
- (3) Install PWA 26147 adapters on trunnions(3). Attach PWA 56336 sling to overhead hoist with PWA 2388 hook, then connect sling to PWA 26147 adapters.
- (4) Loosen six hand knobs(8) and slide clamps(7) to outermost position.
- (5) Locate TDC marking(9) on fixture. Locate alignment hole in plate(10) in line with scribed line(4) on fixture.
- (6) Locate alignment pin(13) on OD flange of PWA 57918 assembly fixture(6). This is TDC position of assembly(5).
- (7) Raise lift fixture(2) and slowly lower over assembly(5) aligning TDC marking(9) with alignment pin(13) on assembly fixture(6). Before seating lift fixture, engage alignment hole in plate(10) with locating pin protruding through flange of turbine stator support (TOBI).
- (8) Ensure lift fixture is fully seated all around on flange of front turbine case and plate(10) is seated on flange of turbine stator support (TOBI).
- (9) Slide six clamps(7) inward to engage flange of front turbine case and tighten hand knobs(8).
- (10) Thread four installation jackscrews(12) into holes in turbine stator support (TOBI). Torque screws 30 pound-inches.

- d. Carefully raise lift fixture(2) and assembly(5) from assembly fixture(6).
- e. Ensure all combustion chamber liner retainers are tight. Replace any retainers which can be moved by hand.
- f. Heat forward flange of front turbine case of assembly(5) 180° to 190°F (82° to 88°C) using heat gun or locally available flexible heater.
- g. Heat OD of No. 4 bearing rear air sealing ring(1, figure 17) 300°F (149°C) for 10 minutes using PWA 57862 heater and PWA 61685 control.

NOTE

Following steps shall be performed rapidly before parts temperatures normalize.

- h. Remove heaters from front turbine case and No. 4 bearing rear air sealing ring.
- i. Position PWA 57919 lift fixture(1, figure 18B) and assembly(2) over diffuser case. Align TDC marking(9, figure 18A) with locating pin on OD flange of diffuser case.
- j. Carefully lower PWA 57919 lift fixture(1, figure 18B) and assembly(2) onto diffuser case, engaging centering guide on fixture with centering assembly detail(3) on rear compressor driveshaft.
- k. Engage slotted hole in front turbine case OD flange with locating pin in diffuser case OD flange and turbine stator support (TOBI) dowel pin hole with pin in diffuser case ID flange.



1. PWA 57919 lift fixture
2. Front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, assembly
3. PWA 57919 centering assembly detail
4. Rear compressor driveshaft
5. Nut
6. Bolt

Figure 18B. Front Turbine Case, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Installation Using PWA 57919 Lift Fixture

- l. Secure front turbine case OD flange to diffuser case flange as follows:
 - (1) Install 15 bolts(6), heads up, through flange at locations previously marked on front turbine case in step b. Install 15 nuts(5) fingertight.
 - (2) Torque 15 nuts, in marked sequence, 90 to 100 pound-inches.
 - (3) Torque same nuts, in sequence, 125 to 140 pound-inches.
 - (4) Ensure front turbine case flange is seated all around.
 - (5) Install remaining bolts(6) and nuts(5). Torque nuts 125 to 140 pound-inches.
 - (6) Verify all nuts are torqued 125 to 140 pound-inches after parts temperatures normalize.
- m. Remove PWA 57919 lift fixture as follows:
 - (1) Loosen six hand knobs(8, figure 18A). Slide clamps(7) to outermost position to disengage from front turbine case flange.
 - (2) Loosen four jackscrews(12) from turbine stator support.
 - (3) Remove lift fixture(1, figure 18B). Remove centering assembly detail(3) from rear compressor driveshaft(4).

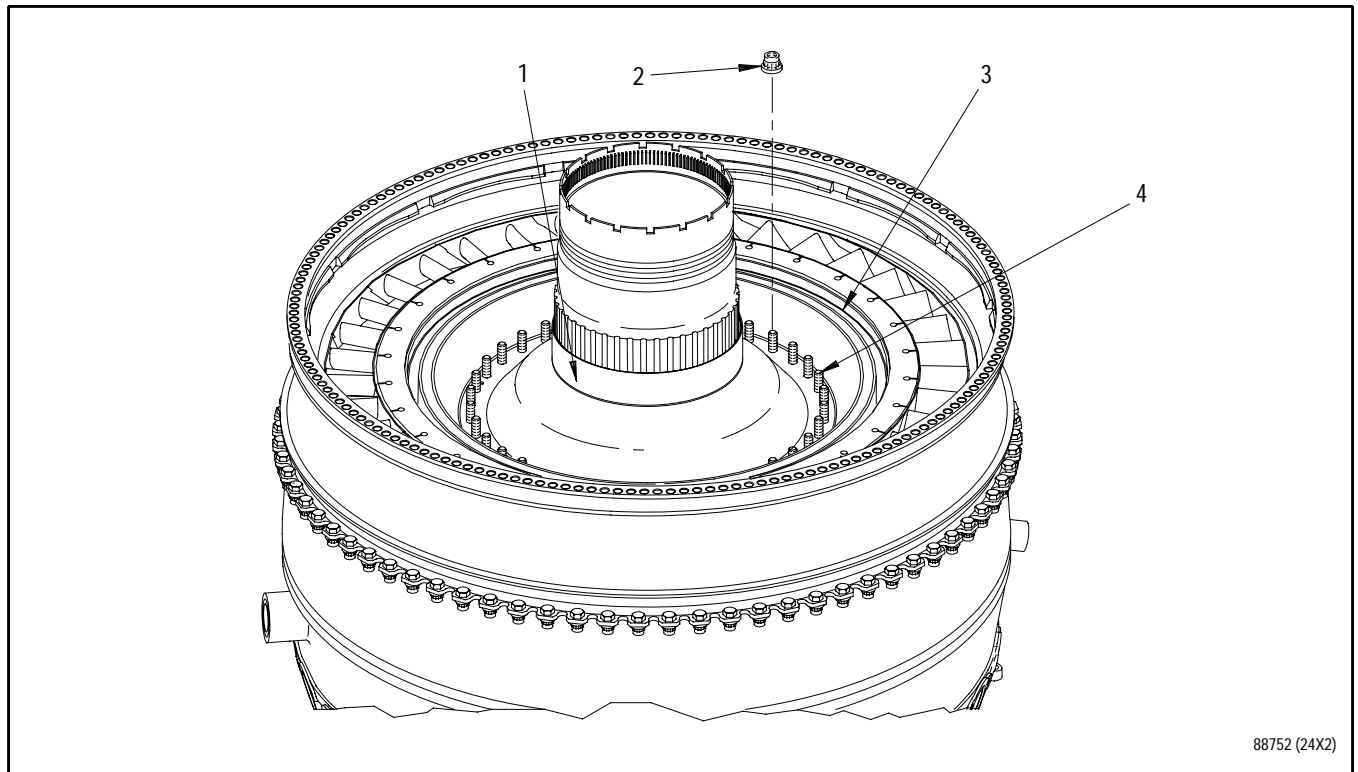
- n. Install silver plated nuts(2, figure 18C) as follows:

- (1) Ensure silver plated nuts PN 4301682 are being installed. Identify nuts by PN only. If PN cannot be verified, replace nuts.
- (2) Thoroughly clean diffuser case ID flange studs(4), using PD-680 solvent or equivalent.



Use of antiseize or PWA 36545 antigallant with silver plated nuts can cause corrosive attack and damage diffuser case flange studs.

- (3) Apply MIL-L-7808 or MIL-L-23699 lubricating oil to all diffuser case flange studs(4). Do not use antigallant or antiseize compound.
- (4) Install nuts(2) on diffuser case ID flange studs(4).
- (5) Torque nuts no more than 70 pound-inches to seat inner support and air sealing ring.
- (6) Torque nuts 90 to 100 pound-inches per sequence in figure 18D.
- (7) Apply final torque 180 to 200 pound-inches per sequence in figure 18D.



88752 (24X2)

Index Number	Description	Lubrication	Torque (lb-in.)
1.	1st stage turbine inner air sealing ring assembly	-	-
2.	Silver plated nut	-	180 to 200
3.	Front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring assembly	-	-
4.	Stud	MIL-L-7808 or MIL-L-23699 (lubricating oil)	-

Figure 18C. Front Turbine Case, First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Installation

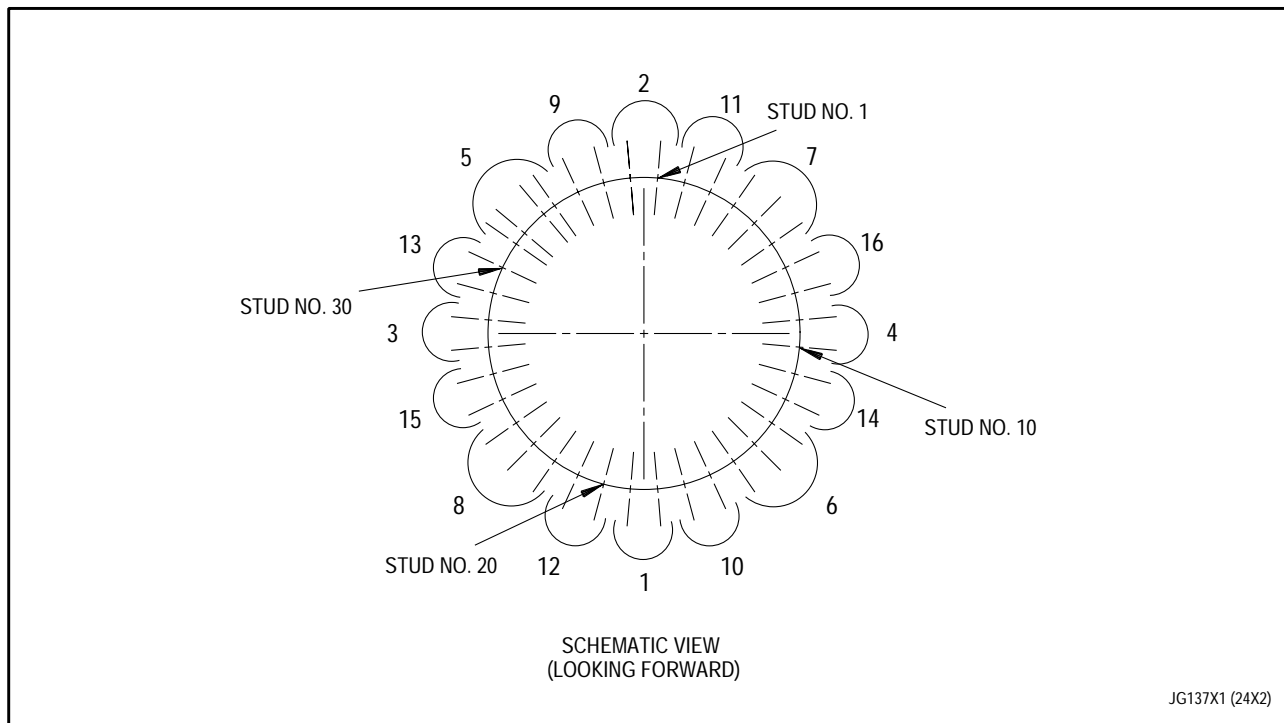


Figure 18D. Torque Sequence For Diffuser Case Rear ID Flange Nuts

10. FIRST STAGE TURBINE STATOR VANES, FIRST STAGE TURBINE STATOR SUPPORT (TOBI), COMBUSTION CHAMBER AND FIRST STAGE TURBINE INNER AIR SEALING RING - INSTALLATION.

(See figure 17 and Figures 19 through 21.)

NOTE

There are two core (rear) configurations. One includes front turbine case, 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber and 1st stage turbine inner air sealing ring, and is installed into short diffuser case assembly per paragraph 9A. The other includes 1st stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring, and is installed into diffuser case assembly per this paragraph.

- a. Ensure fuel nozzles are removed prior to installing combustor and first stage turbine stator support.

NOTE

Rear compressor driveshaft has left-hand threads.

- b. Thread PWA 57506 guide fixture slide(3, figure 19) counterclockwise on rear compressor driveshaft until it bottoms out, then back off 1/2 turn.

NOTE

First stage turbine stator vanes, 1st stage turbine stator support (TOBI), combustion chamber, and 1st stage turbine inner air sealing ring are installed as an assembly(4).

- c. Attach PWA 26147 adapters to PWA 57506 guide fixture trunnions(2). Attach PWA 56336 sling to overhead hoist with PWA 2388 hook and connect sling to PWA 26147 adapters.
- d. Ensure all combustion chamber liner retainers are tight. Replace any retainers which can be moved by hand.
- e. Raise PWA 57506 guide fixture(1) and assembly(4) and position over diffuser case.
- f. Heat OD of No. 4 bearing rear air sealing ring(1, figure 17) 300°F (149°C) for 10 minutes using PWA 57862 heater and PWA 61685 control.

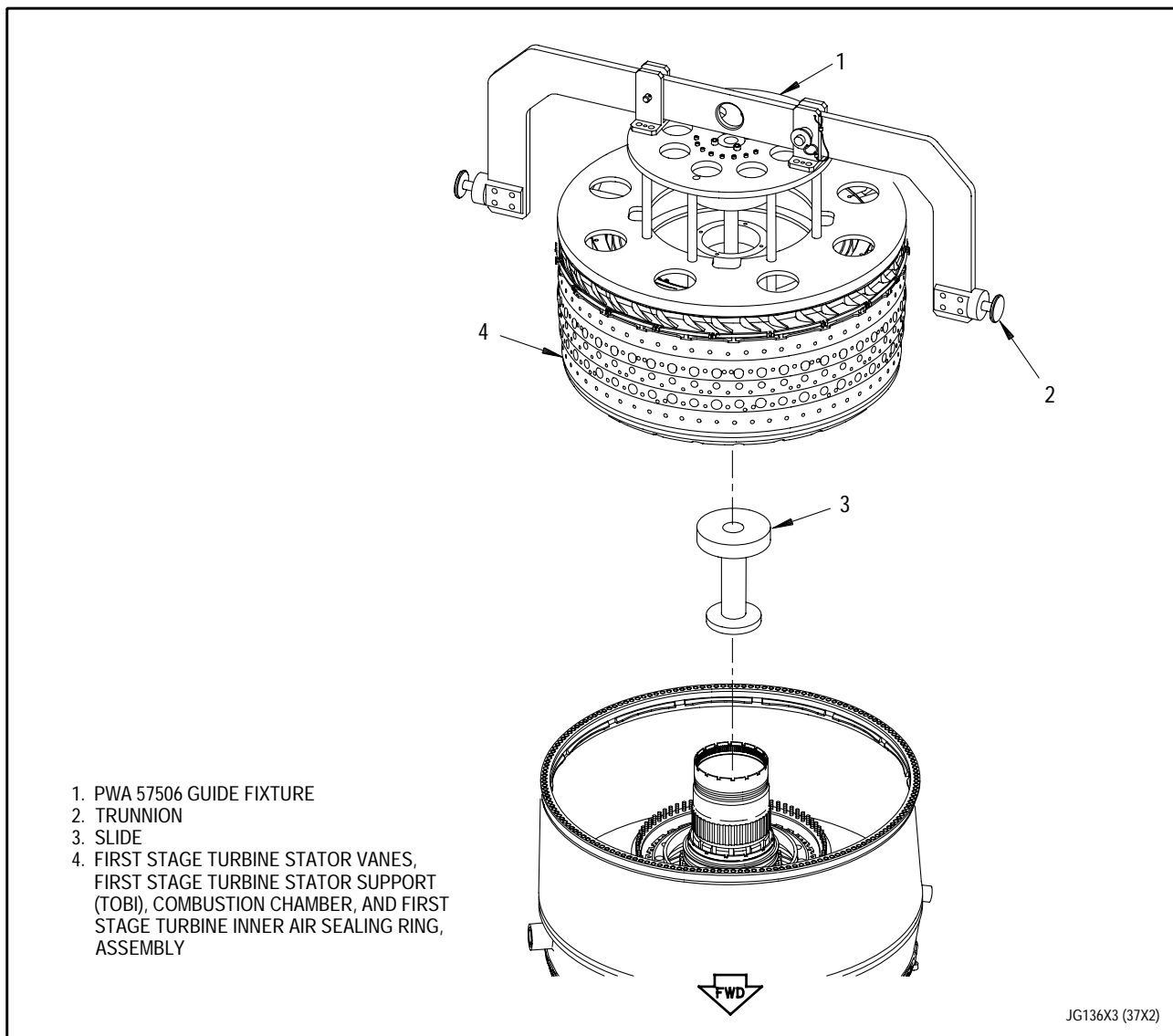


Figure 19. First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, and First Stage Turbine Inner Air Sealing Ring - Installation Using PWA 57506 Guide Fixture

NOTE

The 12 o'clock position is marked with an X on diffuser case OD flange.

- g. Lower PWA 57506 guide fixture(1, figure 19) and position on PWA 57506, detail-3 slide(3) with OFFSET stamped on OD of guide fixture at 12 o'clock position.
- h. Remove tooling bolts and secure on PWA 57506 guide fixture. Remove PWA 57506 guide fixture(1) and detail-13 slide(3).



Do not use antigallant or antiseize compound on diffuser case flange studs (4, figure 20). Use of antiseize or PWA 36545 antigallant with silver plated nuts (PN 4301682) can cause corrosive attack and damage diffuser case flange studs.

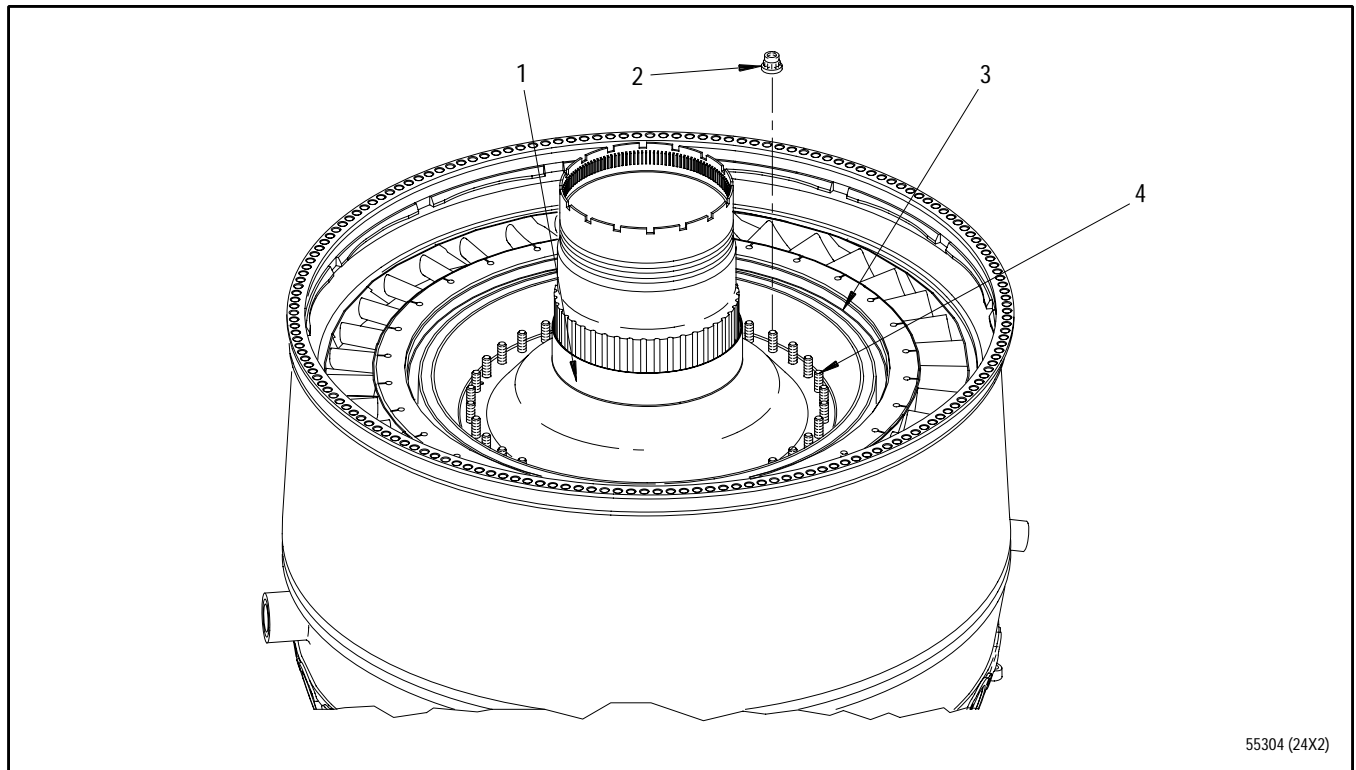
NOTE

Ensure silver plated nuts PN 4301682 are installed in all

locations. Identify silver plated nuts by PN only. If PN can not be verified, replace nuts.

- i. Install silver plated nuts as follows:
 - (1) Thoroughly clean diffuser case inside diameter flange studs(4, figure 20), using PD-680 or equivalent.
 - (2) Apply MIL-L-7808 or MIL-L-23699 to all diffuser case flange studs (4).
 - (3) Install silver plated nuts(2) on diffuser case inside diameter flange studs(4).
 - (4) Torque nuts 90 to 100 pound-inches per sequence in figure 21.
 - (5) Apply final torque of 180 to 200 pound-inches per sequence in figure 21.

- j. Deleted.



55304 (24X2)

Index Number	Description	Lubrication	Torque (lb-in.)
1.	First stage turbine inner air sealing ring assembly	-	-
<p>NOTE</p> <p>Use only nuts with PN ST2325-11, ST2326-11, ST2327-11, ST2328-11</p>			
2.	Silver plated nut	-	180 to 200
3.	First stage turbine stator vanes, first stage turbine stator support (TOBI), combustion chamber, and first stage turbine inner air sealing ring assembly	-	-
4.	Stud	MIL-L-7808 or MIL-L-23699 (OIL)	-

Figure 20. First Stage Turbine Stator Vanes, First Stage Turbine Stator Support (TOBI), Combustion Chamber, And First Stage Turbine Inner Air Sealing Ring - Installed.

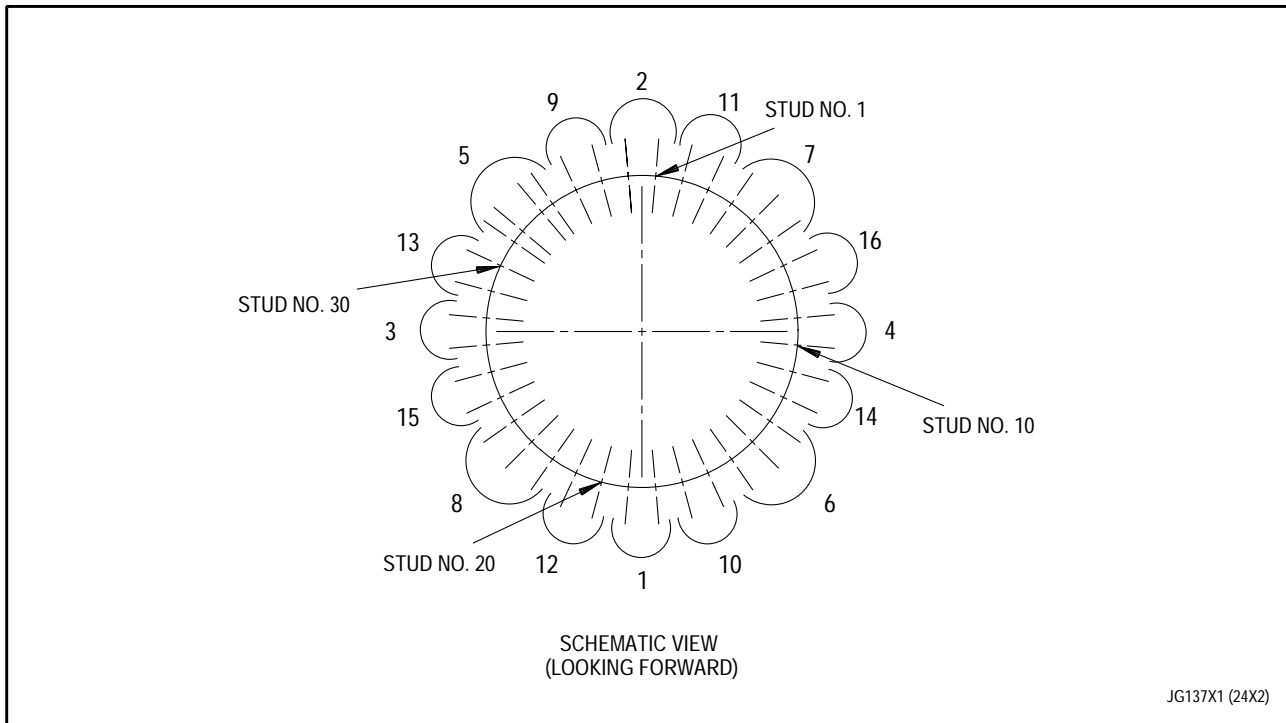


Figure 21. Torque Sequence For Diffuser Case Rear ID Flange Nuts

11. STATIC PRESSURE PROBE - INSTALLATION.

(See figure 22.)

NOTE

Ensure static pressure probe elbow is located to front of engine.

- a. Coat bolts(2, figure 22) with MIL-L-7808 lubricating oil.

- b. Position static pressure probe(3) onto pad on diffuser case(1). Align probe with threaded boss positioned towards aft end of diffuser case and secure with bolts(2).
- c. Torque bolts 65 to 85 pound-inches.
- d. Lockwire bolts with PN MS9226-04 wire.

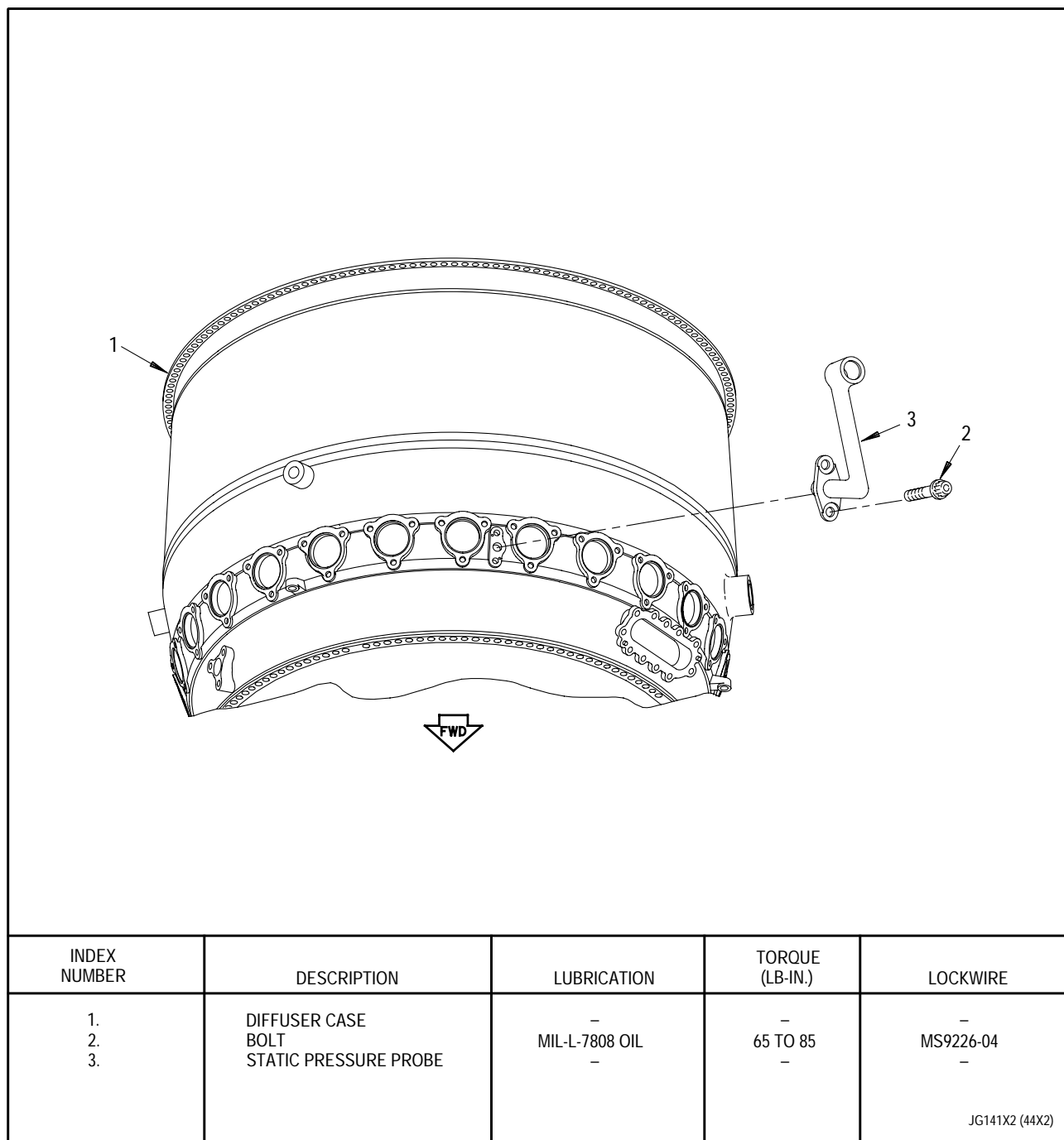


Figure 22. Static Pressure Probe - Installation

12. FUEL NOZZLES - INSTALLATION.

(See Figures 23, 23A, and 23B.)

CAUTION

Failure to prevent contamination and ensure proper seating of fuel nozzles may affect engine operation and cause damage to equipment.

NOTE

- There are two types of fuel nozzles, staged and unstaged. Staged fuel nozzles have an offset bolthole.
 - If same fuel nozzles are installed that were removed during disassembly, nozzles shall be reinstalled in same locations as marked.
- a. Install gasket(1, figure 23) on fuel nozzles(2).
 - b. Lightly coat washer face and threads of bolts(3) with PWA 36053-3 antiseize compound.
 - c. Install fuel nozzles(2), staged at locations 1 through 6 and 19 through 24, and unstaged at locations 7 through 18.
 - d. Position brackets(4) at locations shown and secure with bolts(3) handtight.

NOTE

Fuel nozzle mount bolts at locations with brackets will be torqued during fuel manifolds installation.

- e. Torque bolts(3) 65 to 85 pound-inches in 20 pound-inch increments until torque is maintained at fuel nozzle locations that do not have brackets(4).

CAUTION

Improper torquing, diffuser case bolt thread damage, or contamination between mating flanges and gasket may cause improper seating of fuel nozzles.

- f. Check seating of fuel nozzles by attempting to insert 0.001 inch feeler stock between nozzle and diffuser case mount pad. See figure 23A.
- g. If feeler stock fits between fuel nozzle and diffuser case pad, loosen bolts and retorqued.
- h. Recheck using feeler stock.
- i. If gap still exists outside bolt area(1, figure 23A), remove fuel nozzle, determine cause, and reinstall nozzle per steps c. through e. Feeler stock may fit between diffuser case pad and fuel nozzle in area(1) but shall not reach mount bolt.

CAUTION

Failure to lockwire properly, maintaining specified twists per inch keeping lockwire taut without overstress may cause lockwire to break.

- j. Before incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560, lockwire bolts(3, figure 23) with PN AS3214-03 (0.039 inch) wire, five to eight twists per inch.
- k. After incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560, install PN AS3510-0318K safety cable on bolts(3) per figure 23B.

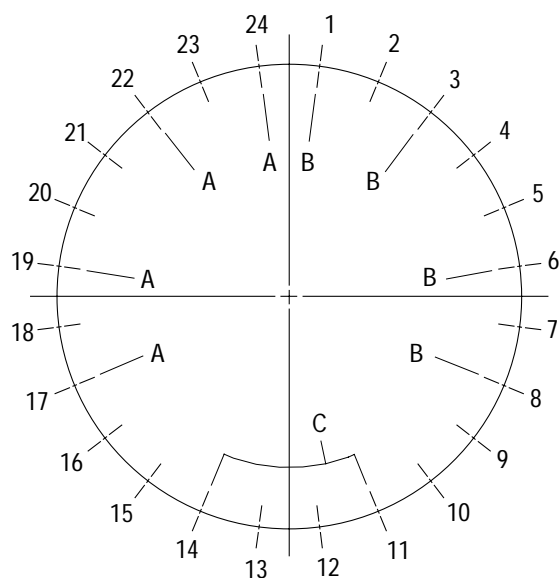


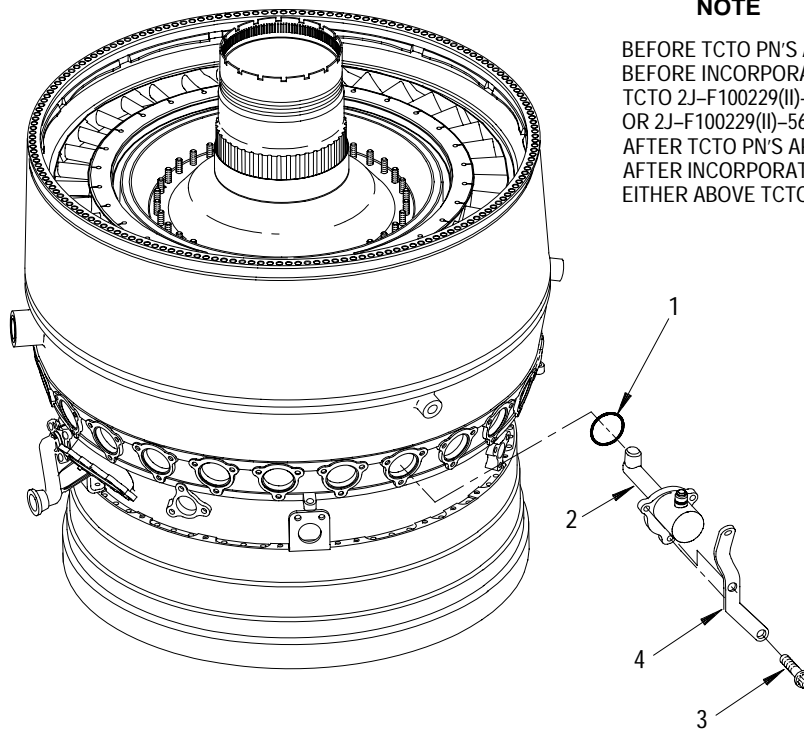
DIAGRAM OF FUEL NOZZLE POSITIONS
AND BRACKET LOCATIONS (SEE SHEET 2)
(AFT LOOKING FORWARD)

FUEL NOZZLE POSITION	TYPE
1 THROUGH 6	STAGED
7 THROUGH 18	UNSTAGED
19 THROUGH 24	STAGED

FUEL NOZZLE POSITION	BEFORE TCTO BRACKET PART NUMBER	AFTER TCTO BRACKET PART NUMBER
1	4060165	4084795
3	4060165	4084795
6	4060165	4084795
8	4078226	4084797
11	4060167	4084796-01
12	4077052	4084829
13	4077051	4084828
14	4060168	4084825-01
17	4078225	4084794
19	4060166	4084792
22	4060166	4084792
24	4060166	4084792

NOTE

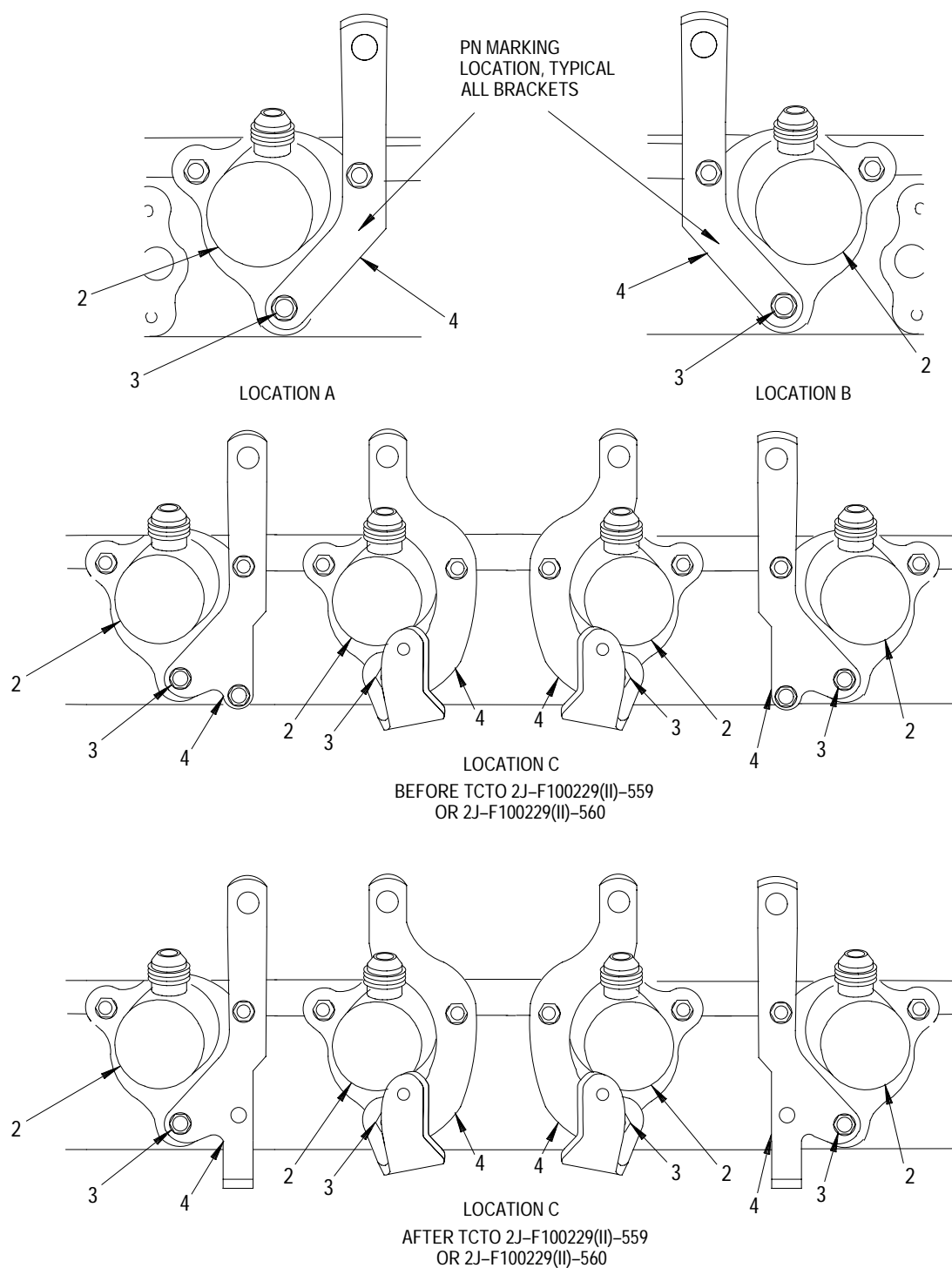
BEFORE TCTO PN'S APPLY
BEFORE INCORPORATION OF
TCTO 2J-F100229(II)-559
OR 2J-F100229(II)-560.
AFTER TCTO PN'S APPLY
AFTER INCORPORATION OF
EITHER ABOVE TCTO'S.



100582 (48X2)

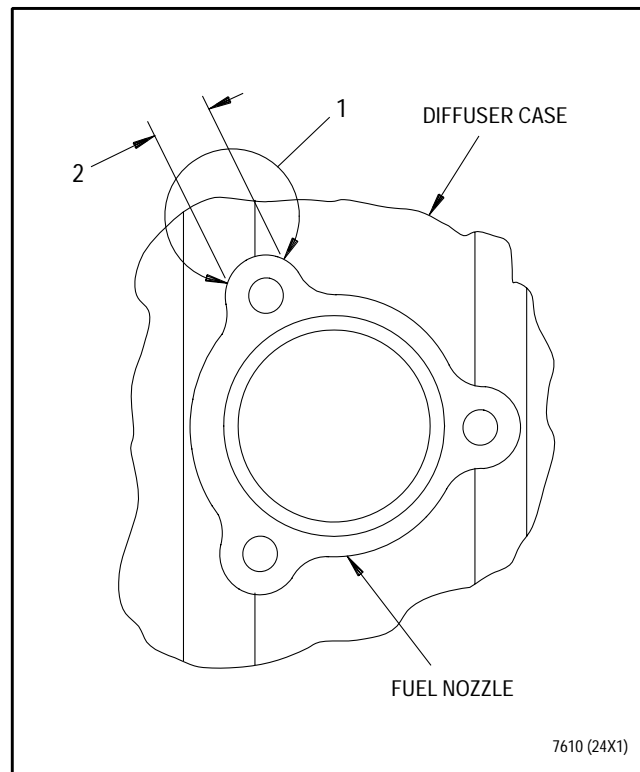
- | | |
|----------------|------------|
| 1. Gasket | 3. Bolt |
| 2. Fuel nozzle | 4. Bracket |

Figure 23. Fuel Nozzles and Brackets - Installation (Sheet 1 of 2)



100583 (48X2)

Figure 23. Fuel Nozzles and Brackets - Installation (Sheet 2 of 2)



1. Gap may exist in this area (3 places)
but 0.001 inch feeler stock shall not
reach mount bolt.
2. 0.50 inch, 3 places

Figure 23A. Fuel Nozzle Seating Inspection (Nozzle Not Shown)

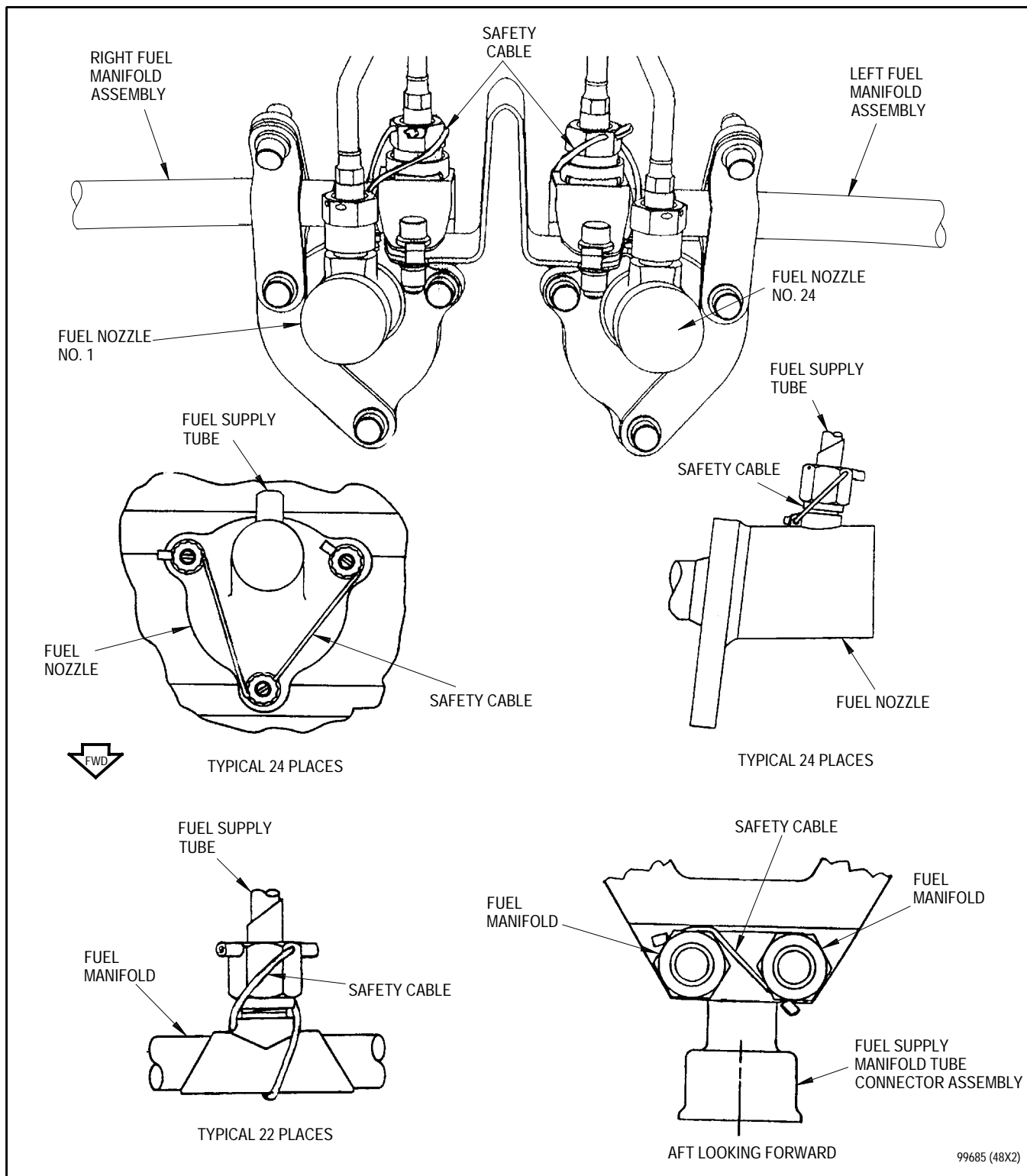


Figure 23B. Safety Cable - Installation

13. LEFT AND RIGHT FUEL SUPPLY MANIFOLDS - INSTALLATION (BEFORE INCORPORATION OF TCTO 2J-F100229(II)-559 OR 2J-F100229(II)-560).

(See figure 23A and Figures 24 and 25.)

- a. Loosen bolts(8, figure 24) securing fuel manifold elbow(9).
- b. Install loop clamps(12, sheets 2 and 3) on left and right fuel manifold assemblies(1 and 6, sheet 1) at locations shown. Do not reuse clamps which were removed from manifold assembly. Removed clamps shall be replaced with new clamps.
- c. Install cushion loop clamps(16 or 18, sheet 3) on left and right fuel manifold assemblies(1 and 6, sheet 1) at locations shown. Do not reuse clamps which were previously removed from manifold assembly. Removed clamps must be replaced with new clamps.
- d. Lightly coat washer face of bolts(13, sheets 2 and 3) with PWA 36053-3 antiseize compound.
- e. Position left and right fuel manifold assemblies(1 and 6, sheet 1) on diffuser case.
- f. Position loop clamps(12, sheets 2 and 3) over brazed-on sleeves of fuel manifold assemblies(1 and 6) at locations shown in figure 24, sheet 3. Obtain a minimum clamp edge to sleeve edge distance(19, sheet 2) of 3/16 inch on both sides of clamp.
- g. Secure clamps(12, sheet 3) to brackets(14) with bolts(13) and nuts(11) handtight.

NOTE

Two configurations of cushion loop clamp(16 or 18) exist. Plate (17) is welded to loop clamp assembly(18).

- h. Align loop clamps(16, sheet 3) and plates(17), or loop clamp assemblies(18), and secure to brackets(14) using bolts(13) and nuts(11). If loop clamps(16) are used, ensure radius on plates(17) seat in radius on clamps(16) with no fiberglass cushion between clamps and plates.



To prevent damage to fuel supply tubes or fuel manifold assemblies, do not bend to achieve correct alignment.

- i. Adjust position of left and right fuel manifold assemblies(1 and 6, sheet 1) to align fittings of fuel supply tubes(2 and 3).

- j. Install fuel supply tubes(2 and 3) as follows:



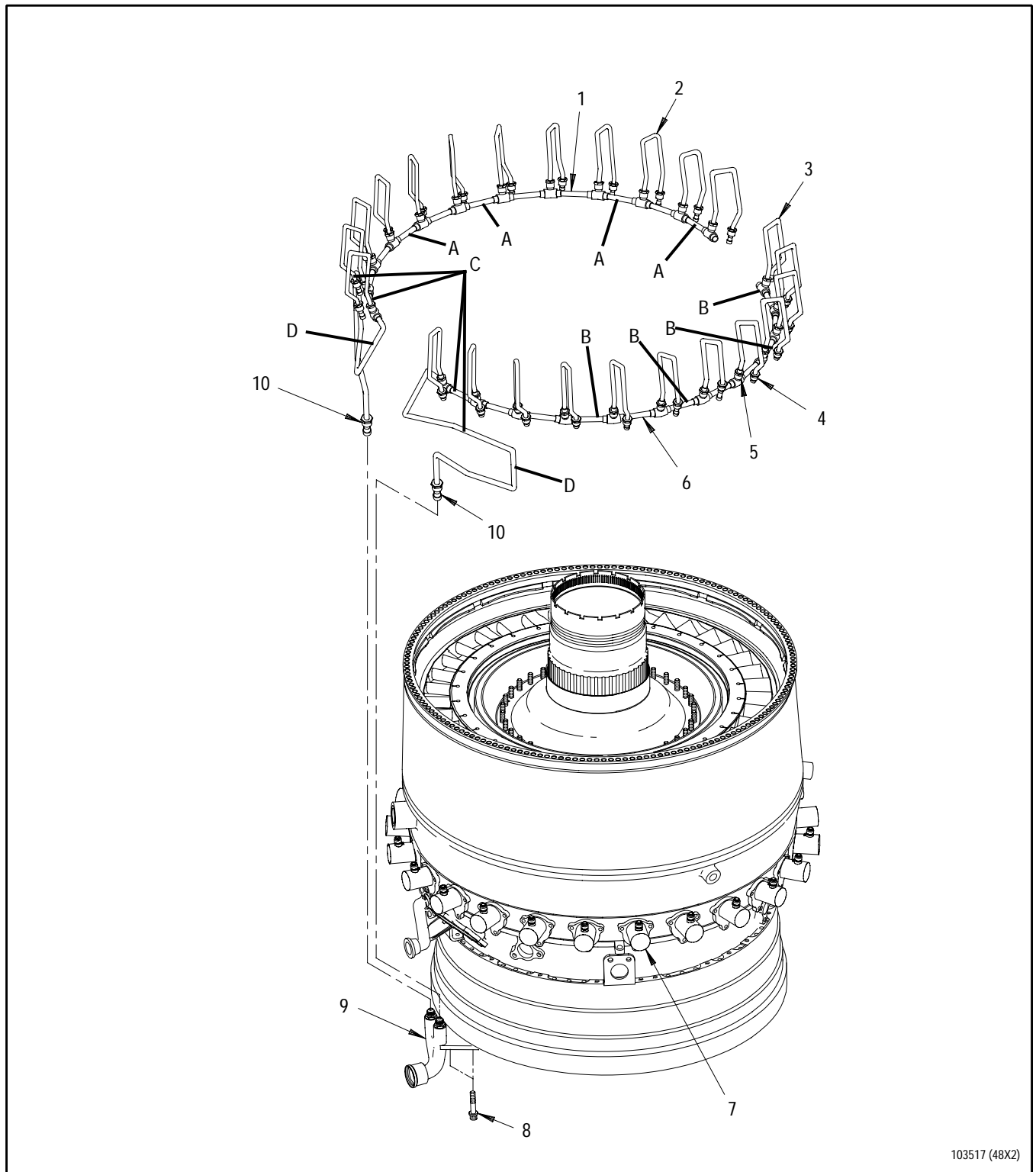
Fuel system contamination or leakage may result if material from burnishing operations enters fuel supply path or remains on sealing surfaces.

- (1) Lightly burnish coupling nut(4 and 5) threads on fuel supply tubes, fuel manifold assembly(1 and 6) threads and fuel nozzle(7) threads.
- (2) Use shop air and a clean cloth or equivalent process to remove loose material from coupling nuts, fuel manifold threads and fuel nozzle threads.
- (3) Lightly coat external threads of fuel manifolds and fuel nozzles with PWA 550-3 antigalling compound. Let dry until parts are dry to touch.

- (4) Slide coupling nuts back on fuel supply tubes and apply PWA 550-3 antigalling compound to rear side of tube ferrule. See figure 24, sheet 2. Let dry until parts are dry to touch before repositioning nuts. This procedure does not apply to thrust wire nuts at Locations 3, 10, 15, and 22.
- (5) At locations 3, 10, 15, and 22, connect thrust wire nut/elbow first. Reinstall fuel supply tubes in original position and tighten coupling nuts handtight.

Legend for figure 24

1. Fuel manifold assembly (left)
2. Fuel supply tube (left)
3. Fuel supply tube (right)
4. Coupling nut (supply tube to fuel nozzle)
5. Coupling nut (supply tube to manifold)
6. Fuel manifold assembly (right)
7. Fuel nozzle
8. Bolt
9. Fuel manifold elbow
10. Coupling nut
11. Nut
12. Loop clamp
13. Bolt
14. Bracket
15. Bolt
16. Cushion loop clamp
17. Plate
18. Cushion loop clamp assembly
19. Clamp edge to sleeve edge shall be 3/16 inch minimum



103517 (48X2)

Figure 24. Fuel Manifolds and Brackets - Installation (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 1 of 3)

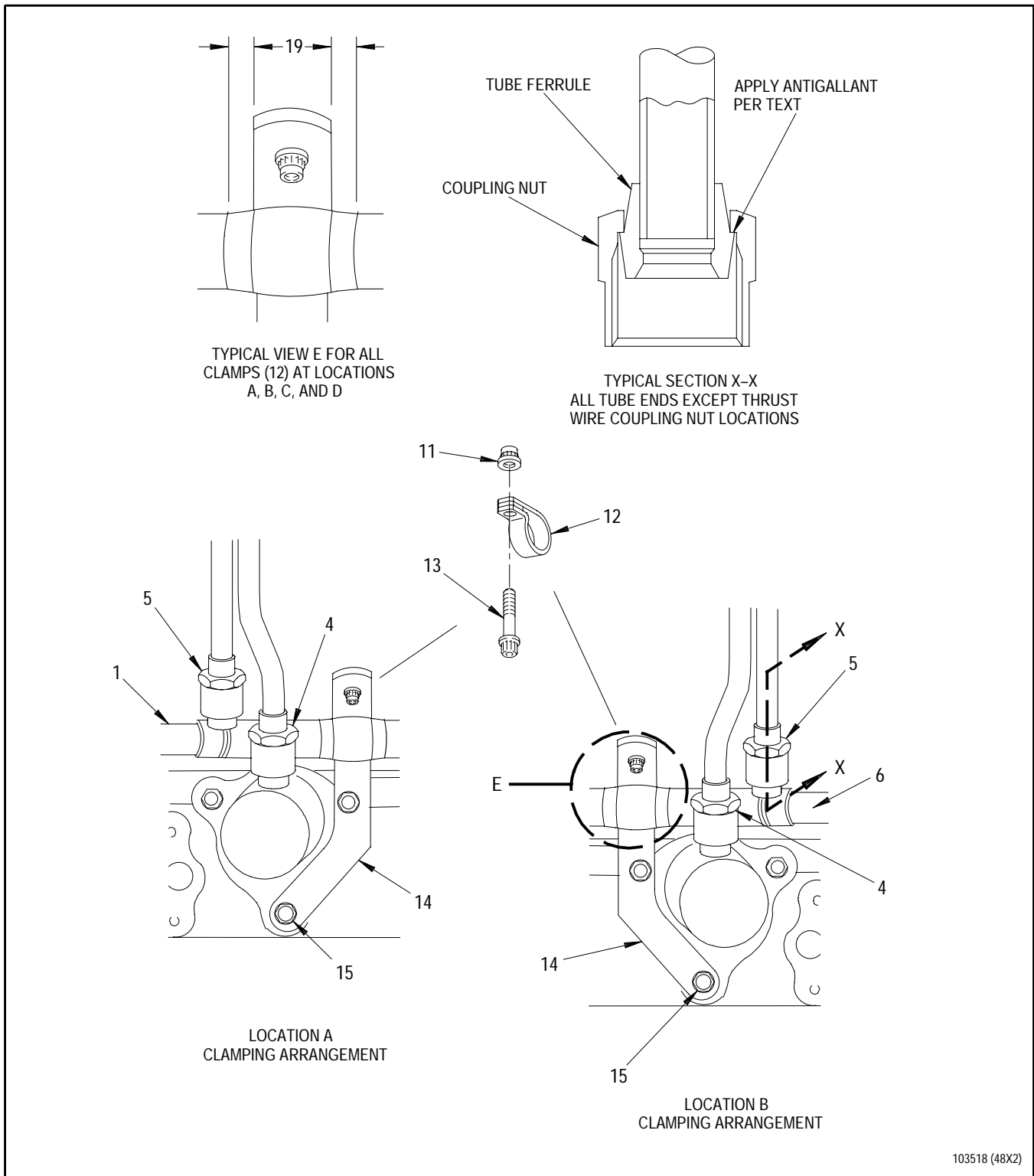


Figure 24. Fuel Manifolds and Brackets - Installation (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 2 of 3)

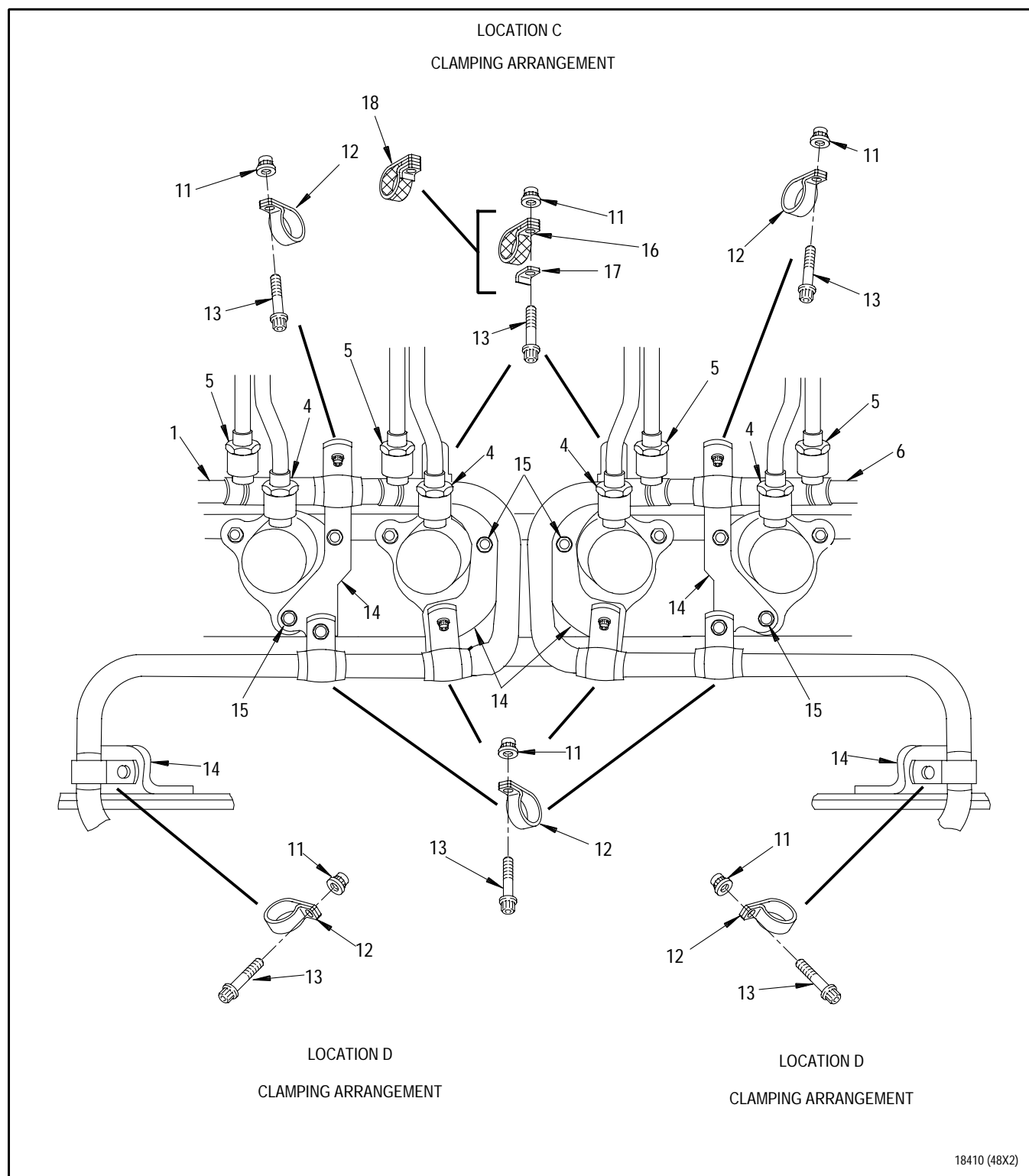


Figure 24. Fuel Manifolds and Brackets - Installation (Before Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 3 of 3)

- k. Connect coupling nuts(10) to fuel manifold elbow(9) handtight.



Improper torquing, diffuser case bolt thread damage, or contamination between mating flanges and gasket may cause improper seating of fuel nozzles.

- l. Torque fuel nozzle mount bolts(15, sheets 2 and 3) 65 to 85 pound-inches in 20 pound-inch increments until torque is maintained.
- m. Check seating of fuel nozzles by attempting to insert 0.001 inch feeler stock between nozzle and diffuser case mount pad. See figure 23A.
- n. If feeler stock fits between fuel nozzle and diffuser case pad, loosen bolts and retorque.
- o. Recheck using feeler stock.
- p. If gap still exists, remove fuel nozzle, determine cause, and reinstall nozzle per step l.



Failure to install protective caps on fuel nozzle inlet fittings can result in damage to fittings during tightening of loop clamp nuts and bolts. Fuel nozzles at locations 12 and 13 (bottom dead center) are particularly susceptible to damage.

- pl. Install protective caps on all fuel nozzle inlet fittings.

NOTE

Loop clamps may shift position during engine run. This is permissible provided that a clamp does not overhang wear sleeve edge.

- q. Tighten loop clamps(12 and 16 or 18, figure 24) by torquing nuts(11) 27 to 30 pound-inches, starting at top and working around to bottom on both sides.
- r. Ensure clamps(12 and 16 or 18) are not twisted or distorted and rest flat on brackets.
- s. Ensure loop clamp edge to sleeve edge distance(19) is at least 3/16 inch on both sides of all clamps(12) after final torquing. If distance(19) is less than 3/16 inch on either side of any clamp(12), loosen loop clamp nut(11) and two bolts(15) securing fuel nozzle to bracket(14). Realign bracket and clamp to ensure proper edge distance(19) and retorque bolts(15) per steps l. through p. Retorque nut(11) per step q. and recheck distance(19).



Failure to lockwire properly, maintaining specified twists per inch keeping lockwire taut without overstress may cause lockwire to break.

- t. Lockwire bolts(15) with PN AS3214-03 (0.039 inch) wire, five to eight twists per inch.
- u. Tighten fuel manifold elbow(9, sheet 1) mount bolts(8), 85 to 95 pound-inches.

NOTE

Coupling nuts shall not be lockwired until after fuel manifold system pressure check.

- v. Torque coupling nuts(10) 340 to 375 pound-inches.



To prevent tube damage, ensure that fuel supply tubes do not rotate when coupling nuts(4 and 5) are tightened.

- w. Tighten each fuel supply tube(2 and 3) by torquing coupling nuts(4 and 5), in two increments. First increment shall be to 20 pound-inches, alternating between coupling nuts on any single fuel supply tube. Final increment shall be to final torque of 100 to 110 pound-inches, alternating between coupling nuts on any single fuel supply tube.



Improperly torqued coupling nuts can result in fuel leakage.

- w1. Have second individual verify final torque on all 24 fuel supply tubes(2 and 3) by torquing to 100 pound-inches.
- x. Inspect all fuel manifold assembly clamps. Replace any bent, twisted, distorted, or loose fitting clamps.
- y. Perform pressure leak check of fuel manifolds per WP 707 00.



Failure to lockwire properly, maintaining specified twists per inch keeping lockwire taut without overstress may cause lockwire to break.

- z. Lockwire coupling nuts(4) to lug on fuel nozzles(7) with PN AS3214-03 (0.039 inch) wire, five to eight twists per inch. Attach wire to coupling nut before twist with lockwire closure terminating at nozzle lug. See figure 25.
- aa. Lockwire coupling nuts(5, figure 24) to tee on fuel manifold assemblies(1 and 6) with PN AS3214-03 (0.039 inch) wire, five to eight twists per inch. Double loop wire around tee before twist with lockwire closure pigtail at coupling nut. See figure 25.
- ab. Lockwire coupling nuts(10, figure 24) with PN AS3214-03 (0.039 inch) wire, five to eight twists per inch.

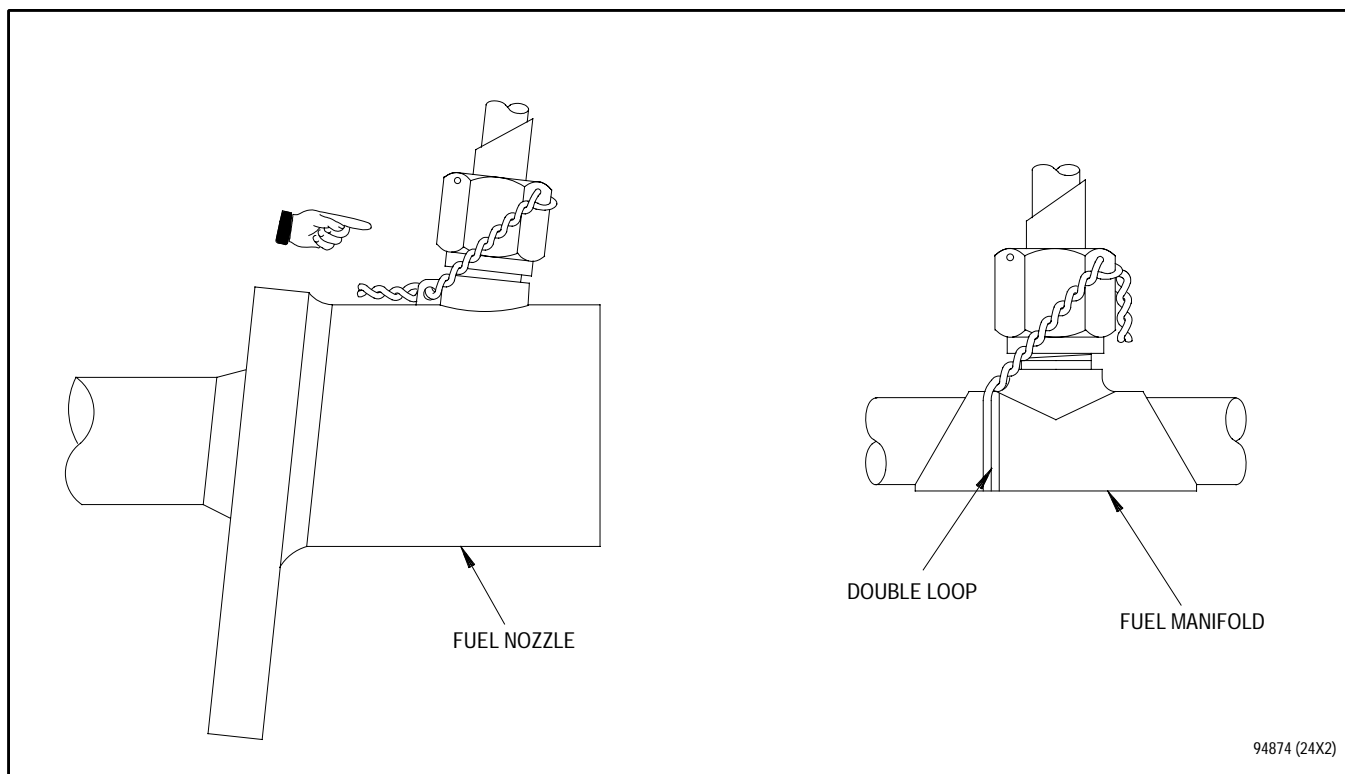


Figure 25. Fuel Supply Tube Coupling Nut Lockwire Configuration

13A. LEFT AND RIGHT FUEL SUPPLY MANIFOLDS - INSTALLATION (AFTER INCORPORATION OF TCTO 2J-F100229(II)-559 OR 2J-F100229(II)-560.

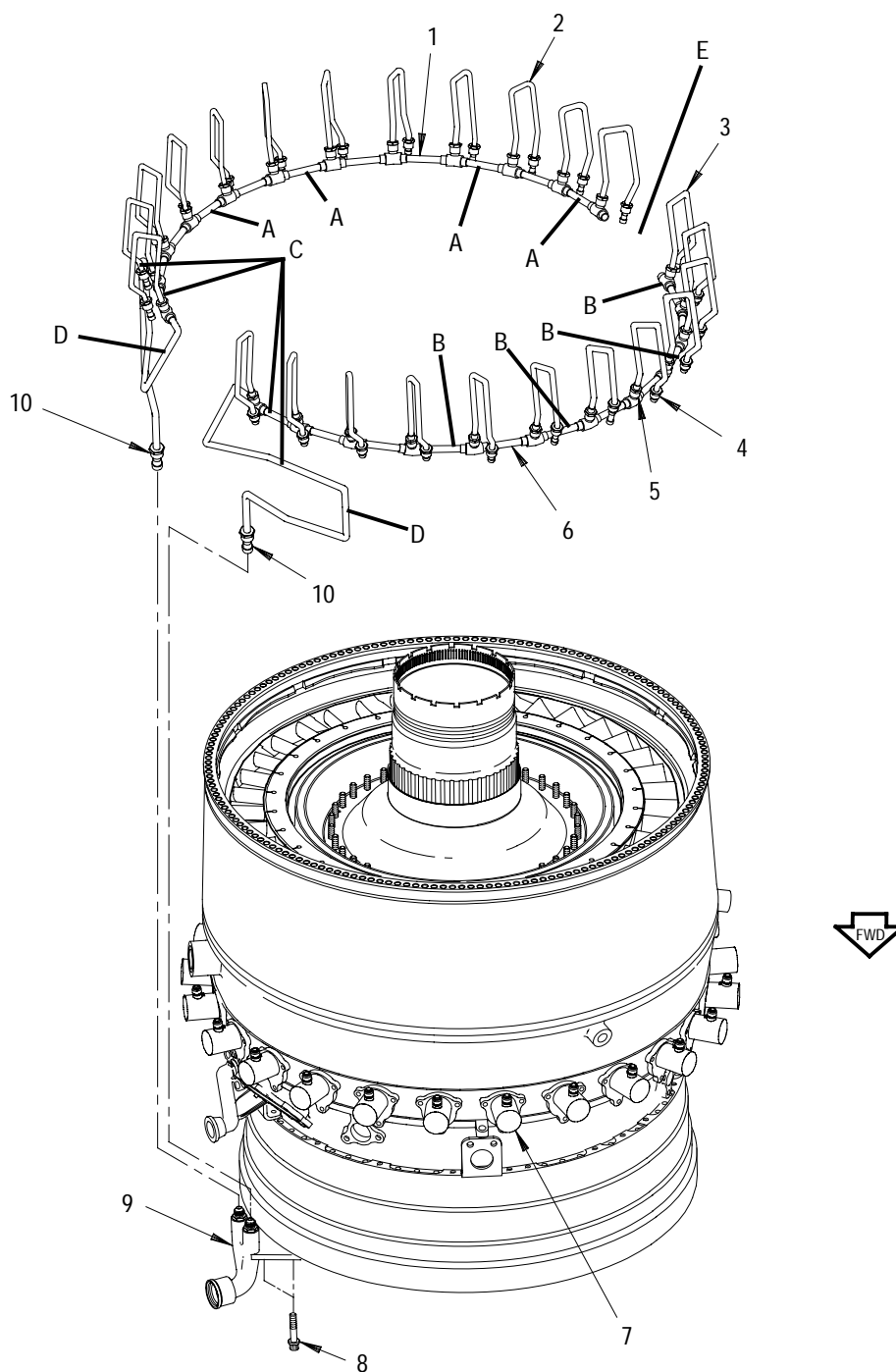
(See figures 23A and 23B and Figure 25A.)

- a. Loosen bolts(8, figure 25A) securing fuel supply manifold tube connector assembly(9).
- b. Place one new bracket assembly(21) on end of each fuel manifold assembly(1 and 6) at Location E if not already installed. See figure 25A.
- c. If fuel manifold assembly(1 or 6) is being reused, prepare threads of reused fuel manifold assembly and fuel manifold coupling nuts(10) as follows:



Material from burnishing operations entering fuel supply path or remaining on sealing surfaces may cause fuel system contamination or leakage.

- (1) Lightly burnish threads. Do not allow any material from burnishing operations to enter fuel supply path.
 - (2) Use shop air and clean cloth or equivalent process to remove loose material from fuel manifold threads and coupling nuts.
 - (3) Lightly coat threads of fuel manifold assembly coupling nuts(10) with PWA 550-3 antigalling compound. Let dry until parts are dry to touch.
- d. Position left and right fuel manifold assemblies(1 and 6) on diffuser case and connect coupling nuts(10) to fuel supply manifold tube connector assembly(9) fingertight. Temporarily install saddle loop clamps(12) on angle bracket(17) at Location D and secure with nuts(11) and bolts(13) fingertight.
 - e. Install brackets and loop clamps on fuel manifold in Locations A through C per Figure 25A and as follows:
 - (1) Lightly coat all bolt(13) washer faces with PWA 36053-3 antiseize compound.
 - (2) Position fuel manifold brackets(20) on fuel nozzle brackets(14) at Locations A and B and center on brazed-on wear sleeve. Secure with bolts(15), bolts(13), and nuts(11) and tighten fingertight.
 - (3) Position brackets(20) on aft (upper) end of brackets(14) at fuel nozzle positions 11 and 14 at Location C. Center brackets on brazed-on wear sleeve. Secure with bolts(15), bolts(13), and nuts(11) and tighten fingertight.



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Figure 25A. Fuel Manifolds and Brackets - Installation (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 1 of 4)

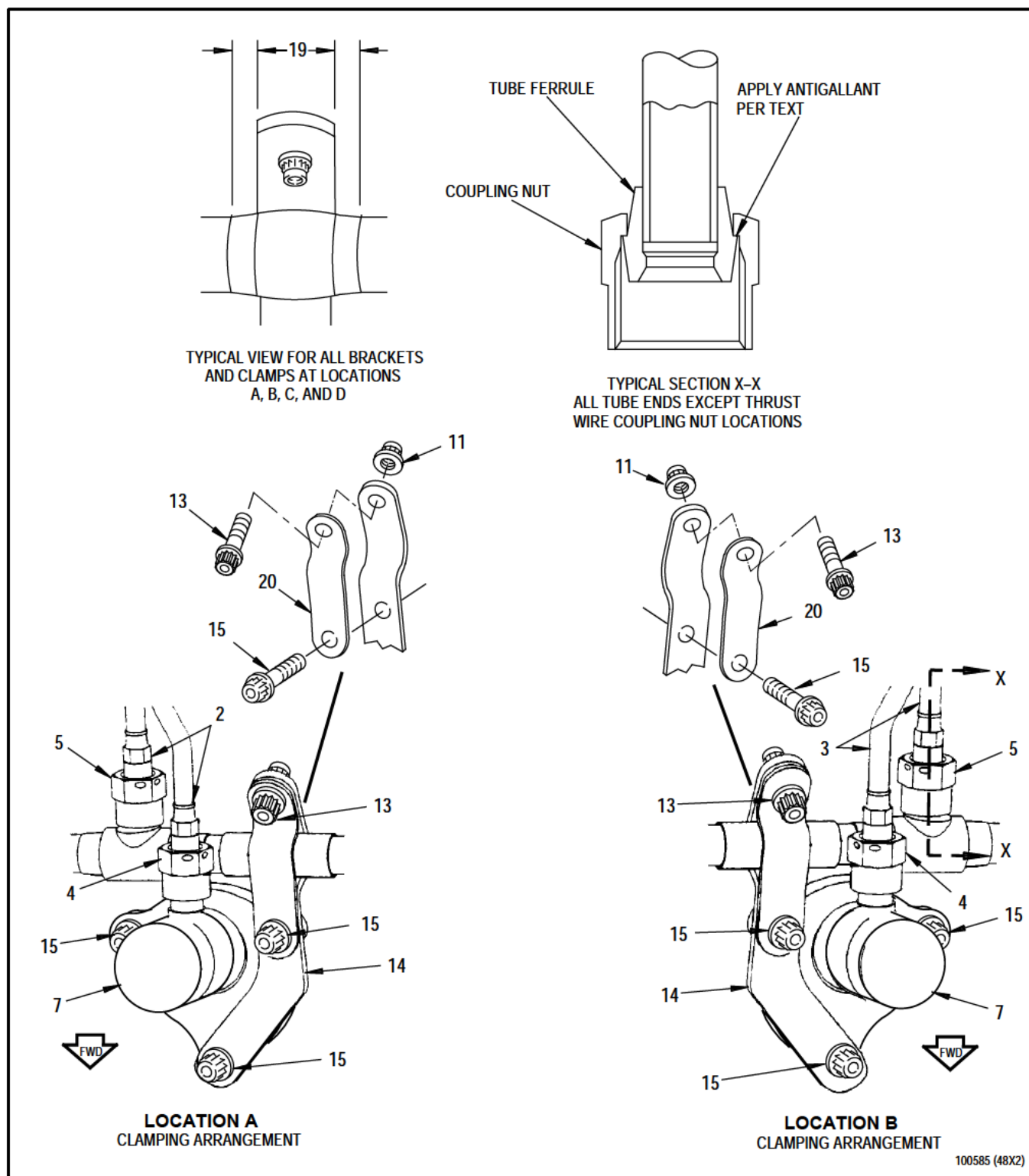


Figure 25A. Fuel Manifolds and Brackets - Installation (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 2 of 4)

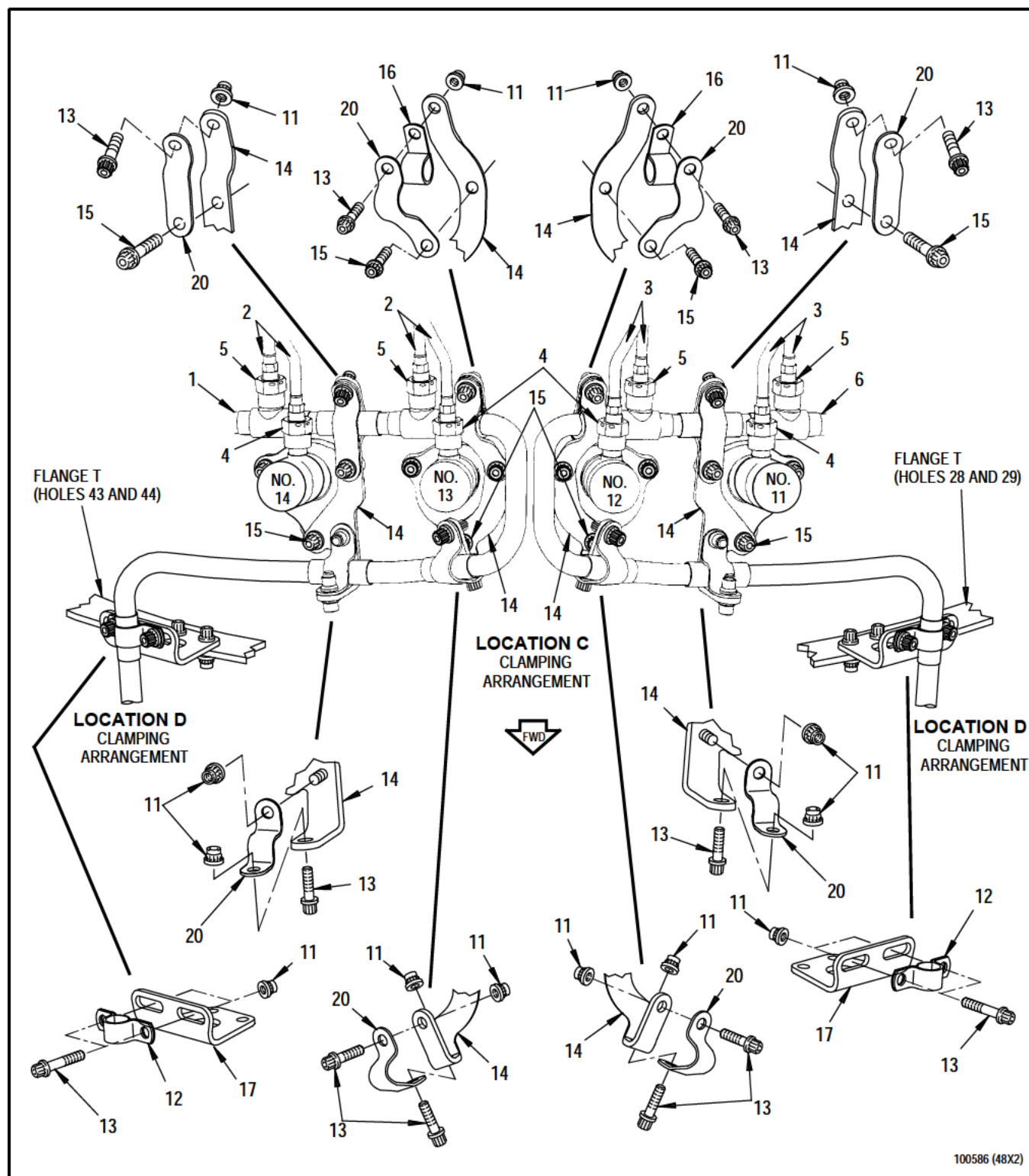


Figure 25A. Fuel Manifolds and Brackets - Installation (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 3 of 4)

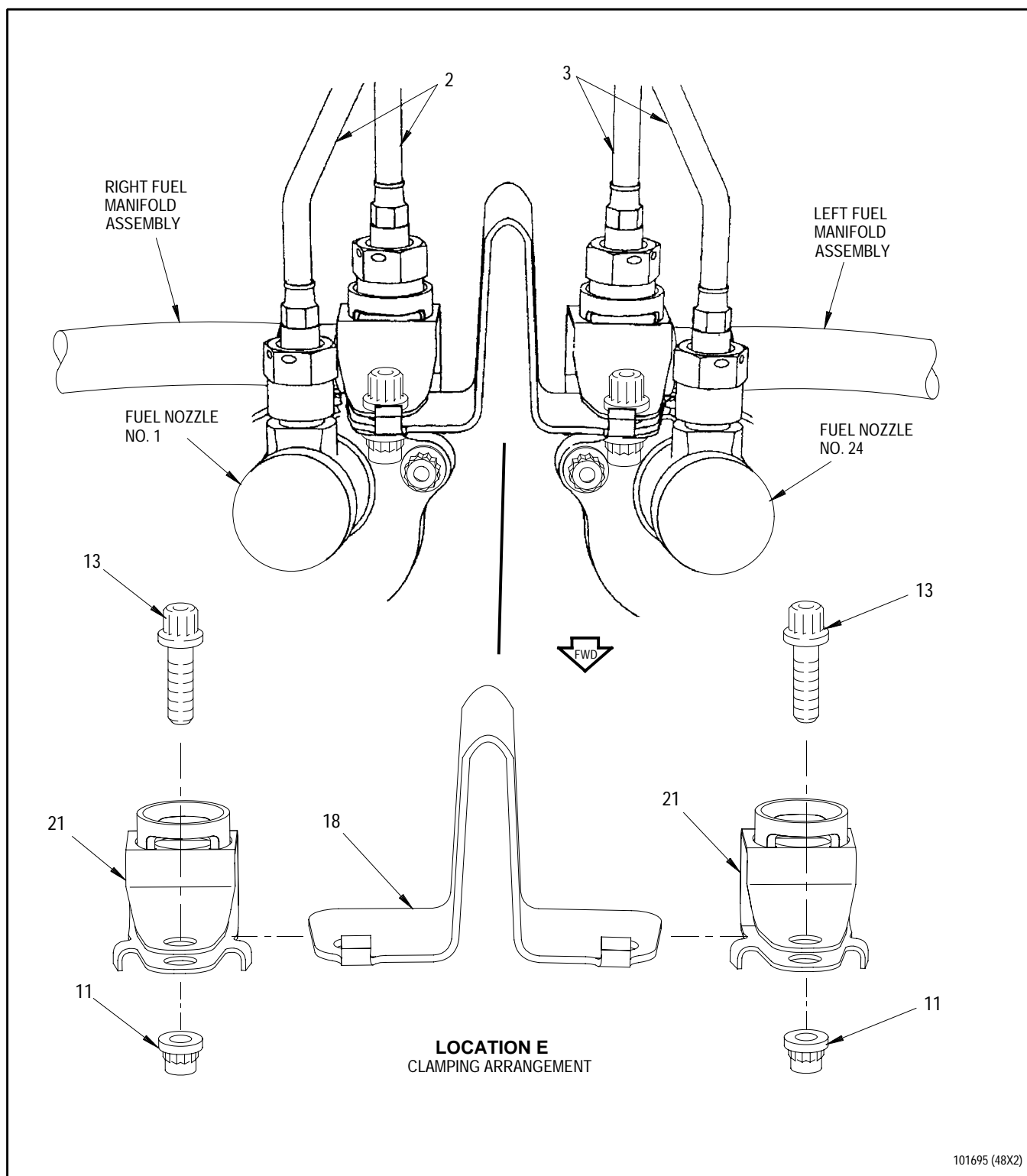


Figure 25A. Fuel Manifolds and Brackets - Installation (After Incorporation of TCTO 2J-F100229(II)-559 or 2J-F100229(II)-560) (Sheet 4 of 4)

Legend for figure 25A

1. Fuel manifold assembly (left)
2. Fuel supply tube (left)
3. Fuel supply tube (right)
4. Coupling nut (supply tube to fuel nozzle)
5. Coupling nut (supply tube to manifold)
6. Fuel manifold assembly (right)
7. Fuel nozzle
8. Bolt
9. Fuel supply manifold tube connector assembly
10. Coupling nut
11. Nut
12. Saddle loop clamp
13. Bolt
14. Fuel nozzle bracket
15. Bolt
16. Cushion loop clamp
17. Angle bracket
18. Fuel manifold bracket
19. Clamp edge to sleeve edge shall be 0.120 inch minimum.
20. Fuel manifold bracket
21. Bracket assembly

- (4) Position brackets(20) on forward (lower) end of brackets(14) at fuel nozzle positions 11 and 14 at Location C. Secure with nuts(11) and bolts(13) fingertight.
- (5) Install cushion loop clamp(16) around left and right fuel manifold assemblies at fuel nozzle positions 12 and 13. Position clamps on aft (upper) end of brackets(14).
- (6) Position brackets(20) over cushion loop clamps(16) on aft (upper) end of brackets(14) at fuel nozzle positions 12 and 13. Center brackets and clamps on brazed-on wear sleeve. Secure with bolts(15), bolts(13), and nuts(11) and tighten fingertight.

- (7) Position brackets(20) on forward (lower) end of brackets(14) at fuel nozzle positions 12 and 13. Secure with nuts(11) and bolts(13) fingertight.

- f. Align fuel manifold bracket(18) with bracket assemblies(21) at Location E and install as follows:

- (1) Lightly coat two bolt(13) washer faces with PWA 36053-3 antiseize compound.
- (2) Assemble nuts(11) and bolts(13) to secure brackets. Tighten nuts and bolts fingertight.

g. Remove bolts(13) on saddle loop clamps(12) and angle bracket(17) at Location D and lightly coat washer face with PWA 36053-3 antiseize compound. Reinstall bolts with nuts(11) fingertight.

h. If fuel supply tubes(2 and 3) are being reused, prepare threads as follows:



Material from burnishing operations entering fuel supply path or remaining on sealing surfaces may cause fuel system contamination or leakage.

- (1) Lightly burnish threads of fuel supply tube coupling nuts(4 and 5). Do not allow any material from burnishing operations to enter fuel supply path.
- (2) Use shop air and clean cloth or equivalent process to remove loose material from coupling nuts, fuel manifold threads, and fuel nozzle threads.
- (3) Lightly coat threads of fuel supply tubes with PWA 550-3 antigalling compound. Let dry until parts are dry to touch.
- (4) Slide coupling nuts back on fuel supply tubes and apply PWA 550-3 antigalling compound to rear side of tube ferrule per figure 25A. Let dry until parts are dry to touch before repositioning nuts. This procedure does not apply to thrust wire nuts at positions 3, 10, 15, and 22.

i. Install left and right fuel supply tubes(2 and 3) at fuel nozzle positions 1 through 24 per figure 25A and as follows:



Bending fuel supply tubes and fuel manifolds for proper alignment will damage tubes and manifolds.

- (1) Adjust position of left and right fuel manifold assemblies(1 and 6) to align fittings of fuel supply tubes(2 and 3). Do not bend fuel supply tubes or fuel manifolds to achieve correct alignment.
 - (2) Install fuel supply tube coupling nuts(4 and 5) to fuel nozzle and fuel manifold. At positions 3, 10, 15, and 22, connect thrust wire nut/elbow first. Reinstall fuel supply tubes in original position if being reused. Tighten coupling nuts fingertight.
- j. Torque fuel nozzle mount bolts(15) as follows:
- (1) Start at bottom of engine and work to top, both sides.
 - (2) Torque fuel nozzle mount bolts 65 to 85 pound-inches in 20 pound-inch increments until torque is maintained.

CAUTION

Failure to ensure proper seating of fuel nozzles may affect engine operation and cause damage to equipment.

- k. Check seating of fuel nozzles by attempting to insert an 0.001 inch feeler stock between nozzle and diffuser case mount pad. See figure 23A. If feeler stock fits between fuel nozzle and diffuser case pad, loosen bolts and retorque per previous step. Check seating again per this step.
- l. If gap still exists, remove fuel nozzle, determine cause, and retorque nozzle bolts per step j. Causes may include improper torquing, bolt to diffuser case thread damage, or foreign material between mating flanges and gasket. Check seating per previous step.
- m. Torque nuts(11, figure 25A) on loop clamps(12 and 16) and brackets(20) at Locations A through D as follows:
 - (1) Start at bottom of engine at Location C and work to top, both sides. Torque nuts at Location D on Flange T last.
 - (2) Ensure bracket and loop clamp edge distance(19) to brazed-on wear sleeve is at least 0.120 inch on both sides of all brackets and clamps.
 - (3) Torque nuts(11) 62 to 72 pound-inches.
 - (4) Ensure clamps and brackets are not twisted or distorted and rest flat on brackets.
- n. Torque fuel supply manifold tube connector assembly mount bolts(8), 85 to 95 pound-inches.

CAUTION

Improperly torqued coupling nuts may cause fuel leakage.

- o. Torque fuel manifold assembly coupling nuts(10), 340 to 375 pound-inches.

CAUTION

Allowing fuel supply tubes to rotate when coupling nuts(4 and 5) are tightened may cause tube damage.

- p. Tighten each fuel supply tube(2 and 3) by torquing coupling nuts(4 and 5) in two increments. First increment shall be to 20 pound-inches, alternating between coupling nuts on any single fuel supply tube. Final increment shall be to 100 to 110 pound-inches, alternating between coupling nuts on any single fuel supply tube. Use backup wrench to ensure fuel supply tubes do not rotate.
- q. Verify final torque on all 24 fuel supply tubes(2 and 3) by torquing to 100 pound-inches.
- r. Torque nuts(11), on brackets(18 and 21) at Location E, 62 to 72 pound-inches.
- s. Inspect all fuel manifold assembly brackets and clamps. Replace all bent, twisted, distorted, or loose-fitting brackets or clamps.
- t. Perform pressure leak check of fuel manifolds per WP 707 00.

- u. Ensure bracket or loop clamp edge to sleeve edge distance(19) is at least 0.120 inch on both sides of all brackets or clamps. If distance is less than 0.120 inch on either side of any bracket or clamp, loosen bolts(13 and 15) and nuts(11) to realign brackets and clamp. Retorque bolts(15) per step j. and nuts(11) per step m. Recheck distance(19) and repeat this step until required edge distance is maintained.
- v. Install PN AS3510-0318K safety cable per figure 23B on the following:

- (1) Three bolts(15, figure 25A) at each fuel nozzle.
- (2) Coupling nuts(4) on fuel supply tubes at each fuel nozzle location. Do not safety cable across two plumbing fitting coupling nuts on any single tube.
- (3) Coupling nuts(5) on fuel supply tubes at each fuel manifold fitting location. Do not safety cable across two plumbing fitting coupling nuts on any single tube.
- (4) Coupling nuts(10) on fuel manifolds connected to fuel supply manifold tube connector assembly(9).

14. NO. 4 BEARING SEAL AIR SUPPLY MANIFOLD ASSEMBLY - INSTALLATION.

(See Figure 26.)

- a. Coat bolts(5) with MIL-L-7808 lubricating oil.
- b. Coat bolts(1) with MIL-L-7808 lubricating oil.
- c. Install metal seal ring(3) on No. 4 bearing seal air supply manifold assembly(2).
- cl. Ensure sleeve is installed in air supply manifold elbow(4) prior to assembly.
- d. Insert air supply manifold assembly(2) into elbow(4). Align manifold assembly in elbow to provide clearance around elbow sleeve.
- e. Install elbow(4) to upper fourth through ninth stage compressor case(6). Install two bolts(5) fingertight.
- f. Attach other end of air supply manifold(2) using three bolts(1). Fingertighten bolts(1).
- g. Align and adjust air supply manifold assembly(2) to provide clearance around elbow sleeve, and adjust elbow sleeve to provide a uniform gap between sleeve flange and elbow.
- h. Torque bolts(1) 20 to 26 pound-inches and lockwire using PN MS9226-04 wire.
- i. Torque bolts(5) 65 to 85 pound-inches, while maintaining assembly alignment. Lockwire bolts(5) using PN MS9226-04 (0.032 inch) wire.

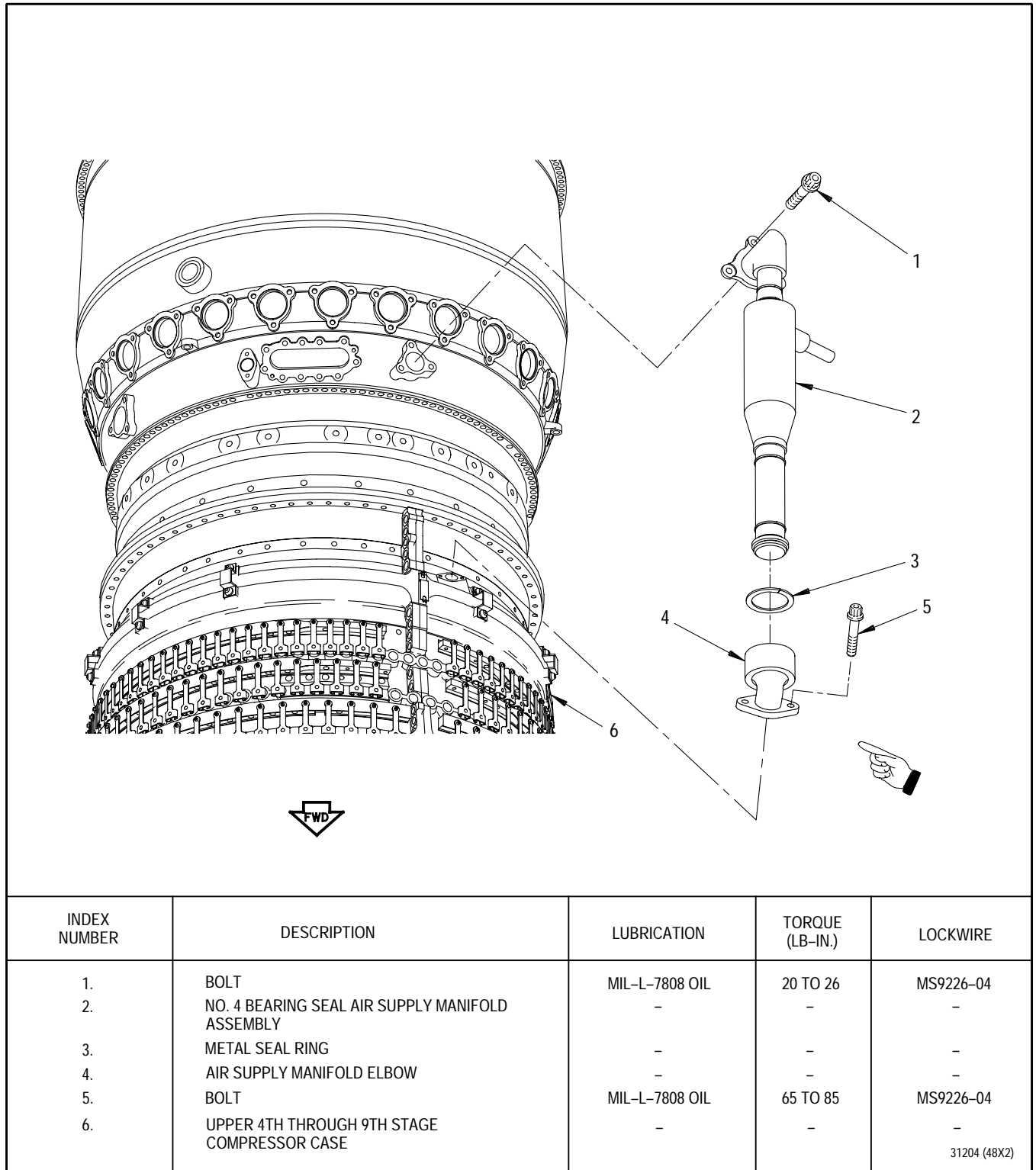


Figure 26. No. 4 Bearing Seal Air Supply Manifold - Installation

**15. IGNITER PLUG DEPTH CHECK, INSERT
REMOVAL AND SPACER RING REPLACEMENT.**

- a. For igniter plug depth check,
insert removal and spacer ring
replacement, refer to T.O.
2J-F100-53-4, WP 024 00.

Pages 61 through 66 deleted, including Figures 27 through 29 and Table 2.

16. REAR COMPRESSOR DRIVE TURBINE ROTOR AND STATOR - INSTALLATION.

(See Figures 29A and 30 through 36.)

NOTE

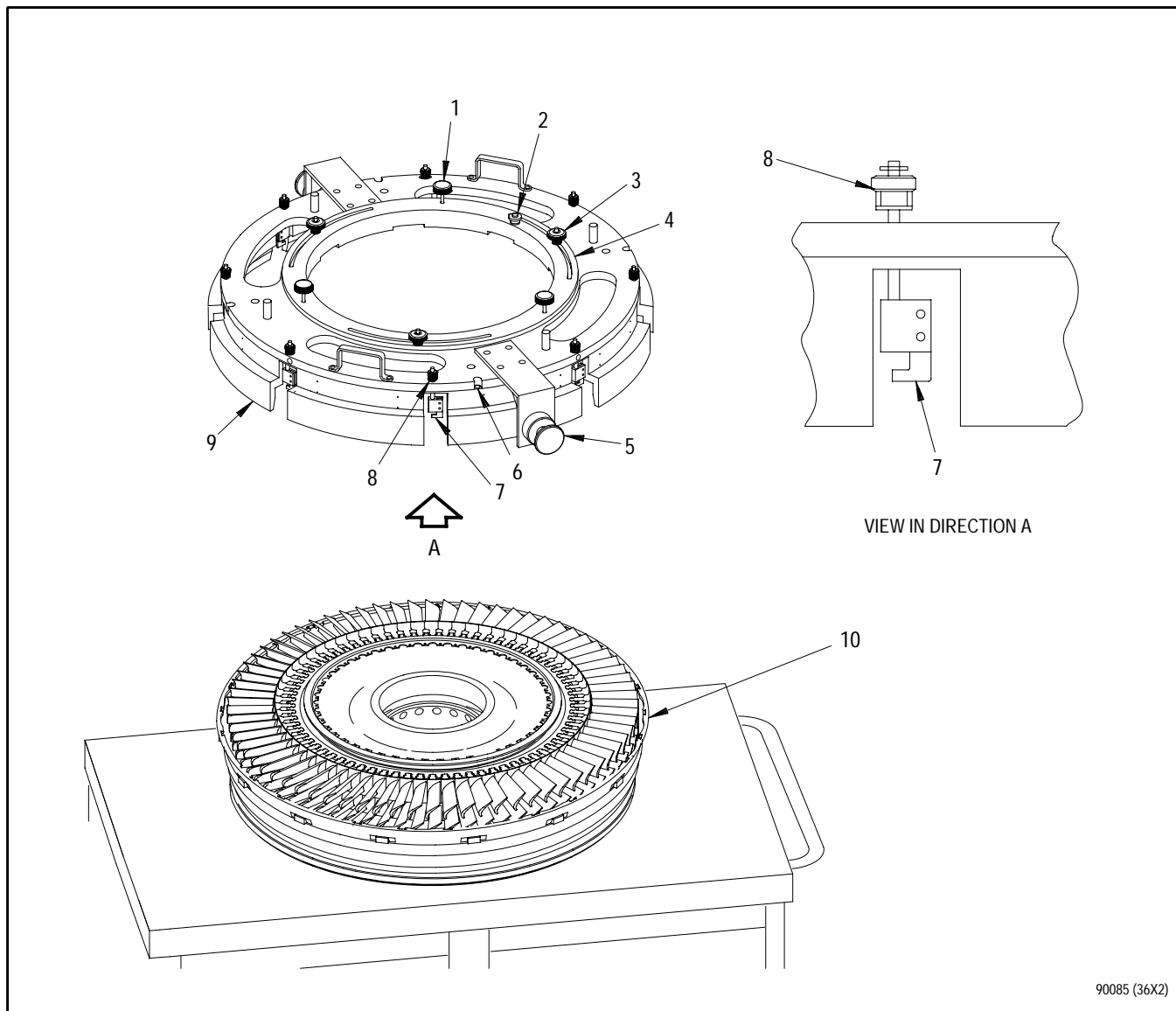
- There are two configurations of rear compressor drive turbine rotor and stator assembly. One is to be installed in core module containing short diffuser case and separate front turbine case and requires use of PWA 57920 lift fixture (see step a.). The other is to be installed in core module containing long diffuser case and requires use of PWA 57712 adapter (see step a1.).
- Rear compressor drive turbine rotor and stator assembly may already be installed in PWA 57920 lift fixture or PWA 57712 adapter from previous maintenance activity.
- a. If necessary, install PWA 57920 lift fixture on turbine rotor and stator assembly as follows:
 - (1) Loosen knurled knobs(3 and 8, figure 29A) and knurled head screws(1).
 - (2) Remove ball lock pin(2).
 - (3) Rotate clamp ring(4) fully clockwise.



Failure to center lift fixture over turbine rotor and stator assembly during installation can result in damage to 2nd stage turbine blades.

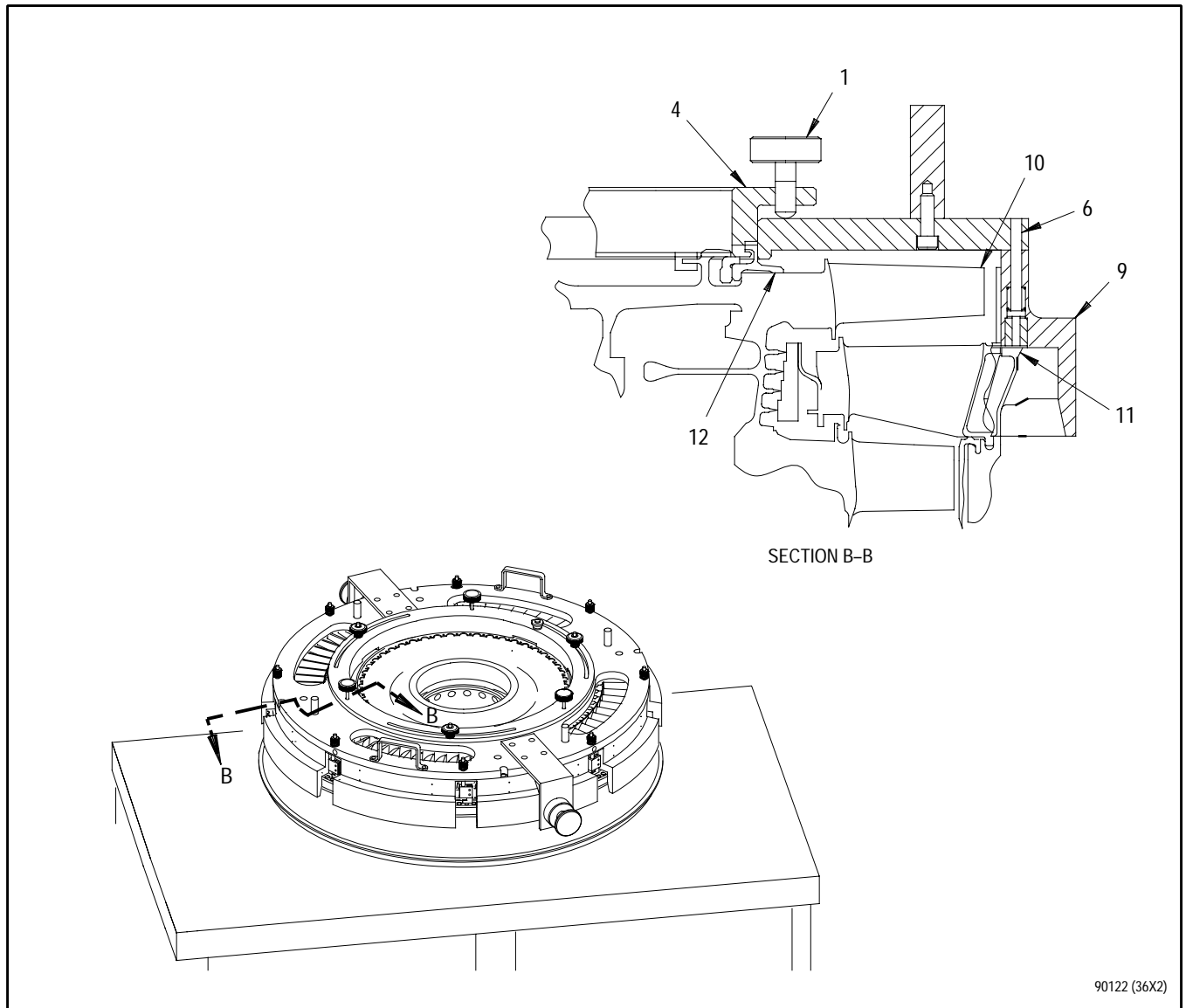
NOTE

- The 12 o'clock position of turbine rotor and stator assembly(10) is the slot located between X marks on face of rear flange of turbine duct and vane support(11).
 - Clamp ring(4) may be rotated slightly counterclockwise to prevent interference between lugs on clamp ring(4) and lugs on 2nd stage rear turbine blade retaining plate(12).
- (4) Install PWA 57920 lift fixture on rotor and stator assembly(10) aligning offset slots in base assembly(9) with offset lugs, located either side of large OD tang on turbine duct and vane support(11). Ensure ID of base assembly(9) does not contact 2nd stage turbine blades. Rotate clamp ring(4) as necessary to prevent interference between lugs on clamp ring(4) and lugs on 2nd stage rear turbine blade retaining plate(12) during installation.



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Figure 29A. PWA 57920 Lift Fixture - Installation (Sheet 1 of 2)



- | | | |
|----------------------------------|-------------------------------|--|
| 1. Knurled head screw (3 places) | 6. Flush pin (4 places) | 11. Turbine duct and vane support |
| 2. Ball lock pin | 7. Clamp (8 places) | 12. 2nd stage rear turbine blade retaining plate |
| 3. Knurled knob (3 places) | 8. Knurled knob | |
| 4. Clamp ring | 9. Base assembly | |
| 5. Trunnion | 10. Rotor and stator assembly | |

Figure 29A. PWA 57920 Lift Fixture - Installation (Sheet 2 of 2)

WARNING

Failure to engage clamps(7) in rectangular-shaped slots may result in disengagement of PWA 57920 fixture during lifting and cause serious injury to personnel.

- (5) Engage eight clamps(7) with rectangular-shaped slots in turbine duct and vane support(11). Tighten knurled knobs(8) handtight.
- (6) Ensure all flush pins(6) are even with, or above, adjacent surface of base assembly(9). If flush pins(6) are below surface of base assembly(9) repeat steps (1) through (6).
- (7) Push clamp ring(4) down and turn counterclockwise until it stops.
- (8) Ensure lugs on clamp ring(4) engage behind lugs on 2nd stage rear turbine blade retaining plate(12).
- (9) Install ball lock pin(2) into clamp ring(4). Turn ring clockwise until it stops. Ring should not rotate far enough to allow disengagement of lugs on clamp ring(4) and retaining plate(12). If disengagement of lugs occurs repeat steps (1) through (9).
- (10) Tighten knurled head screws(1) handtight to hold running position of rotor.
- (11) Tighten knurled knobs(3) securing clamp ring(4).

al. If necessary, install PWA 57712 adapter(1, figure 30) onto rear compressor drive turbine rotor and stator(7) as follows:

- (1) Loosen all knurled knobs(2, 3, and 6).
- (2) Remove spring plunger(5).

NOTE

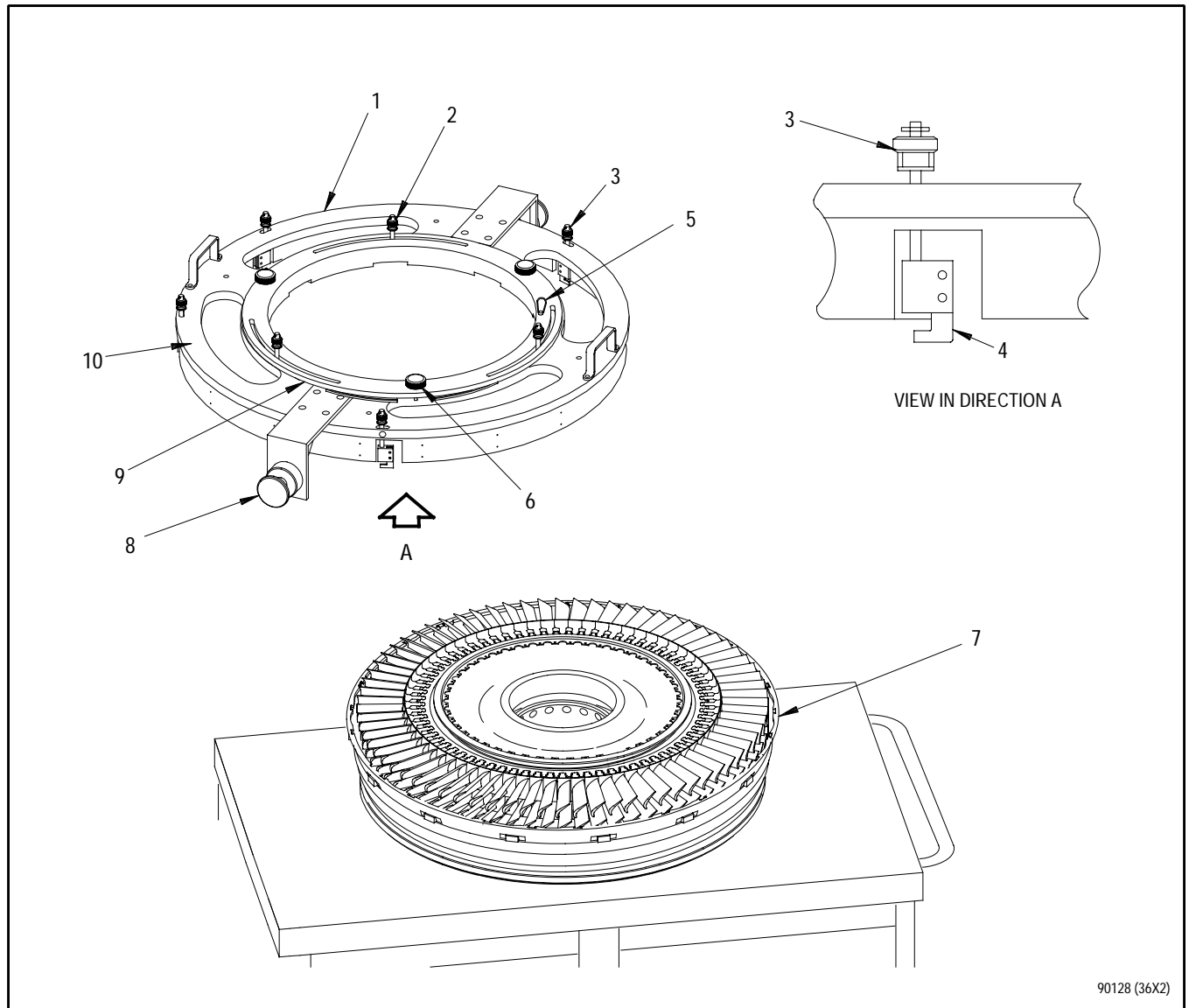
When installing adapter(1) on rear compressor drive turbine rotor and stator assembly(7) it may be necessary to rotate ring clamp(9) so scallops do not hang up on adapter.

- (3) Install PWA 57712 adapter(1) on rotor and stator(7) so the word TOP marked on base(10) is at 12 o'clock.

WARNING

Failure to engage clamps(4) in rectangular-shaped slots may result in disengagement of PWA 57712 adapter during lifting and cause serious injury to personnel.

- (4) Engage four clamps(4) into rectangular-shaped slots in rotor and stator(7).
- (5) Tighten knurled knobs(3) hand tight.
- (6) Push ring clamp(9) in and turn counterclockwise until it stops.
- (7) Install spring plunger(5) into ring clamp(9).
- (8) Ensure ring clamp(9) can not rotate. If ring clamp rotates, repeat steps (6) and (7).
- (9) Tighten knurled knobs(6) handtight to hold running position of rotor.
- (10) Tighten knurled knobs(2) securing ring clamp(9) to base(10).



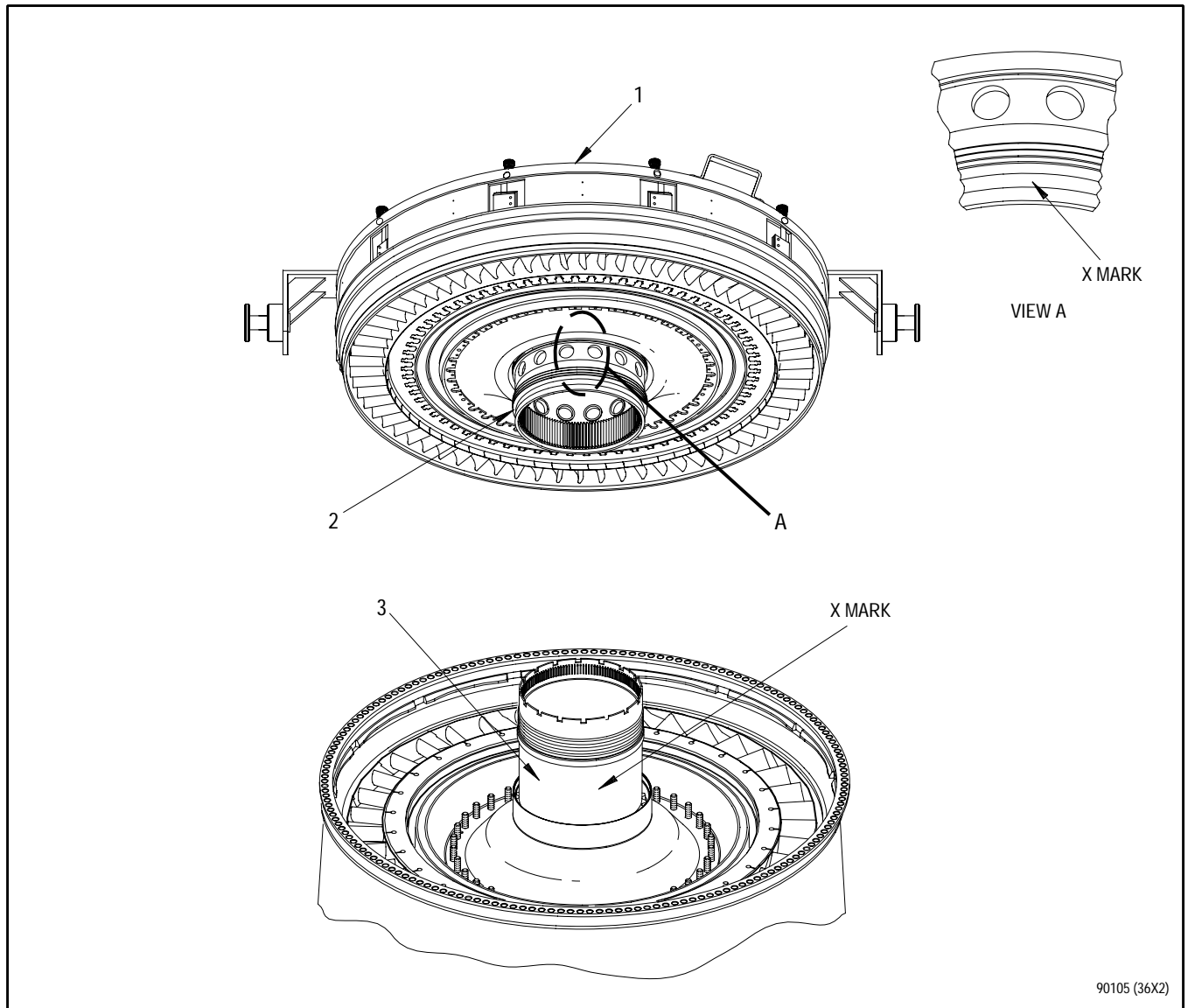
1. PWA 57712 adapter
2. Knurled knob
3. Knurled knob
4. Clamp
5. Spring plunger
6. Knurled knob
7. Rear compressor drive turbine rotor and stator
8. Trunnion
9. Ring clamp
10. Base

Figure 30. PWA 57712 Adapter - Installation

- a2. Take dimensions as follows:
(See figure 33.)
 - (1) Measure Dimension B, length of driveshaft(2, figure 33), to nearest 0.001 inch at three places equally spaced. Take average of measurements and record.
 - (2) Measure Dimension C, length of hub(1), to nearest 0.001 inch at three places equally spaced. Take average of measurements and record.
 - (3) Record the difference between Dimension B and Dimension C as Dimension A ($A=B-C$) for use in step p.
- b. Attach PWA 26147 adapters to trunnions on PWA 57920 lift fixture(1, figure 31) or PWA 57712 adapter.
- c. Attach PWA 56336 sling to overhead hoist with PWA 2388 hook. Attach sling to PWA 26147 adapters.
- c1. Before installing rear compressor drive rotor and stator assembly, burnish threads of rear compressor driveshaft with soft bristle brass wire brush. Ensure rear face of turbine hub is clean and free of any antiseize buildup from previous turbine nut contact.
- d. Vacuum clean area between No. 4 bearing rear seal assembly and rear compressor rear hub to remove any debris.
- e. Vacuum clean area between 1st stage turbine inner air sealing ring and 1st stage turbine outer air sealing ring to remove any debris.
- f. To prevent heat loss after heater removal, locate spline alignment symbols (X marks) on rear compressor driveshaft(3) and front turbine hub(2) before installing PWA 57495 heater. If marks are not present, continue turbine installation.
- g. Install PWA 57495 heater into rear of turbine bore. Connect PWA 61685 heater control to heater.
- h. Heat turbine hub assembly as follows:
 - (1) Set PWA 61685 heater control to 300°F (149°C).
 - (2) After heater reaches 300°F, allow turbine to heat soak for a minimum of 5 minutes.
 - (3) Increase temperature to 450°F (232°C).
 - (4) After heater reaches 450°F, allow turbine to heat soak for a minimum of 5 minutes.
- i. Turn off and remove PWA 61685 control and PWA 57495 heater.
- j. Install rear compressor drive turbine rotor and stator assembly as follows:
 - (1) Raise rotor and stator assembly into position over core engine module.

NOTE

- The 12 o'clock position is marked on diffuser case with an X mark.
- Offset lug is marked on turbine case with an X mark.
 - (2) Align offset lug on turbine case with offset slot on diffuser case located at approximately 12 o'clock position.



**Figure 31. Rear Compressor Rotor and Stator Assembly
and Rear Compressor Driveshaft - Spline Alignment**

- (3) Install PWA 57538 rotator through tower shaft opening at 6 o'clock position on intermediate case. Engage splines of tool with splines of tower shaft drive gear inside diffuser case.



Failure to ensure that X marks on diffuser case and turbine case are aligned following installation may result in damage to engine hardware.

- (4) Rotate rear compressor driveshaft with PWA 57538 rotator to align spline alignment symbols (X marks) on rear compressor driveshaft(3) and front turbine hub(2). Alignment marks shall be aligned within three splines. If marks are not present, install turbine. Lower rear compressor drive turbine rotor and stator assembly onto core engine module. Ensure that X marks on diffuser case and turbine case are aligned.



Failure to completely loosen knurled thumb screws on lift fixture or adapter may result in damage to fixture, adapter or engine hardware.

- k. Loosen all knurled thumb screws(9, figure 32) on PWA 57920 lift fixture or PWA 57712 adapter.

1. Install PWA 57530 pusher and puller and seat rear compressor drive turbine rotor and stator assembly as follows:

- (1) Slide jaw segments(8) into hub between 2nd stage rotor disk and rear compressor driveshaft.

NOTE

- PWA 57530 threaded rod(5) and coupler(6) are installed as an assembly and are referred to as PWA 57530 coupler.
- PWA 57530 coupler has left-hand threads.
- (2) Install PWA 57530 coupler(6) onto rear compressor driveshaft so jaw segments(8) engage ID of 2nd stage rotor disk. Thread coupler counterclockwise until it bottoms out, then back off 1/2 turn.
- (3) Disengage adapter(4) from hydraulic cylinder(2). Install adapter(4) with flat surface out over shoulder bolts(7). Rotate adapter(4) clockwise to engage.

Legend for figure 32

1. Flange nut
2. Hydraulic cylinder
3. Hydraulic coupler
4. Adapter
5. Threaded rod
6. Coupler
7. Shoulder bolt
8. Jaw segment
9. Thumbscrews

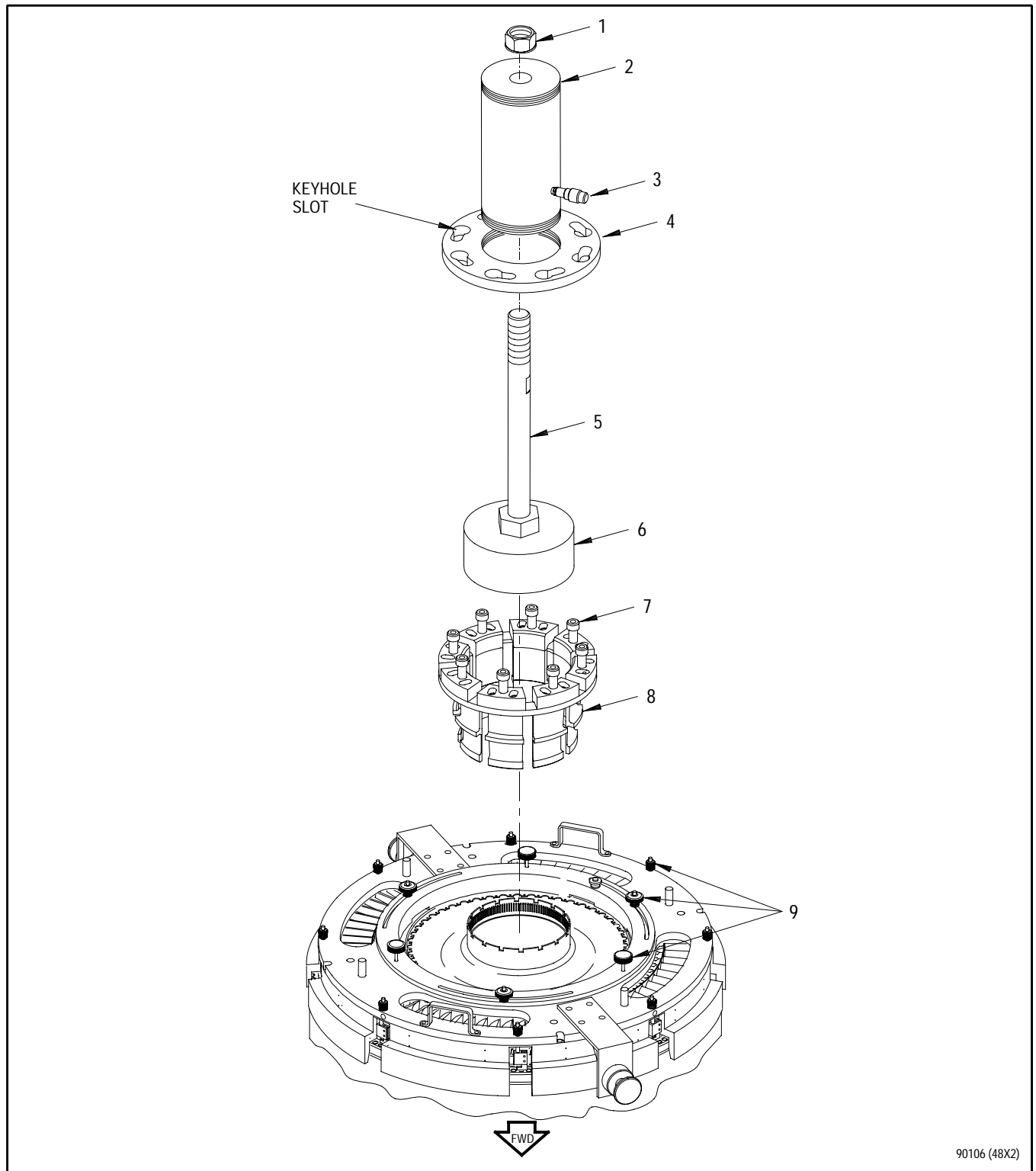


Figure 32. Rear Compressor Drive Turbine Rotor and Stator - Seating with Hydraulic Pusher

NOTE

PWA 57530 hydraulic cylinder(2) is used for removal and installation of turbine rotor assembly. Outer end of hydraulic cylinder is marked THIS SURFACE FWD FOR INSTALLATION, AFT FOR REMOVAL.

(4) Slide hydraulic cylinder(2) over threaded rod(5) with hydraulic coupler(3) positioned inward toward adapter(4). Thread cylinder completely into adapter(4), then back off 1/2 turn.

(5) Install flange nut(1) onto threaded rod(5) and back off two threads.

(6) Connect PWA 55380 hydraulic pump to hydraulic coupler(3).

m. Actuate PWA 55380 hydraulic pump to 5000 psi to seat rear compressor drive turbine rotor and stator assembly. Do not exceed 5000 psi on hand pump.

n. Allow parts to cool for 20 minutes at room temperature.

nl. Remove PWA 57538 rotator from tower shaft opening at 6 o'clock position on intermediate case.

o. Disconnect PWA 55380 hydraulic pump and remove PWA 57530 pusher and puller.

p. Using depth micrometer or equivalent, check seating of turbine rotor and stator assembly as follows:
(See figure 33.)

(1) Measure Dimension A from rear of hub(1, figure 33) to end of rear compressor driveshaft(2). Take three measurements equally spaced and average them.

(2) Compare measured Dimension A with calculated Dimension A from step a2. Dimensions shall agree within ± 0.002 inch.

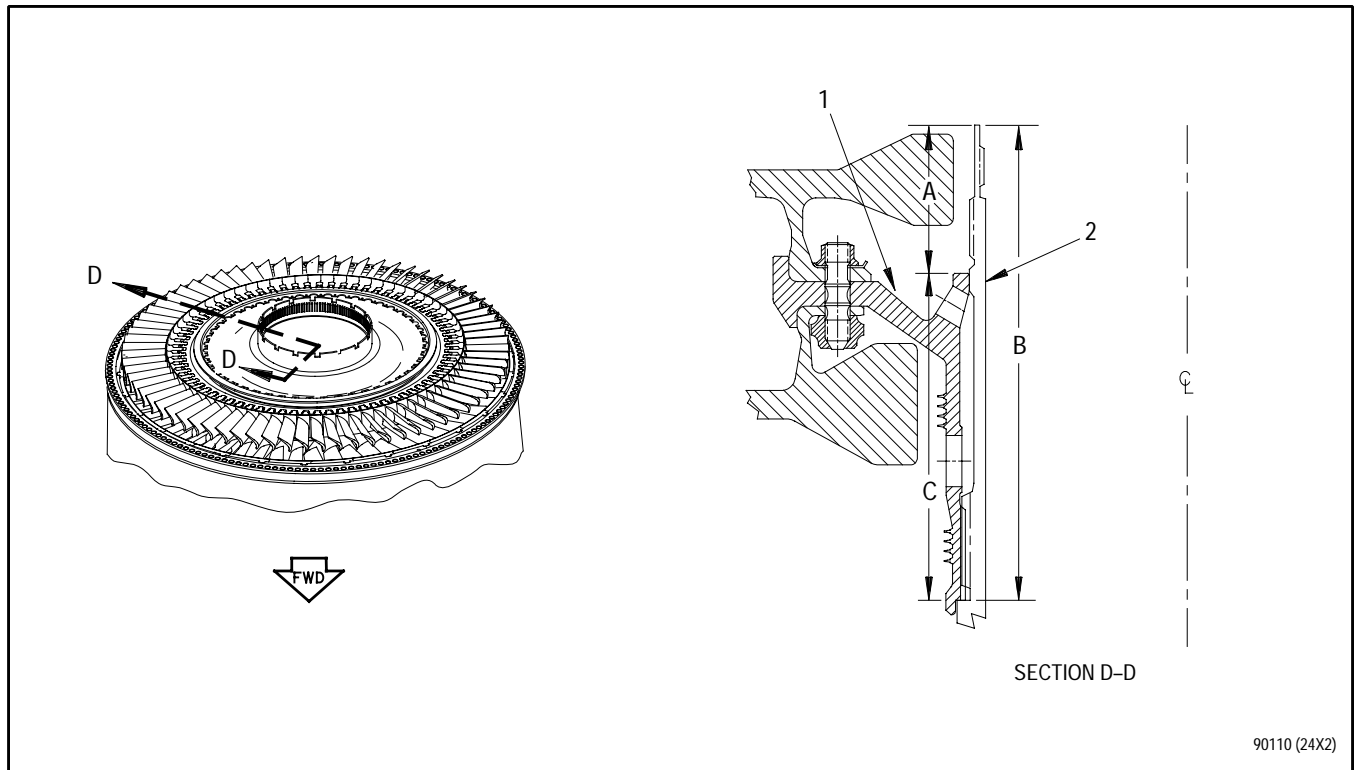
(3) If dimensions agree, proceed to step q.

(4) If dimensions do not agree, rotor and stator assembly is not seated properly. Remove assembly and repeat installation procedure.

NOTE

When rotating turbine rotor, scraping noises are permissible provided rotor rotates freely.

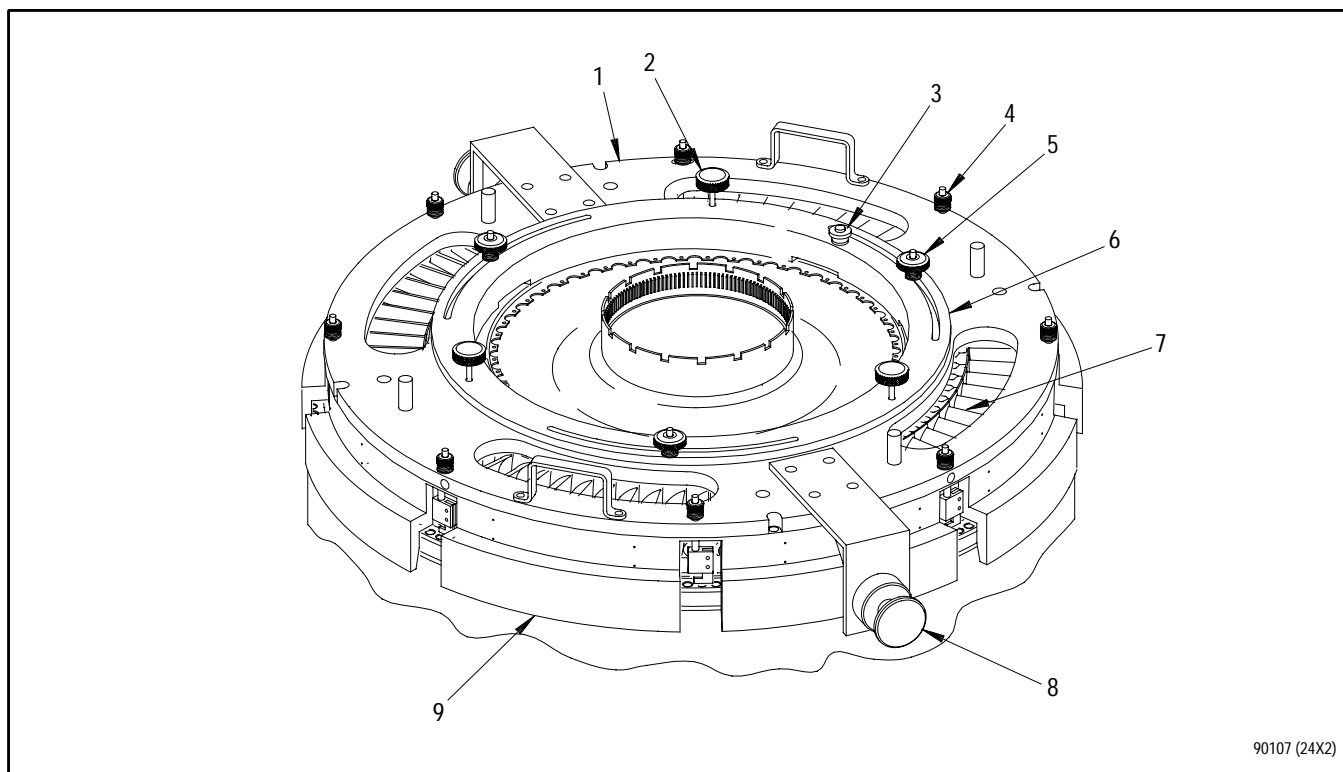
q. Rotate turbine rotor to ensure turbine and rear compressor turn freely.



1. Hub
2. Rear compressor driveshaft

Figure 33. Rear Compressor Drive Turbine Rotor and Stator - Seating Measurement

- r. Remove PWA 57920 lift fixture or PWA 57712 adapter as follows:
 - (1) Remove spring plunger(3, figure 34).
 - (2) Push ring clamp(6) in and turn clockwise until it disengages from turbine blade retaining plate and rotates freely.
 - (3) Install spring plunger(3).
 - (4) Loosen knurled knobs(4) and disengage clamps from slots in rotor and stator(7).
 - (5) Attach PWA 26147 adapters to trunnions(8).
 - (6) Attach PWA 56336 sling to overhead hoist with PWA 2388 hook. Attach sling to PWA 26147 adapters.
 - (7) Remove PWA 57920 lift fixture or PWA 57712 adapter(1).
- s. Prepare rear compressor driveshaft nut(6, figure 35) for installation as follows:
 - (1) Mechanically clean old antigalling compound from nut with a soft bristle wire brush and Methyl Ethyl Ketone or Toluene. Ensure there are no high spots on face of nut.



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- | | |
|--|--|
| 1. PWA 57920 lift fixture (shown)
or PWA 57712 adapter | 6. Ring clamp |
| 2. Knurled knob | 7. Rear compressor drive turbine
rotor and stator |
| 3. Spring plunger | 8. Trunnion |
| 4. Knurled knob
(8 places on PWA 57920,
4 places on PWA 57712) | 9. Base assembly |
| 5. Knurled knob | |

Figure 34. PWA 57920 Lift Fixture or PWA 57712 Adapter - Removal

NOTE

Some chipping is serviceable per WP 350 00.

- (2) Polish forward face of nut to a smooth finish using 400 to 600 grit emery cloth and MIL-L-7808 engine oil. Polishing shall not be used to smooth out chipped edges.
- (3) Apply PWA 36545 antigalling compound to area A shown in figure 34A. Refer to T.O. 2J-F100-53-1, SWP 098 07.
- (4) Apply PWA 36545 antigalling compound (wet) to forward face of nut, area B shown in figure 34A immediately prior to nut installation. Do not allow any wet compound in thread area.

NOTE

Rear compressor driveshaft nut has left hand threads.

- (5) Burnish threads with a soft bristle brass brush and install rear compressor driveshaft nut(6, figure 35) by turning counterclockwise.

t. Install PWA 57664 equipment set and PWA 57806 adapter set onto rear compressor driveshaft as follows:

NOTE

PWA 57664 detail-2 immobilizer spline and detail-9 immobilizer shaft, are installed as an assembly and are referred to as PWA 57664 detail immobilizer.

- (1) Install PWA 57664 detail immobilizer(5) to engage splines in rear compressor driveshaft.

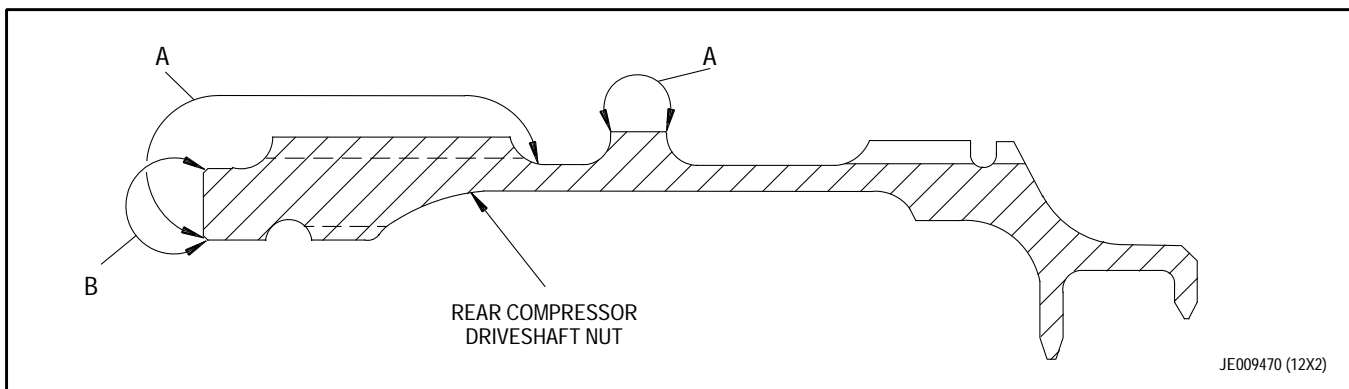


Figure 34A. Rear Compressor Driveshaft Nut - Application of PWA 36545 Antigalling Compound

- (2) Install PWA 57664 detail-8 adapter(4) to engage in splines on rear compressor driveshaft nut(6).
- (3) Install PWA 57806 base assembly(3) onto PWA 57664 adapter(4).
- (4) Ensure PWA 57806 wrench adapter assembly is disengaged from PWA 57806 adapter assembly(2) prior to use as illustrated in figure 35. Install PWA 57806 adapter assembly(2) onto PWA 57664 adapter(4). If SWE 8100/8200 torque multiplier(8) is used, install LM 1022 spacer(12) between adapter assembly(2) and adapter(4).
- (4a) If SWE 8100/8200 torque multiplier is used, install SWE 81001/81002 sling(11) onto torque multiplier.
- (4b) Connect overhead hoist with PWA 2388 hook and nylon strap to PWA 50308 hydraulic wrench(1) or connect PWA 2388 hook to SWE 81001/81002 sling(11).
- (5) Install PWA 50308 hydraulic wrench(1) or SWE 8100/8200 torque multiplier(8) onto PWA 57806 base assembly(3). Tighten knurled knobs.

NOTE

Rear compressor driveshaft nut has left-hand threads.

Hydraulic wrench or torque multiplier body will turn nut counterclockwise during installation.

- (6) Set knob on hydraulic wrench or torque multiplier for clockwise spline rotation. Refer to T.O. 32B14-5-2-1 for wrench operating instructions or T.O. 32A5-2-2-1 for torque multiplier.
- u. Connect hoses to wrench and turn on hydraulic pump or attach ratchet adapter(9) and work handle(10) to SWE 8100/8200 torque multiplier.
- v. Torque nut 3700 to 3900 pound-inches. Immobilizer shall rotate clockwise.
- w. Line up zero degree marks on scale of hydraulic wrench or torque multiplier.
- x. Continue tightening nut by turning through an angle of 58 to 60 degrees. Do not exceed 120,000 pound-inches torque. If 120,000 pound-inches torque is obtained or PWA 50308 hydraulic wrench bypasses prior to reaching angle of turn, remove nut and return to step s and repeat preparation of nut prior to installation or replace nut.

Legend for figure 35

- | | |
|-----------------------------------|-------------------------------------|
| 1. PWA 50308 hydraulic wrench | 7. Rear compressor driveshaft |
| 2. PWA 57806 adapter assembly | 8. SWE 8100/8200 torque multiplier |
| 3. PWA 57806 base assembly | 9. 0.750 inch drive ratchet adapter |
| 4. PWA 57664 adapter | 10. 0.750 inch drive work handle |
| 5. PWA 57664 immobilizer | 11. SWE 81001/81002 sling |
| 6. Rear compressor driveshaft nut | 12. LM 1022 spacer |

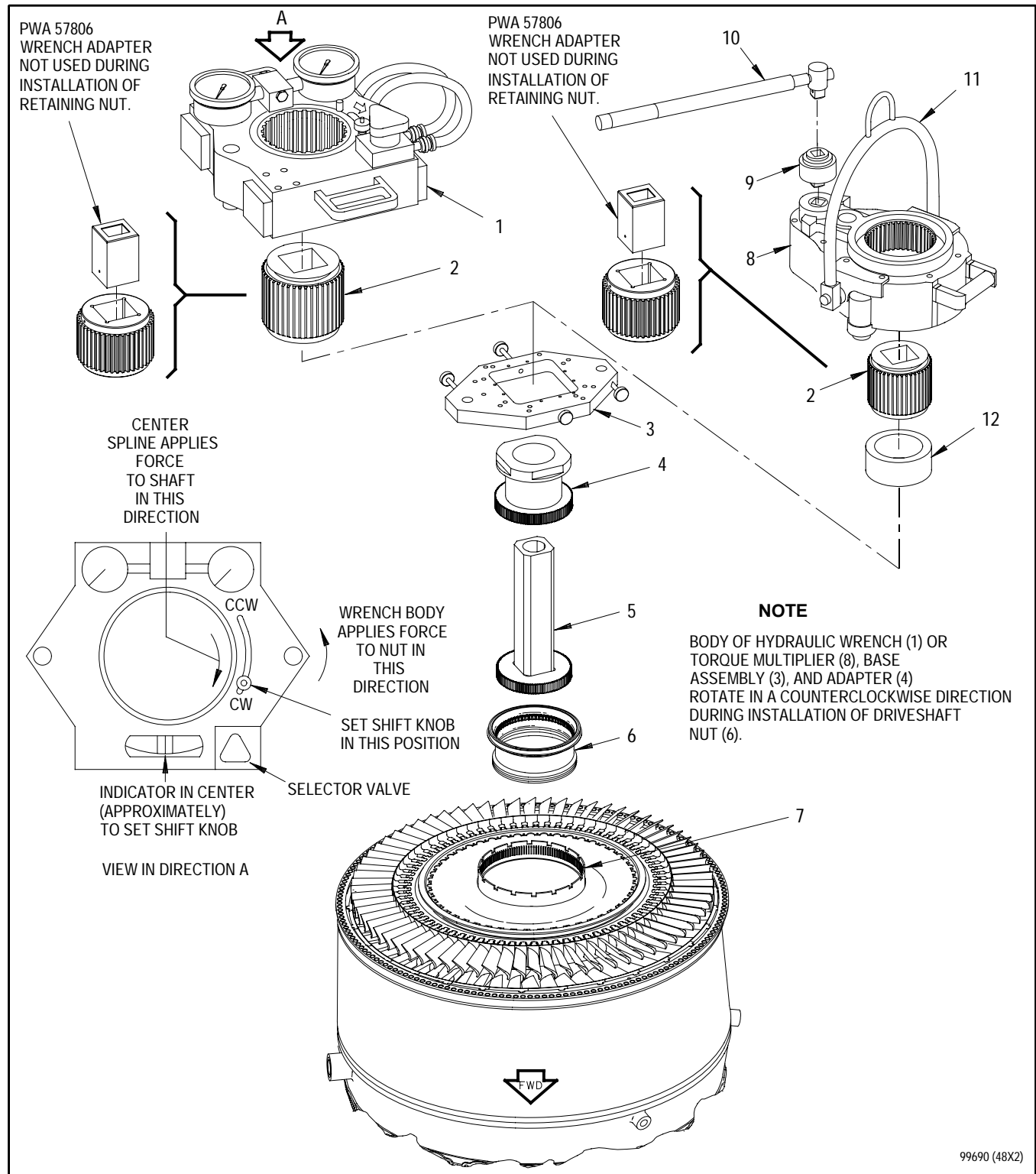


Figure 35. Rear Compressor Driveshaft Nut - Installation



Failure to ensure proper rotational direction of hydraulic wrench or torque multiplier before use may result in overtorque on retaining nut, causing damage to engine components.

NOTE

Nut has left-hand threads.

- y. Loosen nut to zero torque.
- z. Torque nut 3700 to 3900 pound-inches.
- aa. Check zero degree marks on scales of hydraulic wrench or torque multiplier:
 - (1) If marks are aligned, or if mark on outer scale is beyond mark on inner scale within 4 degrees, go to step ab.
 - (2) If marks are not aligned, repeat steps w. through aa., perform step ab.
- ab. Continue tightening nut by turning through an angle of 58 to 60 degrees.
- ac. Remove tooling. Use hoist with nylon strap or sling to remove wrench or torque multiplier respectively. Rotate turbine rotor and ensure turbine and rear compressor turn freely.
- ad. Install rear compressor driveshaft nut lock(2, figure 36) in rear compressor driveshaft nut(3) so tabs fit into slots inside shaft. Install retaining ring(1) to secure lock in place.

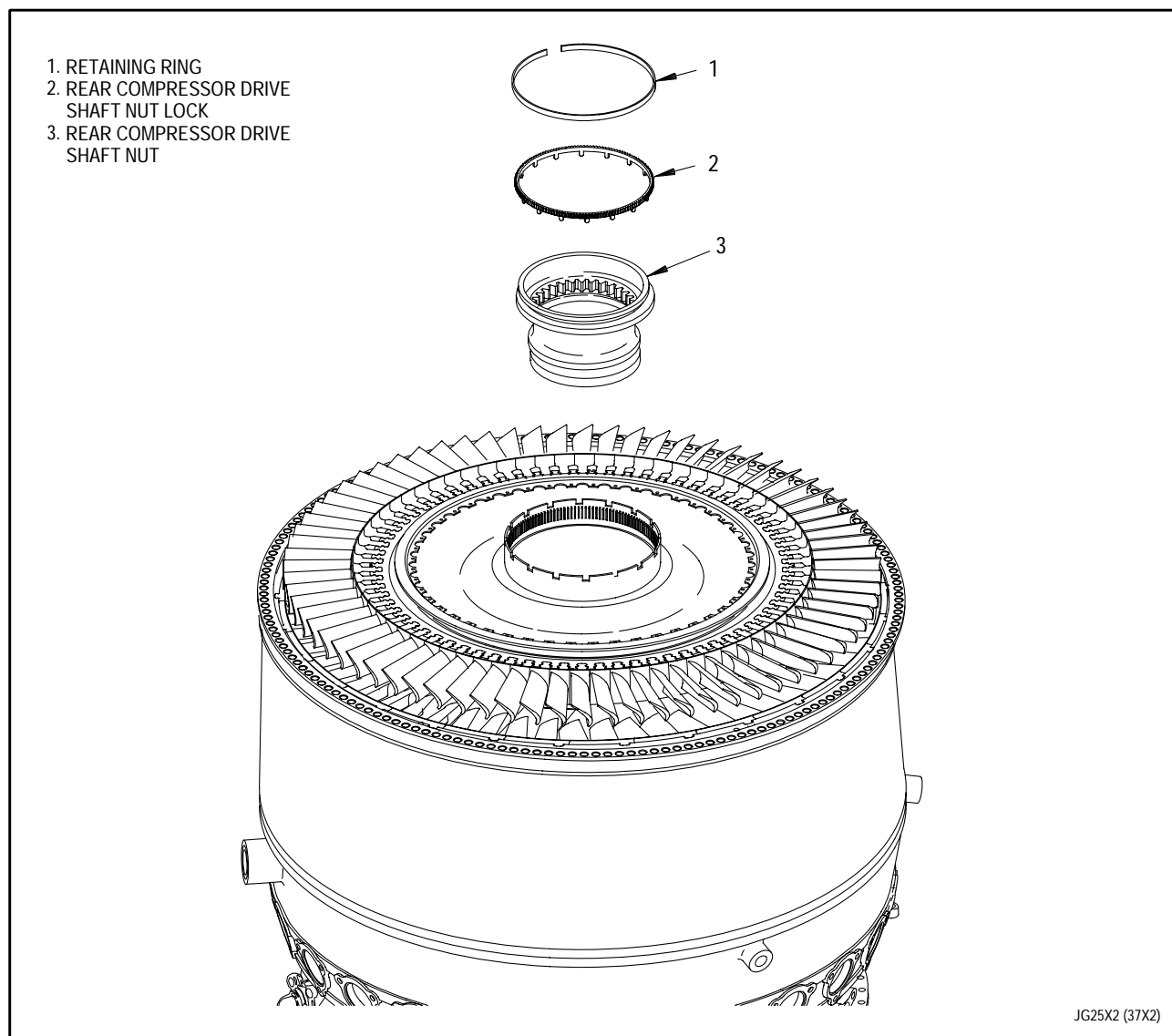


Figure 36. Retaining Ring and Rear Compressor Driveshaft Nut Lock - Installation

WORK PACKAGE**TECHNICAL PROCEDURES****MANIFOLDS, LEFT AND RIGHT FUEL SUPPLY -****PRESSURE LEAK CHECK AND PRESERVATION****EFFECTIVITY: ENGINE MODEL F100-PW-229****LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 10

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 3	29	5 - 6	29	7 - 9	0
4	0			10 Blank	0

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

Nomenclature	Specification/Vendor Part Number
FLUID, LEAK CHECK	MIL-L-25567C
OIL, LUBRICATING	MIL-L-6081C, GRADE 1010

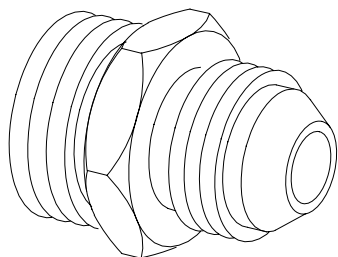
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

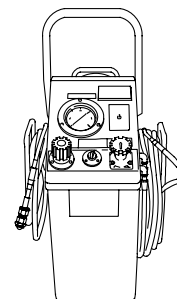
Paragraph	Function - Tool Nomenclature	Tool Number
2	FUEL MANIFOLDS - PRESSURE LEAK CHECK	
	ADAPTER, FUEL MANIFOLD LEAK CHECK - - - - -	PWA 53687
3	FUEL MANIFOLDS - NOZZLES PRESERVATION	
	ADAPTER, PRESERVATION - FUEL NOZZLE, FUEL MANIFOLDS, INSTALLED - - - - -	LM 1050
	TESTER, HYDRAULIC PRESSURE - - - - -	PWA 50096

ILLUSTRATED SUPPORT EQUIPMENT



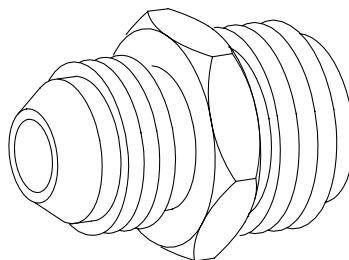
LM 1050 -C

Figure T1. LM 1050 ADAPTER



PWA 50096 -C

Figure T2. PWA 50096 TESTER



PWA 53687 -C

Figure T3. PWA 53687 ADAPTER

1. INTRODUCTION.

- a. This work package contains instructions for performing pressure leak check of fuel manifold fittings, and preservation of fuel nozzles and manifolds.

2. FUEL MANIFOLDS - PRESSURE LEAK CHECK.

- a. Install PWA 53687 adapter into main fuel inlet fitting at fuel manifolds.

NOTE

Gaseous nitrogen or carbon dioxide bottle shall have minimum 100 psi pressure. Low pressure gage shall be capable of reading at least 100 psig.

- b. Connect hose from nitrogen or carbon dioxide bottle to PWA 53687 adapter or equivalent.



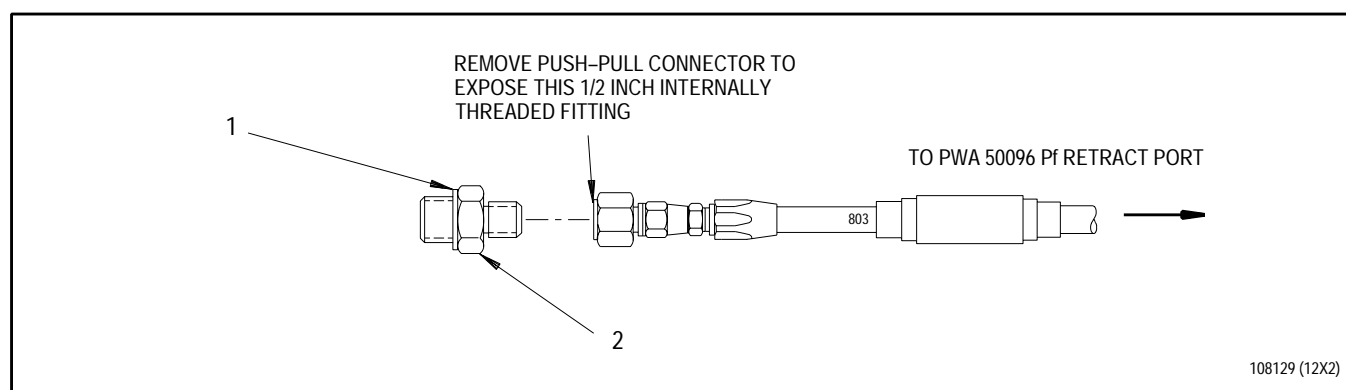
Permanent damage to nozzle valve may occur above 55 psig.

- c. Slowly open regulator valve so pressure flows between 40 and 50 psig throughout leak check. Do not exceed 55 psig pressure.
- d. Apply MIL-L-25567C leak check fluid to all fuel manifold connections. No leakage allowed.
- e. If there is any leakage, accomplish the following in order until leakage stops:
 - (1) Check all coupling nuts for proper torque per T.O. 2J-F100-53-7, WP 706 00.
 - (2) Disassemble connectors and check mating surfaces.
 - (3) Repair or replace as necessary.

3. FUEL MANIFOLDS - NOZZLES PRESERVATION.

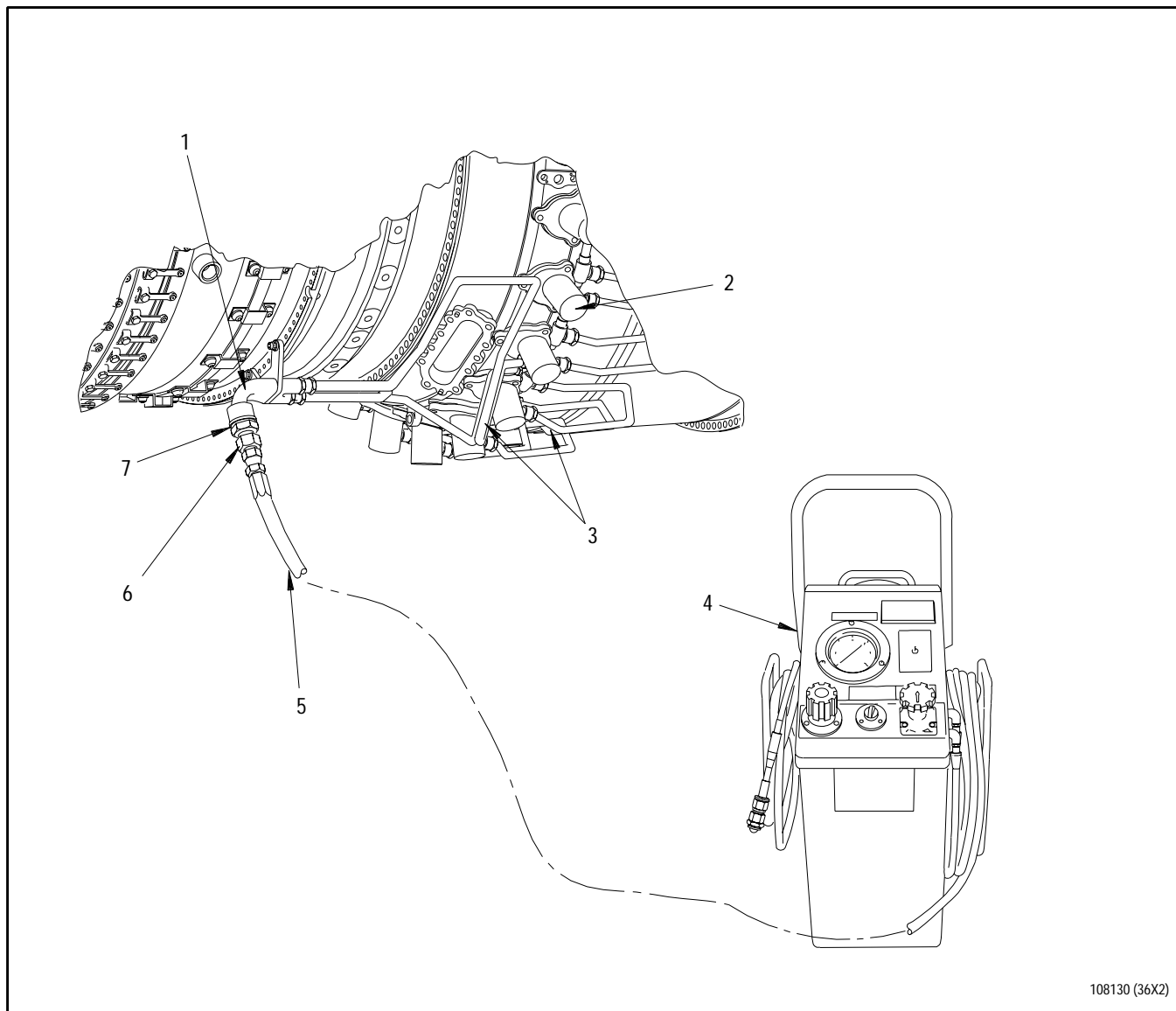
(See Figures 1 through 3.)

- a. Install LM 1050 adapter as shown in figure 1, to connect PWA 50096 hydraulic pressure tester to fuel manifold elbow per figure 2.
- b. Ensure tester has clean 10 micron filter installed, and it contains MIL-L-6081C, Grade 1010 oil.
- c. Actuate tester per figure 3.
- d. Remove hose and adapter. Cap openings on fuel connector manifold.



1. MS9966-12 preformed packing
2. LM 1050 adapter

Figure 1. Adapter for Preservation of Installed Fuel Nozzles and Fuel Manifolds



108130 (36X2)

1. Fuel manifold assembly elbow
2. Fuel nozzle
3. Fuel manifold assembly
4. PWA 50096 hydraulic pressure tester
5. Hose 803 (to Pf retract port)
6. PWA 50096 tester
7. LM 1050 adapter

Figure 2. Connecting PWA 50096 Tester to Installed Fuel Manifold

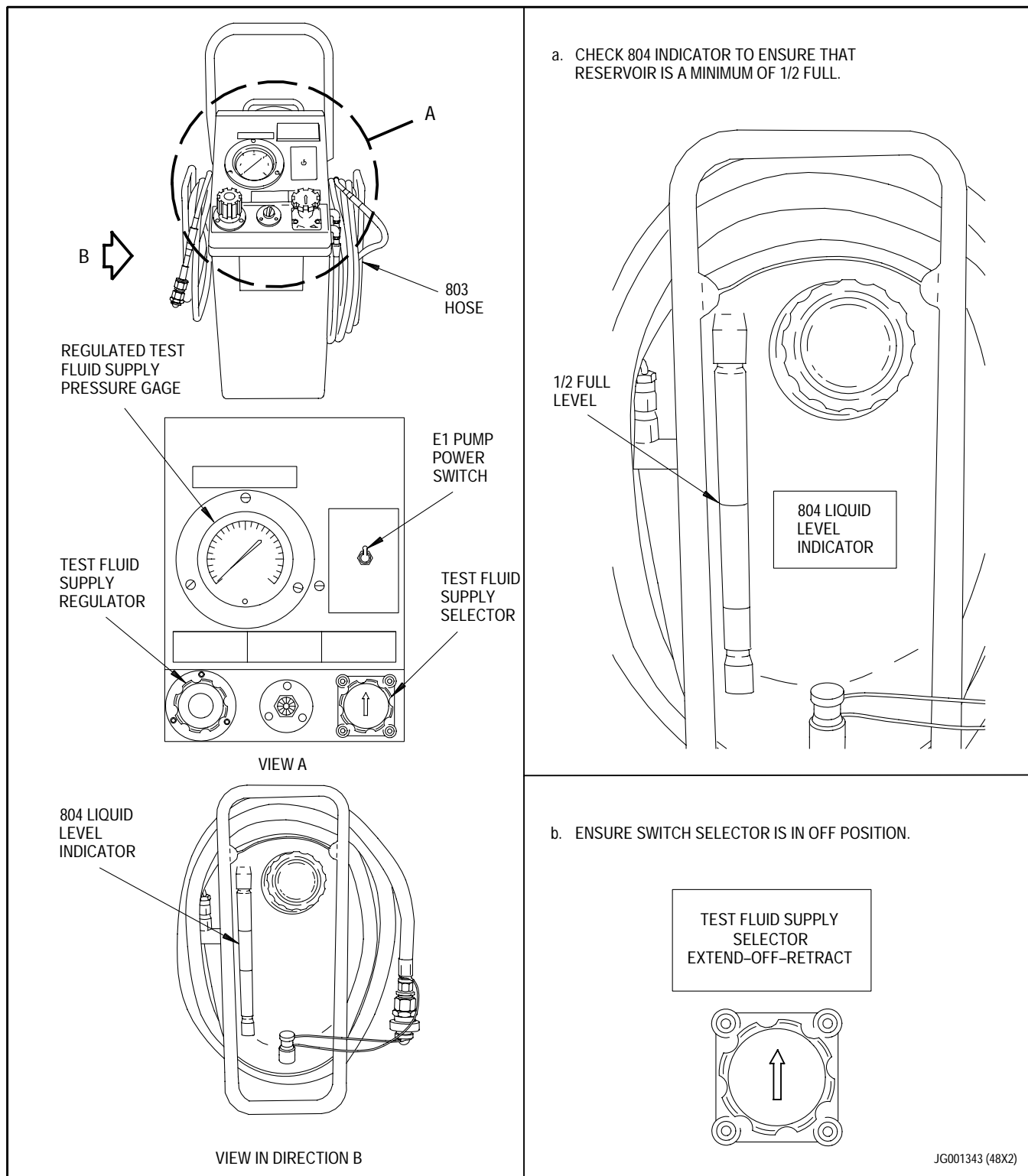
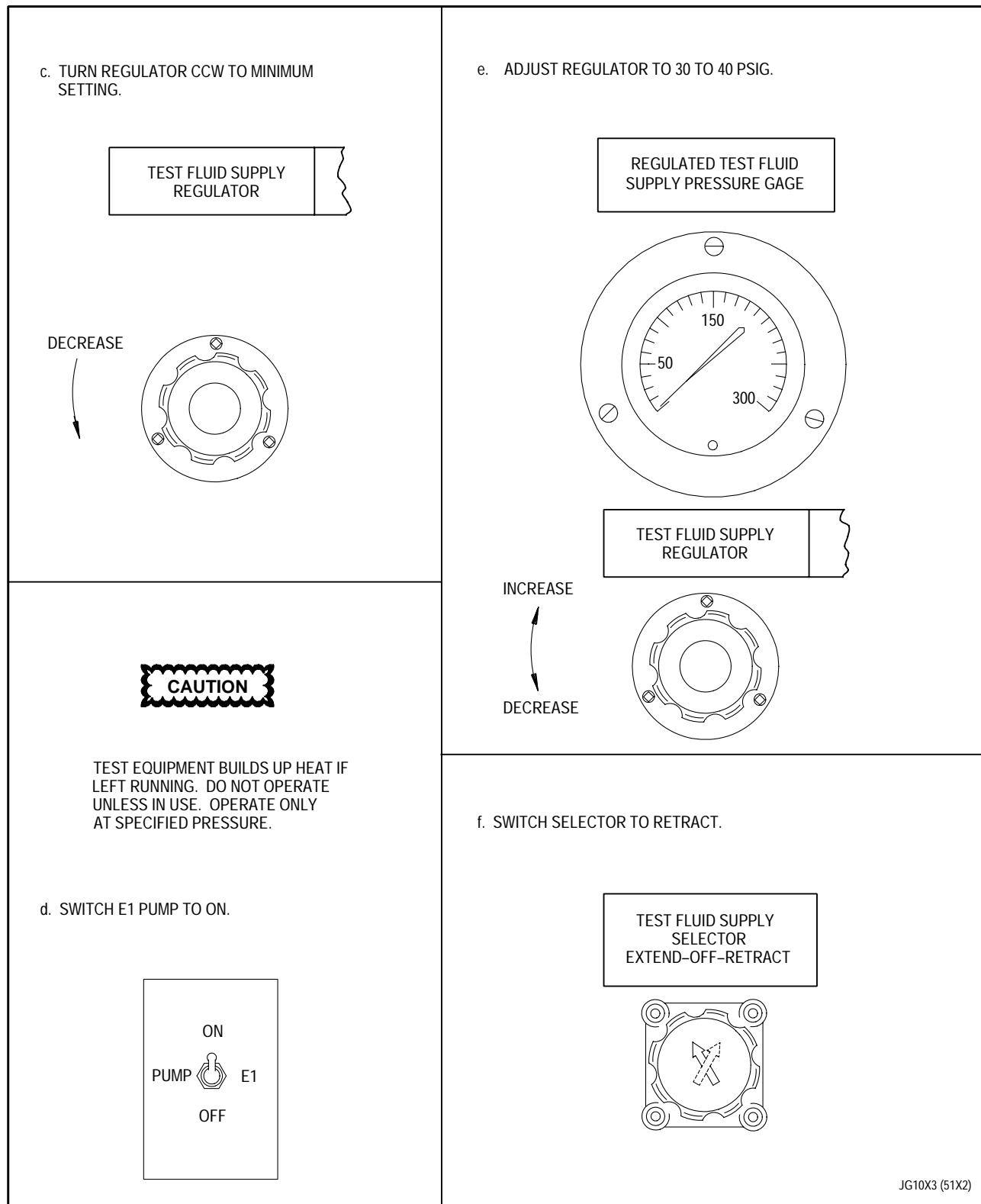


Figure 3. PWA 50096 Hydraulic Pressure Tester Operating Instructions (Sheet 1 of 3)



JG10X3 (51X2)

Figure 3. PWA 50096 Hydraulic Pressure Tester Operating Instructions (Sheet 2 of 3)

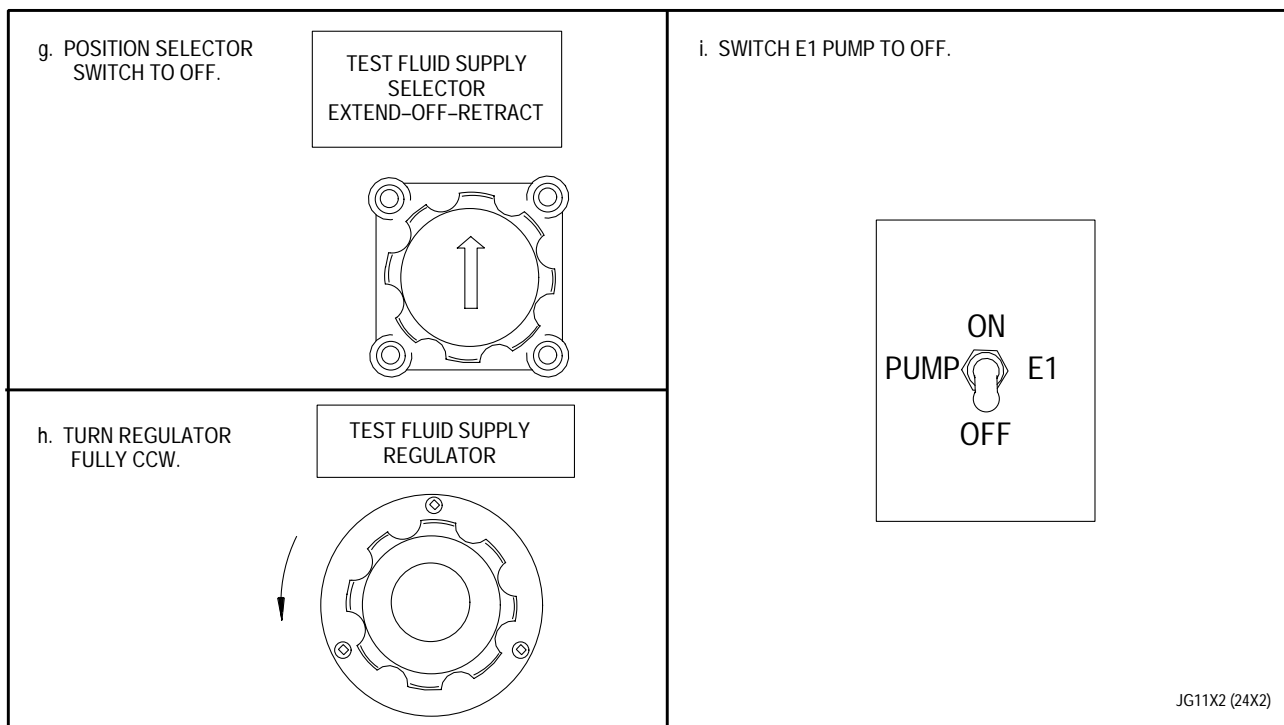


Figure 3. PWA 50096 Hydraulic Pressure Tester Operating Instructions (Sheet 3 of 3)

WORK PACKAGE

TECHNICAL PROCEDURES

COMPARTMENT, NO. 4 BEARING -

VACUUM CHECK

EFFECTIVITY: ENGINE MODEL F100-PW-229

This Work Package Supersedes WP 708 00 Through and Including Change 18.

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 6

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 5	20	6 Blank	20		

REFERENCE MATERIAL REQUIRED

Title	Number
Depot Introduction and General Information - - - - -	T.O. 2J-F100-53-1
Vacuum Leak Check Using PWA 50003 Carbon Seal Tester - General Procedures - - - - -	WP 024 00
Vacuum Leak Check Using Habco 1543003 Vacuum Air Flow Cart - General Procedures - - - - -	SWP 024 01

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

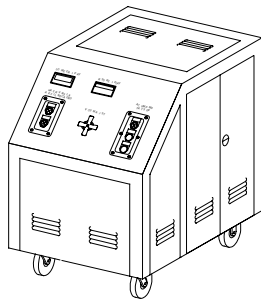
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

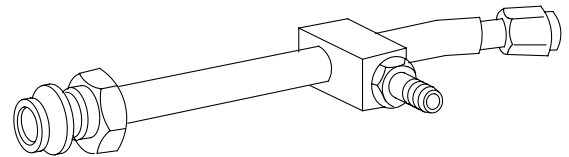
Paragraph	Function - Tool Nomenclature	Tool Number
2	NO. 4 BEARING COMPARTMENT - VACUUM CHECK	
	PLUG, VACUUM CHECK, NO. 4 BEARING COMPARTMENT - - -	PWA 55134
	ADAPTER, NO. 4 BEARING SCAVENGE OUTLET PORT - - - -	PWA 51162
	ADAPTER, VACUUM CHECK, NO. 4 BEARING COMPARTMENT -	PWA 56646
		OR
	CONNECTOR, BEARING AIR CHECK - - - - -	PWA 8151
	TESTER, CARBON SEAL - - - - -	PWA 50003
		OR
	CART, VACUUM AIR FLOW - - - - -	HABCO 1543003

ILLUSTRATED SUPPORT EQUIPMENT



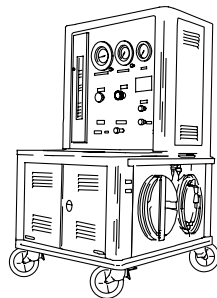
HABCO 1543003 -C

Figure T1. HABCO 1543003 CART



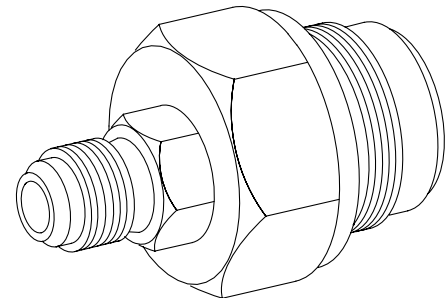
PWA 8151 -C

Figure T2. PWA 8151 CONNECTOR



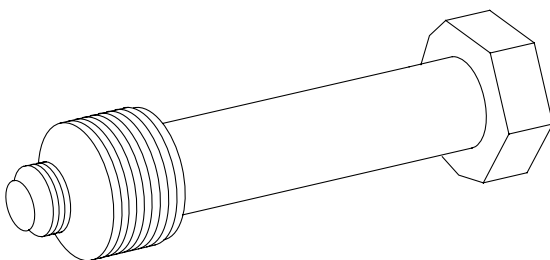
PWA 50003 -C

Figure T3. PWA 50003 TESTER



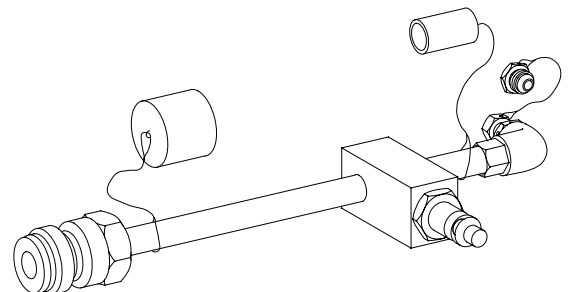
PWA 51162 -C

Figure T4. PWA 51162 ADAPTER



PWA 55134 -C

Figure T5. PWA 55134 PLUG



PWA 56646 -C

Figure T6. PWA 56646 ADAPTER

1. INTRODUCTION.

- a. This work package contains instructions for performing vacuum check of No. 4 bearing compartment.

2. NO. 4 BEARING COMPARTMENT - VACUUM CHECK.

(See Figure 1.)

- a. Install tooling for No. 4 bearing compartment vacuum check as follows:



Use of rubber plugs to cap oil fittings for vacuum check may allow small particles to break off from plugs resulting in oil system contamination.

- (1) Install PWA 55134 plug(2, figure 1) at No. 4 bearing oil pressure inlet fitting at 12 o'clock position on diffuser case.
- (2) Install PWA 51162 adapter(3) at No. 4 bearing scavenge oil outlet fitting at 6 o'clock position on diffuser case.
- (3) Install PWA 56646 adapter(4) on PWA 51162 adapter.

- b. Perform vacuum check using PWA 50003 tester(1) or Habco 1543003 cart(1) as follows:

- (1) If PWA 50003 tester is being used, perform self-test. Refer to T.O. 2J-F100-53-1, WP 024 00.

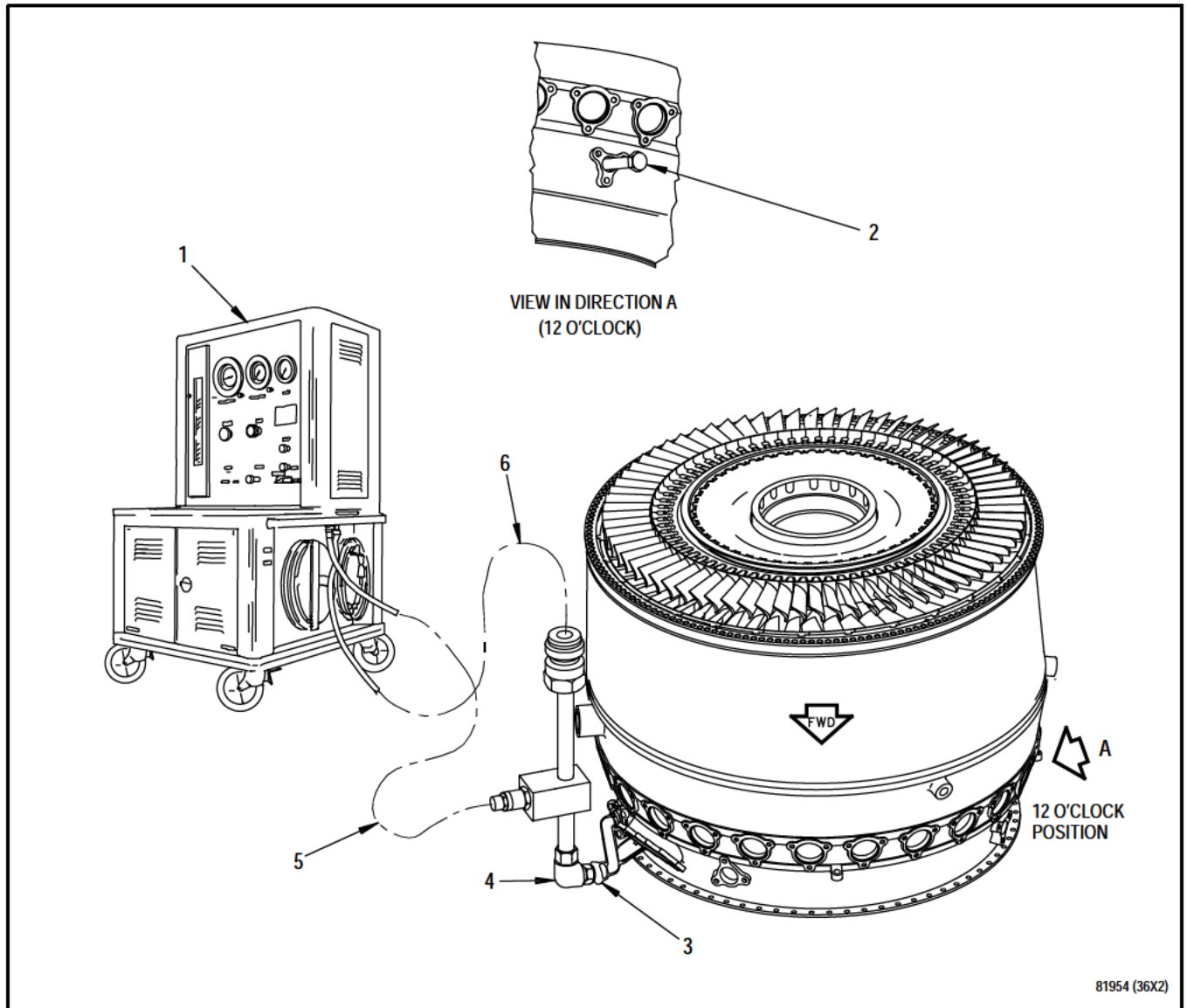
- (2) Connect vacuum line(6) from tester or cart to large fitting on PWA 56646 adapter(4). Connect gage pressure line(5) to small fitting on adapter.

- (3) Refer to T.O. 2J-F100-53-1, WP 024 00 for PWA 50003 tester operating instructions or SWP 024 01 for Habco 1543003 cart operating instructions.

- (4) Air flow leakage shall not exceed 4.0 pounds per hour.

- c. If No. 4 bearing compartment vacuum check is performed as part of troubleshooting procedures for high oil consumption and air flow leakage exceeds limit, inspect rear compressor drive turbine assembly, refer to T.O. 2J-F100-53-5, WP 126 00 and fan drive turbine module, refer to T.O. 2J-F100-53-5, WP 206 00.

- d. Remove vacuum line and gage pressure line from PWA 56646 adapter. Remove PWA 55134 plug, PWA 56646 adapter, and PWA 51162 adapter.



1. PWA 50003 carbon seal tester (shown) or Habco 1543003 vacuum air flow cart (not shown)
2. PWA 55134 plug
3. PWA 51162 adapter
4. PWA 56646 adapter
5. Gage pressure line
6. Vacuum line

Figure 1. No. 4 Bearing Compartment - Vacuum Check

WORK PACKAGE

TECHNICAL PROCEDURES

CORE ENGINE MODULE -

ROTATION TO FRONT END DOWN POSITION (DIFFUSER CASE REMOVED)

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 12

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2	30	5 - 7	0	10 - 11	0
3	0	8 - 9	30	12 Blank	0
4	30				

REFERENCE MATERIAL REQUIRED

None

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

None

CONSUMABLE MATERIALS

None

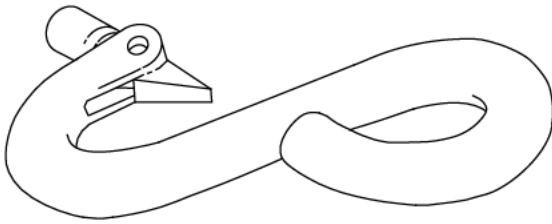
EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

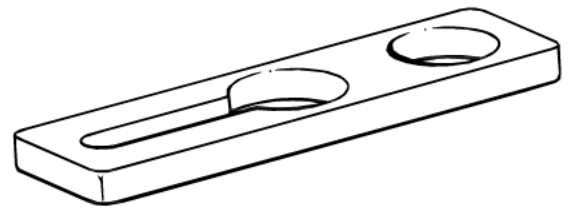
Paragraph	Function - Tool Nomenclature	Tool Number
3	CORE ENGINE MODULE - ROTATING TO FRONT END DOWN POSITION	
	ADAPTER, TRUNNION, CORE ENGINE FRONT - - - - -	PWA 57623
	SLING, ADJUSTABLE MODULE HANDLING - - - - -	PWA 56336
	HOOK, SAFETY - - - - -	PWA 2388
	ADAPTER, LIFT AND TRUNNION - - - - -	PWA 26147
	STAND, BUILD, REAR COMPRESSOR, ROTOR AND CASES - - -	PWA 57722
	FIXTURE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR	
	REAR HUB - - - - -	PWA 57937
		OR
	EYE, LIFTING, REAR COMPRESSOR ROTOR AND STATOR REAR HUB - - - - -	PWA 51298
	ARM, LIFT AND TURN - - - - -	PWA 26584
	SPACER, MODULE SUPPORT STAND - - - - -	PWA 50993
	STAND, STORAGE AND DISASSY, VARIOUS MODULES - - - - -	PWA 56338
		OR
	STAND, INLET FAN MODULE STORAGE AND DISASSY - - - - -	PWA 50775

ILLUSTRATED SUPPORT EQUIPMENT



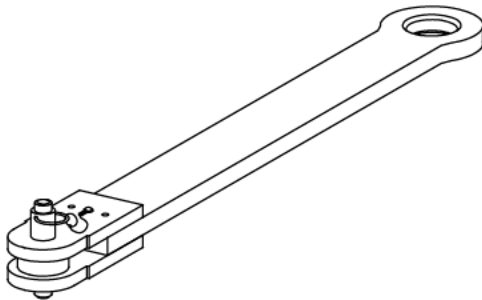
PWA 2388 -C

Figure T1. PWA 2388 Hook



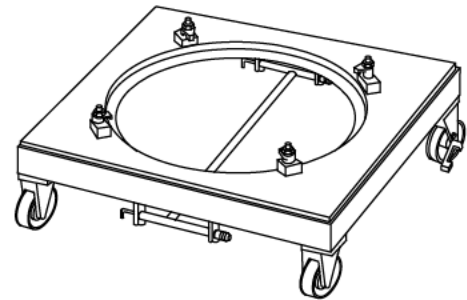
PWA 26147 -C

Figure T2. PWA 26147 Adapter



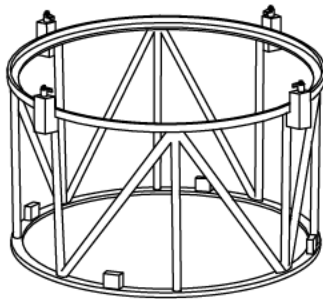
PWA 26584 -C

Figure T3. PWA 26584 Arm



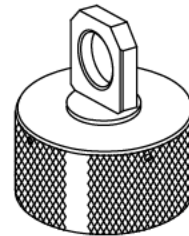
PWA 50775 -C

Figure T4. PWA 50775 Stand



PWA 50993 -C

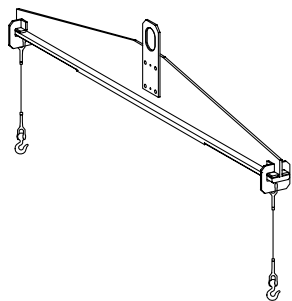
Figure T5. PWA 50993 Spacer



PWA 51298 -C

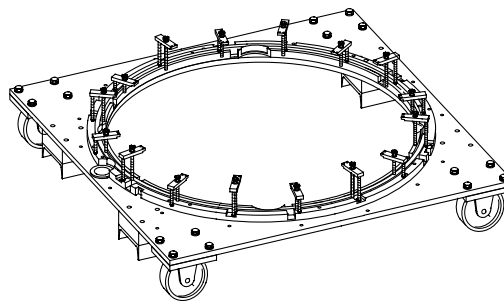
Figure T6. PWA 51298 Eye

ILLUSTRATED SUPPORT EQUIPMENT (continued)



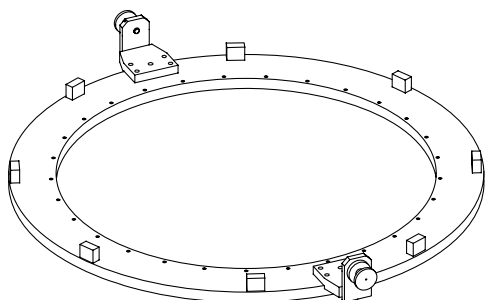
PWA 56336 -C

Figure T7. PWA 56336 SLING



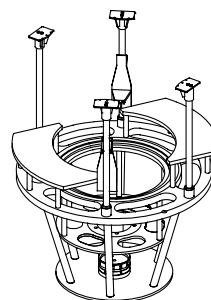
PWA 56338 -C

Figure T8. PWA 56338 STAND



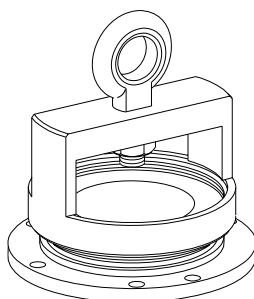
PWA 57623 -C

Figure T9. PWA 57623 ADAPTER



PWA 57722 -C

Figure T10. PWA 57722 STAND



PWA 57937 -C

Figure T11. PWA 57937 FIXTURE

1. INTRODUCTION.

- a. This work package contains instructions for rotating core engine module from a front end up to a front end down position. This procedure is accomplished with the diffuser case removed.

2. PRELIMINARY INSTRUCTIONS.

- a. At the beginning of this procedure core engine module is sitting in PWA 50775 or PWA 56338 stand, front end up. The rear of the module is supported by PWA 57722 build stand.

3. CORE ENGINE MODULE - ROTATING TO FRONT END DOWN POSITION.

(See Figure 1 through 3.)

a. Install PWA 57623 adapter(3, figure 1) as follows:

- (1) Install PWA 56336 sling(1) to hoist using PWA 2388 hook(2).
- (2) Attach PWA 56336 sling(1) to trunnion spools on PWA 57623 adapter(3) using two PWA 26147 adapters(14).
- (3) Install PWA 57623 adapter(3) onto front flange of intermediate case(13).
- (4) Align dowel pin to position trunnion spools at 3 o'clock and 9 o'clock.

(5) Install four detail-11 ring segments(4) and secure with 16 detail screws(5).

(6) Torque screws(5) 110 to 135 pound-inches.

- b. Remove six PWA 57722 build stand detail screws(11) securing detail-19 support plate assembly(9) to detail-1 base assembly(10).
- c. Lift core module(12) out and clear of detail-1 base assembly(10).

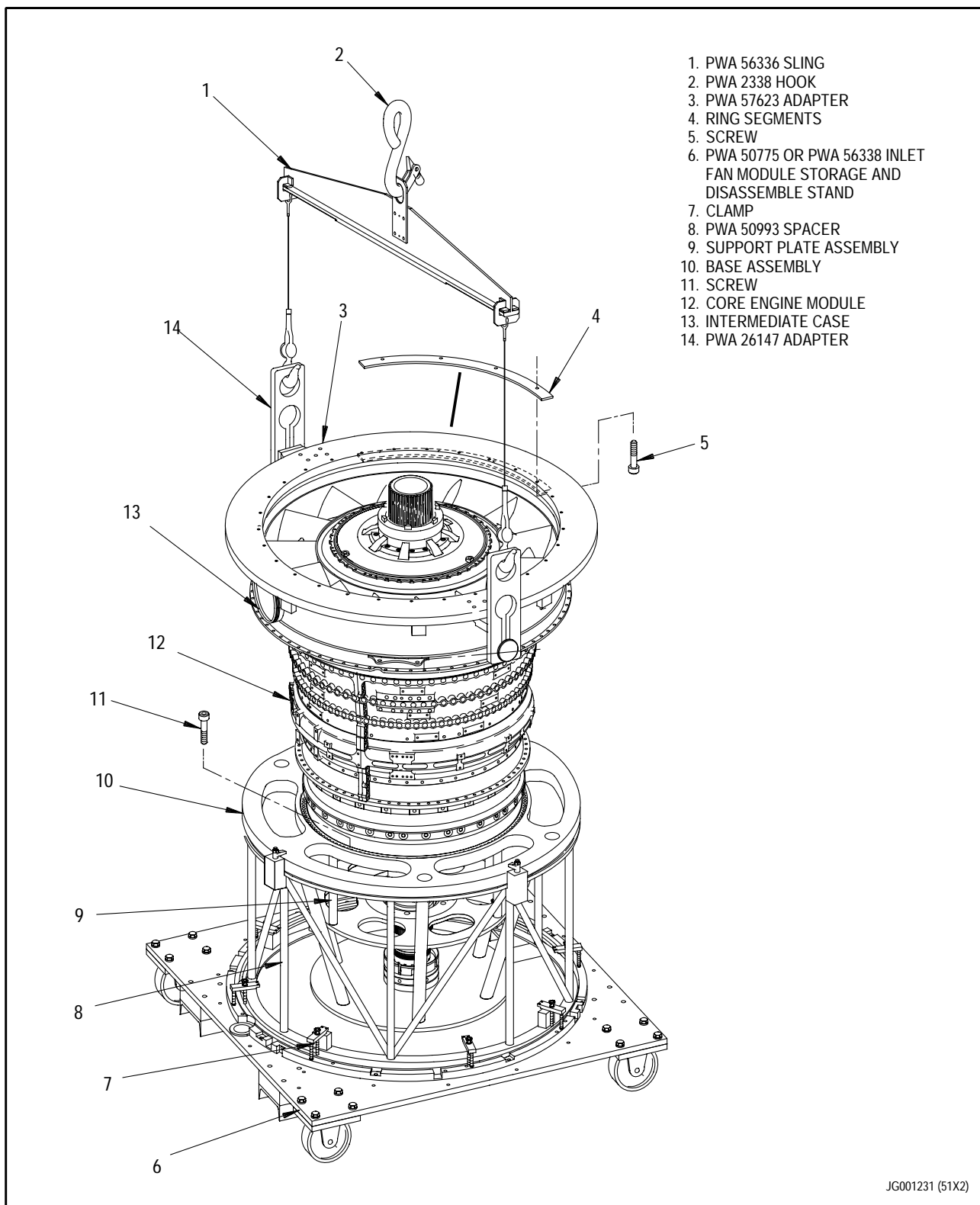


Figure 1. Core Engine Module - Front End Up

- d. Install PWA 57937 fixture(10, figure 2) to rear compressor rear hub(9).
- e. Attach PWA 26584 arm(11) to PWA 57937 fixture(10) using ball lock pin.
- f. Install PWA 2388 hook(1) to end of PWA 26584 arm(11).
- g. Attach hoist to PWA 2388 hook(1).
- h. Attach two standard lifting straps to top side of PWA 57722 stand detail-1 base assembly(10, figure 1) 180 degrees apart.
- i. Connect lifting straps to hoist and remove detail-1 base assembly(10).
- j. Attach two standard lifting straps to top side of PWA 50993 spacer(8).
- k. Loosen clamps(7) securing PWA 50993 spacer(8).
- l. Connect lifting straps to hoist and remove PWA 50993 spacer(8) from PWA 56338 stand(6).
- m. Rotate core engine module(8, figure 2) to front end down position.
- n. Remove PWA 56336 sling(3), PWA 26147 adapters(4), and hoist from PWA 57623 adapter(6).
- nl. Ensure that flat side of detail-33 ring on PWA 56338 stand is facing up.
- o. Lower core engine module down onto PWA 56338 stand(5).
- p. Secure PWA 57623 adapter(6) to stand(5) using clamps(7).
- q. Remove PWA 26584 arm(11), PWA 2388 hook(1), and PWA 57937 fixture(10) from rear compressor rear hub(9).

Legend for figure 2

- 1. PWA 2388 hook
- 2. PWA 2388 hook
- 3. PWA 56336 sling
- 4. PWA 26147 adapter
- 5. PWA 56338 stand
- 6. PWA 57623 adapter
- 7. Clamp
- 8. Core engine module
- 9. Rear compressor rear hub
- 10. PWA 57937 fixture
- 11. PWA 26584 arm

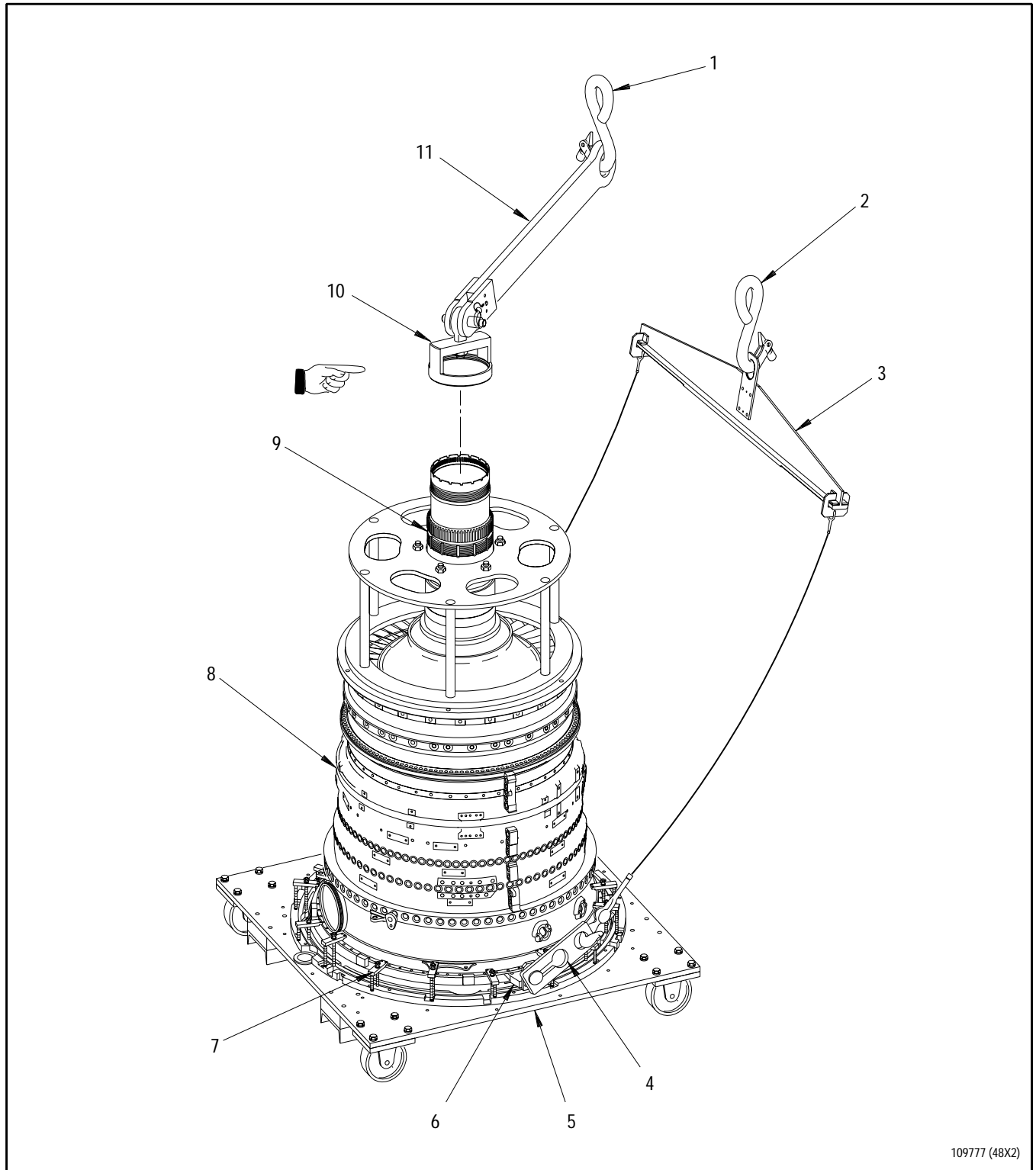
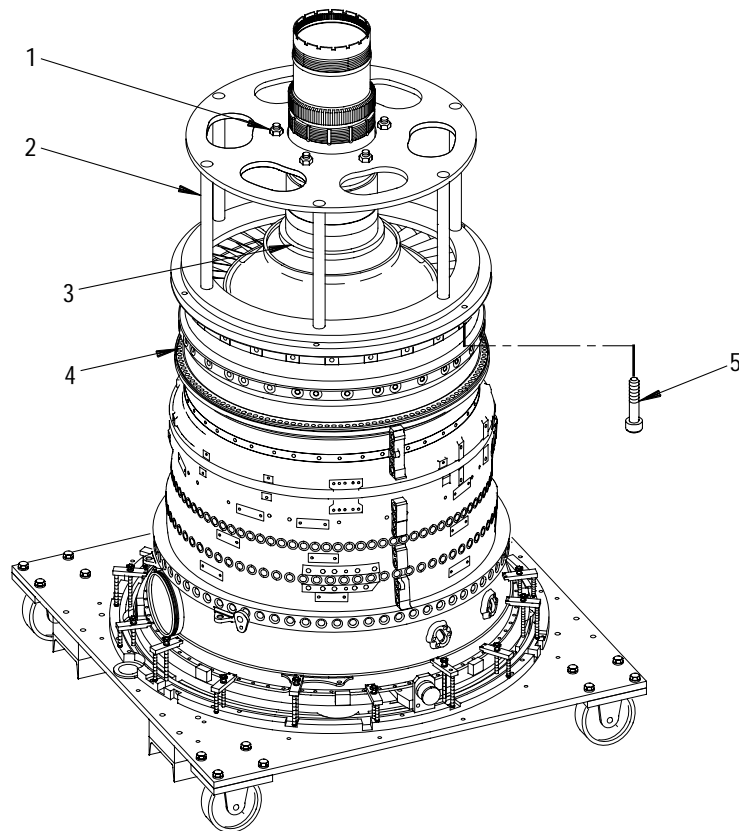


Figure 2. Core Engine Module - Front End Down

- r. Attach two standard lifting straps to top side of PWA 57722 build stand detail-19 support plate assembly(2, figure 3) 180 degrees apart.
- s. Connect lifting straps to hoist.
- t. Remove 14 detail screws(5) securing detail-19 support plate assembly(2) to 10th through 12th stage compressor case(4) and compressor stator support.
- u. Loosen cam followers(1) centering rear compressor rear hub(3) in detail-19 support plate assembly(2).
- v. Remove detail-19 support plate assembly(2).

1. CAM FOLLOWER
2. SUPPORT PLATE ASSEMBLY
3. REAR COMPRESSOR REAR HUB
4. 10TH THROUGH 12TH STAGE
COMPRESSOR CASE
5. SCREW



JG001219 (37X2)

Figure 3. PWA 57722 Build Stand Detail-19 Support Plate Assembly - Removal

WORK PACKAGE

INTRODUCTION

CORE ENGINE MODULE -

TABLE OF LIMITS AND CLEARANCE CHARTS

EFFECTIVITY: ENGINE MODEL F100-PW-229

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 2

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1 - 2		24			

1. INTRODUCTION.

- a. This work package introduces the 800 00 and up series of work packages for the core engine module. This series provides table of limits and clearance charts. The following work packages are included in this series:

WP No.	Title
801 00	Core Engine Module Table of Limits and Clearance Charts (Not Incorporating TCTO 2J-F100229(II)-548
802 00	Core Engine Module Table of Limits and Clearance Charts (Incorporating TCTO 2J-F100229(II)-548
803 00 and up	Open

WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****TABLE OF LIMITS AND CLEARANCE CHARTS**

**EFFECTIVITY: ENGINE MODEL F100-PW-229
(NOT INCORPORATING TCTO 2J-F100229(II)-548)**

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 46

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	16	23	34	2
2	11	17 - 18	9	35	5
3	0	19	23	36	16
4	2	20	9	37	0
5	30	21	17	38 Blank	0
6	0	22	1	39	31
7	22	23	6	40 Blank	0
8 - 9	12	24	5	41	30
10	9	25 - 26	2	42 Blank	0
11	2	27	10	43	5
12	9	28 - 29	19	44 Blank	0
13	16	30 - 33	0	45	25
14 - 15	0			46 Blank	0

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T.O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-519	31 Dec 93	O/I	Retrofit of Improved 4th and 5th stage Bushings to Eliminate Back-out, F100-PW-229 Engines, F15/F16 Aircraft (ECP 92QA105)
2J-F100229(II)-523	30 Nov 93	O/I	Remove and Replace No. 4 Bearing Air Seal Assembly PN 4074849 with New Assembly Featuring Increased Forward Snap Diameter, F100-PW-229 Engines, F15/F16 Aircraft (ECP 90QA181)

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains dimensional limits and torque values for the core engine module for engine F100-PW-229.

2. GENERAL INSTRUCTIONS.

(See FO-1 and Tables 1 through 4.)

- a. Core engine module dimensional limits and torque values are contained in four tables:
 - Table 1 - Fits and Clearances
 - Table 2 - Mounting Distances and Backlash Checks For Bevel Gears
 - Table 3 - Torque Limits and Stretch
 - Table 4 - Spring Pressures
- b. Entries in the tables have reference numbers which are also located in FO-1. These illustrations identify the parts and indicate where spring pressures, fits and special torque values apply. Further information on interpreting fits, clearances, terms and symbols is provided in T.O. 2-1-111.

3. LIMITS.

- a. Limits with no asterisks appearing in the limits column have a Replace If Over tolerance added to either the Minimum or Maximum limit, or both.
- b. Limits with a single asterisk (*) appearing in the limits column have no Replace If Over tolerance assigned.
- c. Limits with a double asterisk (**) appearing in either the Minimum or Maximum limits column, or both, have been assigned a Replace If Over clearance limit identical to the respective blueprint clearance limit.

4. TERMS AND SYMBOLS.

- a. Symbol T in Minimum and Maximum in Tables of Limits column indicates tight fit.
- b. Unless otherwise specified, all fits are diametrical, except spline fits which are calculated from chordal dimensions.

- c. Letter-number codes enclosed within a circle on limits charts, such as A12, are of contractor significance only and shall be ignored.
- d. Letter-number codes within parentheses, such as (C-8), relate to coordinates on the outer margins of each clearance chart to facilitate location.
- e. Symbol (+) in limits column indicates that clearance applies in As Assembled Condition.

5. UNITS.

- a. Figures in Minimum and Maximum columns in Tables of Limits shall be interpreted as follows: Torque in pound-inches, spring pressure in pounds, and all other limits in inches.

Table 1. Fits and Clearances
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2901	Turbine Shaft Coupling - - -	4.0782	4.0798		
	No. 2 Bearing Seal Seat - -	4.0800	4.0810	.002*	.0022*
2902	Turbine Shaft Coupling - - -	3.9990	4.0010		
	No. 2 Bearing Front Scoop -	4.0010	4.0025	.000*	.0035*
2903	Turbine Shaft Coupling - - -	3.9996	4.0006		
	No. 2 Bearing Rear Scoop -	3.9960	3.9965	.0031T*	.0046T*
2904	No. 2 Bearing Rear Scoop -	4.3320	4.3325		
	No. 2 Bearing - - - - -	4.33045	4.3307	.0013T*	.00205T*
2905	Turbine Shaft Coupling - - -	3.9996	4.0009		
	No. 2 Bearing Seal Seat - -	3.9985	4.0000	.0004*	.0024T*
2906	6th Stage Compressor Disk and Hub - - - - -	4.3180	4.3197		
	No. 3 Bearing Seal Seat - -	4.3200	4.3210	.0003*	.0030*
2907	6th Stage Compressor Disk and Hub - - - - -	5.0995	5.1000		
	Gearbox Drive Bevel Gear Shaft - - - - -	5.0945	5.0950	.0040T	.0056T
2908	6th Stage Compressor Disk and Hub - - - - -	5.1445	5.1450		
	Gearbox Drive Bevel Gear Shaft - - - - -	5.1394	5.1402	.0043T*	.0056T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2909	6th Stage Compressor Disk and Hub - - - - -	5.5030	5.5035		
	Gearbox Drive Bevel Gearshaft	5.4994	5.5002	.002T*	.0041T
2910	6th Stage Compressor Disk and Hub - - - - -	5.6002	5.6014		
	No. 3 Bearing Seal Seat - - - -	5.5990	5.6000	.0002T*	.0024T*
2912	3rd Stage Fan Compressor Stator - - - - -	31.864	31.868		
	Intermediate Case - - - - -	31.856	31.862	.000T	.012T
2913	No. 3 Bearing - - - - -	8.8577	8.8583		
	No. 3 Bearing Support - - - - -	8.8583	8.8589	.0000	.0020
2914	No. 3 Bearing Seal Ring Gap at 7.140 BSC - - - - -	.070	.090		
	No. 3 Bearing Seal - - - - -	7.139	7.141	.067*	.093*
2915	Gearbox Drive Bevel Gearshaft	6.1046	6.1056		
	No. 3 Bearing - - - - -	6.1021	6.1024	.0022T*	.0035T*
2917	Intermediate Case - - - - -	17.752	17.758		
	Rear Compressor Inlet Stator Shroud - - - - -	17.748	17.752	.000**	.010T
2918	No. 2 Bearing Oil Seal Ring Gap at 5.180 BSC - - - - -	.070	.090		
	No. 2 Bearing Seal - - - - -	5.179	5.181	.067*	.093*
2919	Side Clearance No. 2 Bearing Oil Seal Ring - - - - -	.119	.124		
	Seal Ring Holder - - - - -	.127	.130	.003*	.011*
2920	Side Clearance No. 2 Bearing Oil Seal Ring - - - - -	.1525	.1540		
	Seal Ring Holder - - - - -	.1570	.1600	.0030*	.0075*
2921	Bushing - - - - -	.7520	.7525		
	Compressor Intermediate Case -	.7500	.7515	.0005T**	.0025T**

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2922	Bushing - - - - -	.5010	.5015		
	Compressor Intermediate Case - - - - -	.4990	.5000	.0010T**	.0025T**
2923	6th Stage Compressor Disk and Hub - - - - -	5.6060	5.6065		
	No. 3 Bearing Air Seal - -	5.6010	5.6015	.0035T	.0055T
2924	No. 2 Bearing - - - - -	6.6923	6.6929		
	No. 2 Bearing Housing - - -	6.6929	6.6935	.0000*	.0012*
2925	Rear Compressor Inlet Stator Shroud - - - - -	18.300	18.304		
	Compressor Stator Inlet Shroud - - - - -	18.296	18.300	.000*	.008T*
2926	No. 2 Bearing Support - - -	16.279	16.283		
	Compressor Intermediate Case - - - - -	16.275	16.279	.000**	.008T**
2927	No. 2 Bearing Housing - - -	8.019	8.022		
	No. 2 Bearing Support - - -	8.015	8.019	.000*	.007T*
2928	Gearbox Drive Shaft Upper Bearing - - - - -	2.8342	2.8347		
	No. 2 Bearing Housing - - -	2.8343	2.8346	.004*	.004T*
2929	Gearbox Drive Bevel Gearshaft - - - - -	1.2800	1.2809		
	Roller Bearing - - - - -	1.2793	1.2795	.0005T*	.0016T*
2930	Gearbox Drive Shaft - - - -	4.1336	4.1339		
	Intermediate Bearing Housing - - - - -	4.1335	4.1340	.0004*	.0004T*
2931	Gearbox Drive Gearshaft Sleeve - - - - -	2.5603	2.5611		
	Ball Bearing - - - - -	2.5589	2.5591	.0012T*	.0022T*
2932	Gearbox Drive Bevel Gearshaft - - - - -	2.2996	2.3002		
	Gearshaft Sleeve - - - - -	2.2986	2.2990	.0006T*	.0016T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2933	Gearbox Drive Bearing Housing - - - - -	5.281	5.282		
	No. 2 Bearing Housing - - - -	5.279	5.281	.000*	.003T*
2934	1) Gearbox Drive Shaft				
	Coupling External Spline				
	(a) Effective Tooth Thickness - - - - -		.1259		
	(b) Actual Tooth Thickness -	.1228			
	2) Gearbox Drive Bevel				
	Gearshaft Internal Spline				
	(a) Effective Space Width -	.1309			
	(b) Actual Space Width - - -		.1340		
	3) Fit - - - - -			.0050*	
2935	No. 3 Bearing Support - - - -	12.541	12.547		
	No. 3 Bearing Housing - - - -	12.538	12.542	.001*	.009T*
2936	No. 3 Bearing Lock - - - - -	6.024	6.026		
	Gearbox Drive Bevel				
	Gearshaft - - - - -	6.028	6.030	.002*	.006*
2937	No. 3 Bearing Seal Support -	12.780	12.784		
	Compressor Intermediate				
	Case - - - - -	12.776	12.780	.000**	.006T**
2938	Fan Exit Case and Stator - -	28.438	28.442		
	Intermediate Case - - - - -	28.430	28.438	.000**	.012T**
2939	Fan Exit Case and Stator - -	26.907	26.917		
	4th Stage Compressor Case -	26.903	26.907	.002T**	.014T**
2940	Side Clearance No. 2 Bearing				
	Seal Ring - - - - -	.1920	.1950		
	Seal Ring Holder - - - - -	.1525	.1540	.0380*	.0425*
2941	Rear Compressor Drum Rotor				
	Disk - - - - -	16.625	16.628		
	Compressor 6th Stage Disk				
	and Hub - - - - -	16.636	16.646	.008T*	.021T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2956	Air Seal Radial Clearance 4th				
	Stage Air Seal - - - - -	17.174	17.188		
	Sealing Ring (Front) - - - - -	17.186	17.214	.001T*	.020*
	4th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Center) - - - - -	17.286	17.314	.001T*	.020*
2957	Air Seal Radial Clearance 5th				
	Stage Air Seal - - - - -	17.174	17.188		
	Sealing Ring (Front) - - - - -	17.186	17.214	.001T*	.020*
	5th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Center) - - - - -	17.286	17.314	.001T*	.020*
	5th Stage Air Seal - - - - -	17.374	17.388		
	Sealing Ring (Rear) - - - - -	17.386	17.414	.001T*	.020*
2960	No. 3 Bearing Heat Shield - - -	3.901	3.902		
	Rear Compressor Front Hub - - -	3.898	3.900	.001T	.006T
2962	No. 3 Bearing Heat Shield - - -	4.895	4.896		
	Rear Compressor Front Hub - - -	4.892	4.894	.001T	.006T
2964	Air Seal Radial Clearance 7th				
	Stage Air Seal - - - - -	18.280	18.294		
	Sealing Ring (Front) - - - - -	18.283	18.331	.0055T*	.0255*
	7th Stage Air Seal - - - - -	18.147	18.161		
	Sealing Ring (Center) - - - - -	18.150	18.198	.0055T*	.0255*
2965	Air Seal Radial Clearance 8th				
	Stage Air Seal - - - - -	18.019	18.033		
	Sealing Ring (Front) - - - - -	18.022	18.070	.0055T*	.0255*
	8th Stage Air Seal - - - - -	17.926	17.940		
	Sealing Ring (Rear) - - - - -	17.929	17.977	.0055T*	.0255*
2966	Air Seal Radial Clearance 9th				
	Stage Air Seal - - - - -	17.568	17.582		
	Sealing Ring (Front) - - - - -	17.571	17.619	.0055T*	.0255*
	9th Stage Air Seal - - - - -	17.449	17.463		
	Sealing Ring (Rear) - - - - -	17.452	17.500	.0055T*	.0255*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2967	Air Seal Radial Clearance				
	12th Stage Air Seal (PN				
	4079372-01) - - - - -	16.238	16.252		
	Sealing Ring (Front) - - - - -	16.263	16.305	.0055*	.0335*
	12th Stage Air Seal - - - - -	16.150	16.164		
	Sealing Ring (Rear) - - - - -	16.172	16.215	.0040*	.0325*
2967	Air Seal Radial Clearance				
	12th Stage Air Seal (PN				
	4080382-01) - - - - -	16.222	16.226		
	Sealing Ring (Front) - - - - -	16.253	16.257	.0285	.0325+
	12th Stage Air Seal - - - - -	16.134	16.138		
	Sealing Ring (Rear) - - - - -	16.165	16.169	.0285	.0325+
2972	Inlet Guide Vane Bearing - -	.5445	.5455		
	Compressor 4th Stage Case -	.5450	.5470	.0025**	.0005T**
2973	Compressor Inlet Guide - - -	.3950	.3970		
	Bearing - - - - -	.3980	.3995	.0010*	.0045*
2976	Rear Compressor - - - - -	.0686	.0730		
	Front Hub Spline - - - - -	ACT	EEF		
	Towershaft Drive Gear				
	Spline - - - - -	.0780	.0829	.0050*	.0143*
2977	4th Stage Compressor Case -	28.208	28.212		
	4th thru 9th Stage				
	Compressor Case Set - - - -	28.202	28.206	.001T	.010T
2978	Compressor Vane Bearing (4th				
	Stage PN 4071383 and 5th				
	Stage PN 4074428) - - - - -	.5458	.5465		
	Compressor Case Set - - - - -	.5450	.5470	.0012*	.0015T*
2978	Compressor Vane Bearing (4th				
	Stage PN 4081053-01 and				
	5th Stage PN 4081054-01) -	.543	.544		
	Compressor Case Set - - - - -	.545	.547	.001*	.004*
2979	Compressor Vane - - - - -	.3950	.3970		
	Bearing - - - - -	.3980	.3995	.0010*	.0045*
2980	Compressor Vane Bearing - - -	.544	.545		
	4th thru 9th Stage				
	Compressor Case Set - - - -	.545	.547	.000*	.003*
2981	Compressor Vane Bearing - - -	.399	.400		
	Compressor Vane - - - - -	.395	.397	.002*	.005*
2983	4th thru 9th Stage				
	Compressor Case Set - - - -	24.916	24.920		
	10th thru 12th Stage				
	Compressor Case - - - - -	24.920	24.924	.000*	.008T*
2984	9th Stage Compressor Stator				
	Set - - - - -	23.088	23.098		
	10th thru 12th Stage				
	Compressor Case - - - - -	23.078	23.082	.006*	.020*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2985	9th Stage Compressor Stator Set - - - - -	23.328	23.332		
	4th thru 9th Stage Compressor Case Set - - - -	23.328	23.332	.004*	.004T*
2986	9th Stage Compressor Stator Set - - - - -	21.328	21.332		
	10th thru 12th Stage Case and Stator Set - - - - -	21.328	21.332	.004*	.004T*
2990	Compressor Stator and Support - - - - -	22.678	22.682		
	Diffuser Case - - - - -	22.673	22.679	.002	.009T**
2991	Compressor Stator Support -	22.851	22.855		
	10th thru 12th Stage Compressor Case - - - - -	22.836	22.842	.009T*	.019T*
2992	Compressor Stator Support -	20.904	20.908		
	10th thru 12th Stage Compressor Stator Set - - -	20.904	20.908	.004*	.004T*
2998	Compressor Stator Synchronizing Arm Bolt - -	.1883	.1893		
	Bracket - - - - -	.1895	.1900	.0002*	.0017*
3000	Compressor Stator Connecting Link Bolt - - - - -	.1883	.1893		
	Compressor Stator Rigid Connecting Link - - - - -	.1895	.1900	.0002*	.0017*
3001	Compressor Stator Connecting Link Bolt - - - - -	.1883	.1893		
	Connecting Link Bolt Bearing - - - - -	.1895	.1900	.0002*	.0017*
3005	Rear Compressor Driveshaft -	6.555	6.556		
	No. 4 Bearing Air Seal - - -	6.564	6.566	.008**	.011**

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3006	Rear Compressor Driveshaft -	6.550	6.551		
	No. 4 Bearing Air Seal - - -	6.546	6.548	.0015T	.005T
3007	Rear Compressor Driveshaft -	6.545	6.546		
	No. 4 Bearing Front Seal				
	Seat - - - - -	6.543	6.544	.001T	.004T
3008	Rear Compressor Driveshaft -	6.545	6.546		
	No. 4 Bearing Scoop (Front)	6.546	6.547	.000	.003
3009	Rear Compressor Driveshaft -	6.4991	6.4997		
	No. 4 Bearing - - - - -	6.4957	6.4961	.003T**	.004T**
3010	No. 4 Bearing - - - - -	8.8578	8.8588		
	No. 4 Bearing Housing - - - -	8.854	8.855	.0028T*	.0048T*
3011	Rear Compressor Driveshaft -	6.459	6.460		
	No. 4 Bearing Rear Seal				
	Seat - - - - -	6.457	6.458	.001T	.004T
3014	Side Clearance No. 4 Bearing				
	Seal Ring - - - - -	.119	.124		
	Seal Ring Holder - - - - -	.127	.130	.003*	.011*
3015	Side Clearance No. 4 Bearing				
	Seal Ring - - - - -	.1525	.1540		
	Seal Ring Holder - - - - -	.1570	.1600	.0030*	.0075*
3016	Gap No. 4 Bearing Seal Ring				
	Seal Ring Gap at 7.606 BSC				
	Dia - - - - -	.090	.110		
	No. 4 Bearing Seal - - - - -	7.605	7.607	.087*	.113*
3023	Radial Clearance 1st Stage				
	Turbine Vane - - - - -	.238	.246		
	Combustion Chamber - - - - -	.215	.225	.013*	.031*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3024	Axial Clearance 1st Stage Turbine Vane and Combustion Chamber - - - - -			.037*	.107*
3025	Side Clearance 1st Stage Turbine Vane - - - - -	.295	.305		
	Combustion Chamber (Outer) -	.274	.284	.011*	.031*
3026	Side Clearance 1st Stage Turbine Vane - - - - -	.295	.305		
	Combustion Chamber (Inner) -	.274	.284	.011*	.031*
3029	1st Stage Turbine Air Seal Radial Clearance (Assembled on 1st Stage Turbine Disk)				
	Air Seal - - - - -	14.678	14.694		
	Sealing Ring (Front) - - - - -	14.706	14.710	.006*	.016*
	Air Seal - - - - -	14.874	14.892		
	Sealing Ring (Center) - - - - -	14.903	14.907	.0055*	.0165*
	Air Seal - - - - -	14.874	14.892		
	Sealing Ring (Rear) - - - - -	14.903	14.907	.0055*	.0165*
3030	1st Stage Turbine Air Seal Radial Clearance (Assembled on 1st Stage Turbine Disk)				
	1st Stage Turbine Blade Retaining Plate - - - - -	17.387	17.405		
	Turbine Outer Air Sealing Ring (Front) - - - - -	17.419	17.423	.007*	.018*
	1st Stage Turbine Blade Retaining Plate - - - - -	17.491	17.509		
	Turbine Outer Air Sealing Ring (Rear) - - - - -	17.5190	17.5230	.005*	.016*
3035	Diffuser Case - - - - -	26.092	26.100		
	Turbine Duct Support - - - - -	26.146	26.154	.046T**	.062T**
NOTE					
Dimensions measured on conical surface measured 0.088 inch from mating flanges.					
3043	No. 4 Bearing Front Air Seal Radial Clearance No. 4				
	Bearing Seal - - - - -	7.281	7.285		
	Sealing Ring - - - - -	7.329	7.333	.022*	.026*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3044	6th Stage Compressor Disk and Hub - - - - -	5.6515	5.6525		
	No. 3 Bearing Air Seal - - - -	5.6495	5.6505	.0005T	.0050T
3046	No. 3 Bearing Support - - - - -	12.618	12.620		
	No. 3 Bearing Seal Support - -	12.614	12.618	.000*	.006T
3047	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap Rigid Connecting Link - - - - -	.2525	.2540	.0020*	.0040*
3048	Bleed Valve Strap Retaining Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap - - - - -	.2510	.2525	.005*	.025*
3049	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Carriage Roller - - - - -	.2525	.2540	.020*	.040*
3050	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap Rigid Connecting Link - - - - -	.2525	.2540	.0020*	.0040*
3051	Bleed Valve Carriage Bolt - -	.2500	.2505		
	Bleed Valve Connecting Link -	.2510	.2525	.0005*	.0025*
3055	Rear Compressor Drive Shaft -	5.7645	5.7655		
	Nut - - - - -	5.7750	5.7780	.0085	.0145
3057	Radial Clearance Turbine Hub	6.684	6.680		
	Air Sealing Ring - - - - -	6.720	6.724	.018*	.022*
3059	Side Clearance - - - - -				
	No. 4 Bearing Seal Housing - -	.070	.080		
	Bushing - - - - -	.085	.105	.005*	.035*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3060	End Clearance No. 4 Bearing Seal Housing - - - - -	.336	.340		
	Housing - - - - -	.349	.353	.009*	.017*
3062	No. 4 Bearing Seal Pin - - -	.248	.251		
	Bushing - - - - -	.256	.258	.005*	.010*
3065	No. 4 Bearing Seal Pin - - -	.3614	.3618		
	Support - - - - -	.3600	.3610	.0004T*	.0018T*
3071	Bleed Valve Carriage Roller Guide - - - - -	.4996	.5000		
		.5000	.5080	.0000*	.0084*
3074	Compressor Synchronizing Arm Bearing - - - - -	.5620	.5625		
	Arm - - - - -	.5622	.5628	.0003T*	.0008*
3075	Fuel Nozzle - - - - -	.998	1.001		
	Combustion Chamber - - - - -	1.005	1.009	.004*	.011*
3076	No. 2 and No. 3 Bearing Seal Pin - - - - -	.220	.221		
	Seal Guide - - - - -	.223	.225	.002*	.005*
3077	No. 2 and No. 3 Bearing Seal Pin - - - - -	.220	.221		
	Seal Ring Holder - - - - -	.219	.220	.000*	.002T*
3078	End Clearance No. 2 and No. 3 Bearing Seal Guide	.320	.324		
	Seal Housing - - - - -	.342	.346	.018*	.026*
3079	Side Clearance No. 2 and No. 3 Bearing Seal Housing - - - - -	.065	.075		
	Seal Guide - - - - -	.078	.088	.003*	.023*
3085	No. 2 and No. 3 Bearing Nozzle - - - - -	.7285	.7295		
	No. 2 Bearing Support - - - -	.7300	.7310	.0005*	.0025*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3104	No. 2 Bearing Face Seal Height - - - - - (Seal Face to Extreme End of Housing)			1.070*	1.080*
3105	No. 4 Bearing Face Seal Height - - - - - (Seal Face to Extreme End of Housing)			1.520*	1.530*
3108	No. 4 Bearing Air Sealing Ring - - - - -	7.041	7.043		
	Seal Rear Support - - - - -	7.044	7.046	.001*	.005*
3125	No. 3 Bearing Seal Support -	10.918	10.910		
	Heat Shield - - - - -	10.912	10.900	.002T*	.018T*
3126	No. 3 Bearing Seal Support -	9.960	9.962		
	Support - - - - -	9.946	9.948	.012*	.016*
3128	Bolt - - - - -	.974	.976		
	Gearbox Drive Bevel Gearshaft - - - - -	.976	.978	.000*	.004*
3130	End Clearance Rear Compressor Stator - - - - -	.281	.286		
	Synchronizing Arm Bracket Arm Bearing - - - - -	.279	.281	.000*	.007*
3131	Pin - - - - -	.3955	.3975		
	Bearing - - - - -	.3980	.3995	.0005	.004
3132	Bell Crank - - - - -	.545	.547		
	Bearing - - - - -	.5458	.5465	.0015T	.0012
3133	Pin - - - - -	.3955	.3975		
	Bracket - - - - -	.396	.397	.0015T	.0015
3134	End Clearance Bracket - - - -	.555	.557		
	Bearing and Bell Crank - - -	.546	.553	.002	.011
3135	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001	.0018
3136	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002	.0017

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3137	Arm - - - - -	.6552	.6557		
	Bearing - - - - -	.6557	.6562	.001T	.0000
3138	End Clearance				
	Bearing - - - - -	.341	.343		
	Link - - - - -	.344	.346	.001	.005
3139	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001	.0018
3140	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002	.0017
3141	No. 3 Bearing Air Seal Radial Clearance				
	No. 3 Bearing Air Seal - - - - -	6.979	6.981		
	Sealing Ring (Front) - - - - -	6.994	6.996	.0065*	.0085*
	No. 3 Bearing Air Seal - - - - -	7.079	7.081		
	Sealing Ring (Center) - - - - -	7.094	7.096	.0065*	.0085*
	No. 3 Bearing Air Seal - - - - -	7.179	7.181		
	Sealing Ring (Rear) - - - - -	7.194	7.196	.0065*	.0085*
3146	Pin - - - - -	.1870	.1880		
	Compressor Discharge Manifold -	.1905	.1915	.0025*	.0045*
3168	Pin - - - - -	.187	.188		
	Diffuser Case - - - - -	.186	.187	.000**	.002T**
3175	Air Seal Radial Clearance				
	1st Stage Turbine Ring and Support - - - - -	19.764	19.768		
	1st Stage Turbine Rotor Blade, Assy Of - - - - -	19.798	19.822	.015*	.029*
3177	1st Stage Turbine Outer Air Sealing Ring (PN 4082788-01) -	1.028	1.044		
	1st Stage Turbine Stator Support - - - - -	1.064	1.076	.020T*	.048T*
3177	1st Stage Turbine Outer Air Sealing Ring (PN 4080012-01) -	1.034	1.064		
	1st Stage Turbine Stator Support - - - - -	1.064	1.076	.000*	.042T*
3192	No. 4 Bearing Air Tube Elbow - -	1.093	1.097		
	Diffuser Case - - - - -	1.098	1.102	.001*	.012

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3193	Tube Retaining Plate - - - - -	1.078	1.080		
	Diffuser Case Adapter - - - - -	1.084	1.086	.004*	.008*
3194	Side Clearance No. 4 Bearing				
	Pressure Tube Ferrule - - - - -	.462	.464		
	Retaining Plate - - - - -	.463	.465	.001T*	.003*
3195	Bracket - - - - -	.300*	.301		
	Bearing - - - - -	.3012	.3017	.0002T*	.0017T*
3196	Side Clearance No. 4 Bearing Oil				
	Pressure Tube Sealing Ring - -	.84	.085		
	Connector - - - - -	.086	.088	.001*	.004*
3197	Gap No. 4 Bearing Oil Pressure				
	Tube Seal Ring Gap at 1.120				
	BSC - - - - -	.005	.015		
	Front Air Sealing Ring - - - - -	1.119	1.121	.002*	.018*
3199	Vent Tube Coupling - - - - -	.3725	.3735		
	Diffuser Case - - - - -	.3745	.3765	.001**	.006
3204	Side Clearance No. 4 Bearing				
	Scavenge Oil Tube Seal Ring -	.077	.078		
	External Threaded Ring - - - - -	.079	.081	.001*	.004*
3205	Gap No. 4 Bearing Scavenge Oil				
	Tube Seal Ring Gap at 1.270				
	BSC - - - - -	.005	.015		
	Front Air Sealing Ring - - - - -	1.269	1.271	.002*	.018*
3206	No. 4 Bearing Sump - - - - -	1.0010	1.0015		
	Front Seal Support - - - - -	1.0000	1.0005	.0005T*	.0015*
3216	Side Clearance No. 4 Bearing				
	Seal Air Supply Tube Seal				
	Ring - - - - -	.077	.078		
	Ferrule - - - - -	.079	.081	.001*	.004*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3217	Gap No. 4 Bearing Seal Air Supply Tube Seal Ring Gap at 1.270 BSC - - - - -	.005	.015		
	Front Air Sealing Ring - - - - -	1.269	1.271	.002*	.018*
3220	Headless Shoulder Pin - - - - -	.2502	.2507		
	Diffuser Case - - - - -	.2490	.2500	.000	.0017T**
3221	Combustion Chamber - - - - -	.288	.292		
	Bolt - - - - -	.281	.282	.006	.011*
3222	1st Stage Turbine Stator Support - - - - -	.287	.289		
	Support Bolt - - - - -	.281	.282	.005*	.008*
3223	Shoulder Bolt - - - - -	.3290	.3310		
	Diffuser Case - - - - -	.3290	.3390	.002T**	.010**
3224	No. 4 Bearing Front Seal Support - - - - -	12.880	12.883		
	Diffuser Case - - - - -	12.877	12.880	.001	.006T**
3225	Axial Clearance 1st Stage Turbine Vane - - - - -	1.271	1.275		
	Combustion Chamber - - - - -	1.261	1.271	.001*	.019L*
3227	No. 4 Bearing Seal Front Support - - - - -	12.321	12.323		
	Front Air Sealing Ring - - - - -	12.315	12.319	.002T*	.008T*
3229	Rear Compressor Driveshaft - - -	6.505	6.506		
	No. 4 Bearing Scoop (Rear) - - -	6.506	6.507	.000	.003
3231	Rear Compressor Driveshaft Nut Lock Spline - - - - -	.0619	.0639		
	Rear Compressor Driveshaft Nut Spline - - - - -	.0654	.0722	.0015*	.0103*
3232	No. 4 Bearing Front Seal Support - - - - -	12.720	12.724		
	1st Stage Turbine Stator Support - - - - -	12.724	12.728	.000*	.008T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3236	Damper - - - - -	7.104	7.108		
	Ring - - - - -	7.098	7.102	.002T*	.010T*
3240	1st Stage Turbine Outer Air				
	Sealing Ring (PN 4082788-01) -	18.097	18.101		
	Stator Support - - - - -	18.086	18.092	.005T*	.015T*
3240	1st Stage Turbine Outer Air				
	Sealing Ring (PN 4080012-01) -	18.098	18.102		
	Stator Support - - - - -	18.086	18.092	.006T*	.016T*
3241	1st Stage Turbine Inner Air				
	Sealing Ring - - - - -	15.549	15.573		
	Stator Support - - - - -	15.491	15.495	.054T*	.082T*
3245	No. 4 Bearing Housing - - - - -	10.500	10.503		
	Seal Rear Support - - - - -	10.497	10.500	.000*	.006T*
3246	No. 4 Bearing Housing - - - - -	10.500	10.503		
	Seal Front Support - - - - -	10.497	10.500	.000*	.006T*
3253	Air Seal Radial Clearance				
	11th Stage Air Seal				
	(PN 4079371-01 or 4079381-01) -	16.648	16.662		
	Sealing Ring (Front) - - - - -	16.663	16.705	.0005*	.0285*
	11th Stage Air Seal - - - - -	16.568	16.582		
	Sealing Ring (Rear) - - - - -	16.587	16.630	.0025*	.0310*
3253	Air Seal Radial Clearance				
	11th Stage Air Seal				
	(PN 4080291-01 or 4080381-01) -	16.632	16.636		
	Sealing Ring (Front) - - - - -	16.663	16.667	.0285	.0325+
	11th Stage Air Seal - - - - -	16.552	16.556		
	Sealing Ring (Rear) - - - - -	16.583	16.587	.0285	.0325+
3254	Air Seal Radial Clearance				
	10th Stage Air Seal				
	(PN 4079370-01 or 4079380-01) -	17.104	17.118		
	Sealing Ring (Front) - - - - -	17.134	17.198	.0080*	.0470*
	10th Stage Air Seal - - - - -	17.004	17.018		
	Sealing Ring (Rear) - - - - -	17.034	17.099	.0080*	.0475*
3254	Air Seal Radial Clearance				
	10th Stage Air Seal				
	(PN 4080380-01 or 4080390-01) -	17.088	17.092		
	Sealing Ring (Front) - - - - -	17.159	17.163	.0335	.0375+
	10th Stage Air Seal - - - - -	16.988	16.992		
	Sealing Ring (Rear) - - - - -	17.059	17.063	.0335	.0375+
3256	Air Seal Radial Clearance - - - - -	6.893	6.905		
	Sealing Ring - - - - -	6.911	6.915	.003*	.011*
3257	End Clearance				
	13th Stage Compressor Air Sealing				
	Ring Bushing - - - - -	.398	.402		
	Exit Compressor Stator - - - - -	.404	.412	.002	.016
3258	13th Stage Compressor Air Sealing				
	Ring Bushing - - - - -	.299	.300		
	No. 4 Bearing Air Sealing Ring -	.300	.302	.000	.005

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3259	End Clearance 13th Stage Compressor Air Sealing Ring Bushings - - - - -	.188	.192		
	Exit Compressor Stator - - - - -	.176	.182	.000	.020*
3261	Pin - - - - -	.1245	.1246		
	No. 4 Bearing Front Air Sealing Ring - - - - -	.1235	.1245	.0000*	.0011T*
3264	No. 4 Bearing Connector - - - - -	.450	.451		
	Nozzle - - - - -	.452	.455	.001*	.005*
3265	Diffuser Case - - - - -	15.404	15.410		
	No. 4 Bearing Ring - - - - -	15.410	15.420	.000**	.016T**
3266	(PN 4077319 Prior to Change J) No. 4 Bearing Air Seal Radial Clearance (Listed Front to Rear) No. 4 Bearing Air Seal - - - - -	10.613	10.625		
	Sealing Ring - - - - -	10.628	10.632	.0015**	.0095**
	No. 4 Bearing Air Seal - - - - -	10.213	10.225		
	Sealing Ring - - - - -	10.238	10.242	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.813	9.825		
	Sealing Ring - - - - -	9.838	9.842	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.413	9.425		
	Sealing Ring - - - - -	9.438	9.442	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.013	9.025		
	Sealing Ring - - - - -	9.038	9.042	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	8.613	8.625		
	Sealing Ring - - - - -	8.638	8.642	.0065**	.0145**
3266	(PN 4077319 Change J and up) No. 4 Bearing Air Seal Radial Clearance (Listed Front to Rear) No. 4 Bearing Air Seal - - - - -	10.613	10.625		
	Sealing Ring - - - - -	10.627	10.633	.001**	.010**
	No. 4 Bearing Air Seal - - - - -	10.213	10.225		
	Sealing Ring - - - - -	10.237	10.243	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.813	9.825		
	Sealing Ring - - - - -	9.837	9.843	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.413	9.425		
	Sealing Ring - - - - -	9.437	9.443	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.013	9.025		
	Sealing Ring - - - - -	9.037	9.043	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	8.613	8.625		
	Sealing Ring - - - - -	8.637	8.643	.006**	.015**

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3267	Front No. 4 Bearing Air Sealing Ring - - - - -	11.280	11.284		
	Diffuser Case - - - - -	11.278	11.280	.000**	.006T**
3268	Rear Compressor Driveshaft - - -	9.819	9.821		
	No. 4 Bearing Air Seal (PN 4074849) - - - - -	9.831	9.832	.010T**	.013T**
3268	Rear Compressor Driveshaft - - -	9.8185	9.8215		
	No. 4 Bearing Air Seal (PN 4080807) - - - - -	9.8355	9.8365	.014T*	.018T*
3269	No. 4 Bearing Air Sealing Ring -	7.663	7.667		
	No. 4 Bearing Air Sealing Ring Flange - - - - -	7.656	7.660	.003T*	.011T*
3271	Compressor Stator Vane - - - - -	.3500	.3520		
	Compressor Stator Bearing - - - -	.3525	.3535	.0005*	.0035*
3272	Compressor Stator Bearing - - - -	.681	.683		
	Compressor Stator Shroud - - - - -	.688	.692	.005*	.011*
3273	Inner Shroud - - - - -	.2480	.2510		
	Variable Vane - - - - -	.2445	.2465	.0015	.0075
3281	1st Stage Inner Air Sealing Ring - - - - -	14.311	14.315		
	1st Stage Turbine Stator Support - - - - -	14.307	14.311	.000*	.008T*
3282	Side Clearance No. 4 Bearing Seal Air Supply Tube Seal Ring - - - - -	.056	.057		
	Ferrule - - - - -	.059	.061	.002*	.005*
3284	Air Sealing Radial Clearance 6th Stage Air Seal - - - - -	17.374	17.388		
	Sealing Ring (Front) - - - - -	17.380	17.414	.001T*	.020*
	6th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Rear) - - - - -	17.286	17.314	.001T*	.020*
3288	1st Stage Air Sealing Ring Support - - - - -	15.365	15.375		
	1st Stage Air Sealing Turbine Sealing Ring - - - - -	15.357	15.367	.018*	.002T*
3296	Gap No. 4 Bearing Seal Air Supply Tube Seal Ring at 1.551 BSC - - - - -	.005	.015		
	Air Sealing Ring - - - - -	1.551	1.554	.005*	.024*
3299	Side Clearance No. 3 Bearing Seal Ring (2 Rings) - - - - -	.305	.308		
	Seal Ring Holder - - - - -	.3435	.3465	.0355*	.0415*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3301	Shoulder Pin, Headless - - - - -	.1965	.1975		
	1st Stage Turbine Stator				
	Support - - - - -	.2015	.2025	.0040*	.0060*
3302	Shoulder Pin, Headless - - - - -	.1965	.1975		
	No. 4 Bearing Seal Front				
	Support - - - - -	.2020	.2030	.0045*	.0065*
3303	Shoulder Pin, Headless - - - - -	.2000	.2010		
	Diffuser Case - - - - -	.1985	.1995	.0005T*	.0025T*
3304	Shoulder Pin, Headless - - - - -	.3115	.3116		
	No. 4 Bearing Air Sealing				
	Flange - - - - -	.3135	.3145	.019*	.030*
3305	Shoulder Pin, Headless - - - - -	.2492	.2493		
	Diffuser Case - - - - -	.2482	.2492	.000*	.011T*
3308	No. 3 Front Bearing Face Seal				
	(Seal Face to Extreme End of				
	Housing) - - - - -			1.265*	1.275*
3309	No. 3 Rear Bearing Face Seal				
	(Seal Face to Extreme End of				
	Housing) - - - - -			1.345*	1.355*
3312	Side Clearance				
	Bracket - - - - -	.282	.284		
	Bearing - - - - -	.279	.281	.001*	.005*
3318	Helical Comp Spring Seat - - - - -	.223	.226		
	No. 3 Bearing Seal Pin - - - - -	.220	.221	.002*	.006*
3320	1st Stage Turbine Air Sealing				
	Ring - - - - -	12.182	12.185		
	No. 3 Bearing Front Seal				
	Support	12.170	12.175	.007T*	.015T*
3325	Turbine Hub - - - - -	6.336	5.339		
	Rear Compressor Driveshaft - - -	6.344	6.345	.005T*	.009T*
3327	End Pinch 1st Stage Turbine				
	Blade Retaining Plate	.072	.074		
	1st Stage Turbine Disk and	.040	.044	.002T	.010T
	Turbine Air Seal Spacer - - - - -	.120	.122		
3328	2nd Stage Turbine Stator Vane -	.308	.314		
	2nd Stage Turbine Air Sealing				
	Ring - - - - -	.296	.304	.004	.018
3329	1st Stage Turbine Duct Segment	.076	.079		
	1st Stage Turbine Duct Support	.077	.080	.002T	.004
3330	1st Stage Turbine Duct Segment	.137	.142		
	1st Stage Turbine Duct Support	.137	.140	.003T	.005

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3332	Igniter Mounting Distance By Selection - - - - -			2.120	2.150
3334	Connecting Link - - - - -	.5625	.5630		
	Bearing - - - - -	.5620	.5625	.0000*	.0010*
3335	Synchronizing Ring - - - - -	.300	.301		
	Bearing - - - - -	.3012	.3017	.0002T*	.0017T*
3336	Compressor Stator Arm - - - - -	.188	.189		
	Bearing - - - - -	.191	.193	.002*	.005*
3337	Bolt - - - - -	.1885	.1890		
	Bearing - - - - -	.1895	.1900	.0005*	.0015*
3338	Bracket - - - - -	.1990	.1910		
	Bolt - - - - -	.1885	.1890	.0010*	.0025*
3339	End Clearance Bracket Bearing - - - - -			.008*	.007T*
3341	Half Pin - - - - -	.102	.105		
	Arm and Bearing - - - - -	.109	.115	.004*	.013*
3342	Bearing - - - - -	.340	.341		
	Arm - - - - -	.341	.342	.000*	.002*
3344	Bearing - - - - -	.9993	.9998		
	Rear Compressor Stator Linkage Arm Bracket - - - - -	.9999	1.0004	.0001*	.0011*
3345	Compressor Synchronizing Arm and Compressor Stator Linkage Arm - - - - -	.6560	.6565		
	Bearing - - - - -	.6557	.6562	.0002*	.0008*
3346	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002*	.0017*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3347	Eng Clearance Bearing - - - - -	.341	.343		
	Link - - - - -	.344	.346	.001*	.005*
3348	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001*	.0018*
3356	End Clearance Bearing - - - - -	.279	.281		
	Link - - - - -	.282	.284	.001*	.005*
3359	No. 2 Bearing Face Seal Rear Height (Seal Face to Extreme End of Housing) - - - - -			1.290*	1.300*
3361	Bracket, Angle Assy of Tube-Pressure - - - - -	.2815	.2825		
	Flanged Sleeve Bushing - - - - -	.2830	.2840	.0005*	.0025*
3362	Synchronizing Ring - - - - -	.493	.494		
	Insert - - - - -	.4945	.4955	.0005T*	.0025T*
3363	4th Stage Compressor Stator Segment Gap - - - - -			.026*	.040*
3364	5th Stage Compressor Stator Segment Gap - - - - -			.029*	.043*
3365	6th Stage Compressor Stator Segment Gap - - - - -			.033*	.047*
3366	7th, 8th, 9th Stage Stator Gap Apply When Stators are Loaded Forward, Prior to and During Torquing of Rail Bolts - - - -		.072		
3368	Inner Shroud - - - - -	.3550	.3580		
	Inner Shroud Bearing - - - - -	.3530	.3545	.0005*	.0050*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3369	Inner Shroud - - - - -	.1905	.1925		
	Bolt - - - - -	.1885	.1895	.001*	.004*
	Per segment:1 of 3 places only	-	-	-	.009
3370	Inner Shroud Bearing - - - - -	.247	.249		
	Variable Vane - - - - -	.2445	.2465	.0005*	.0045*
3371	Drum Rotor Disk - - - - -	5.958	5.963		
	Heat Shield - - - - -	5.965	5.970	.002T*	.012T*
3372	Rear Compressor Drum Rotor Disk				
	Compressor 6th Stage Disk and Hub - - - - -			.000**	.018**
3373	4th, 5th, 6th, 7th Stage Lock				
	Ring - - - - -			.030*	.100*
3375	7th Stage Compressor Stator				
	Hook (Front) - - - - -	.097	.103		
	7th Stage Compressor Shroud ID				
	Foot - - - - -	.094	.096	.001*	.009*
	7th Stage Compressor Stator				
3376	Hook (Rear) - - - - -	.077	.083		
	7th Stage Compressor Stator ID				
	Foot - - - - -	.074	.076	.001*	.009*
	8th Stage Compressor Stator				
	Hook (Front) - - - - -	.117	.123		
3377	8th Stage Compressor Shroud ID				
	Foot - - - - -	.114	.116	.001*	.009*
	8th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
	8th Stage Compressor Stator ID				
3377	Foot - - - - -	.074	.076	.001*	.009*
	9th Stage Compressor Stator				
	Hook (Front) - - - - -	.137	.143		
	9th Stage Compressor Shroud ID				
	Foot - - - - -	.134	.136	.001*	.009*
3377	9th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
	9th Stage Compressor Stator ID				
	Foot - - - - -	.074	.076	.001*	.013*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3378	10th Stage Compressor Stator				
	Hook (Front) - - - - -	.097	.103		
	10th Stage Compressor Shroud ID				
	Foot - - - - -	.093	.096	.001*	.010*
	10th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
3379	10th Stage Compressor Stator ID				
	Foot - - - - -	.073	.076	.001*	.010*
	11th Stage Compressor Stator				
	Hook (Front) - - - - -	.117	.123		
	11th Stage Compressor Shroud ID				
	Foot - - - - -	.113	.116	.001*	.010*
3380	11th Stage Compressor Stator				
	Hook (Rear) - - - - -	.067	.073		
	11th Stage Compressor Stator ID				
	Foot - - - - -	.063	.066	.001*	.010*
	12th Stage Compressor Stator				
	Hook (Front) - - - - -	.077	.083		
3381	12th Stage Compressor Shroud ID				
	Foot - - - - -	.073	.076	.001*	.010*
	12th Stage Compressor Stator				
	Hook (Rear) - - - - -	.087	.093		
	12th Stage Compressor Stator ID				
	Foot - - - - -	.083	.086	.001*	.010*
3382	7th Stage Compressor Damper				
	Pocket - - - - -	.093	.100		
	7th Stage Compressor Damper				
3383	Spring - - - - -	.126	.136	.021T*	.048T*
	8th Stage Compressor Damper				
	Pocket - - - - -	.093	.100		
3383	8th Stage Compressor Damper				
	Spring - - - - -	.126	.136	.021T*	.048T*
	9th Stage Compressor Damper				
3383	Pocket - - - - -	.093	.100		
	9th Stage Compressor Damper				
	Spring(PN 4079173) - - - - -	.126	.136	.021T*	.048T*
3383	9th Stage Compressor Damper				
	Pocket - - - - -	.093	.107		
	9th Stage Compressor Damper				
	Spring(PN 4079269) - - - - -	.128	.139	.021T*	.046T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3384	10th Stage Compressor Damper Pocket - - - - -	.087	.105		
	10th Stage Compressor Damper Spring(PN 4079366 and 4079367) - - - - -	.126	.136	.021T*	.045T*
3385	11th Stage Compressor Damper Pocket - - - - -	.087	.105		
	11th Stage Compressor Damper Spring(PN 4079368 and 4079369) - - - - -	.126	.136	.021T*	.045T*
3386	12th Stage Compressor Damper Pocket - - - - -	.087	.105		
	12th Stage Compressor Damper Spring(PN 4079373) - - - - -	.121	.131	.016T*	.044T*
3387	Gap Between Rigid Connecting Link, Bleed Valve Strap and Rigid Connecting Link, Bleed Valve Strap to Be .010 min through Full Start Bleed Actuator Movement				

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3400	4th Stage Blade - - - - -	25.982	26.019		
	Compressor Case and Stator - - - - -	26.098	26.146	.0395*	.0820*
3401	5th Stage Blade - - - - -	24.974	25.011		
	Compressor Case and Stator - - - - -	25.076	25.124	.0325*	.0750*
3402	6th Stage Blade - - - - -	24.156	24.192		
	Compressor Case and Stator - - - - -	24.226	24.275	.0170*	.0595*
3405	9th Stage Blade (PN 4075609-All dash numbers) Compressor Case and Stator - - - - -			.047	.062
3405	9th Stage Blade (PN 4079309-All dash numbers) - - - - -	21.784	21.815		
	Compressor Case and Stator - - - - -	21.882	21.921	.0330*	.0685*
3406	10th Stage Blade (PN 4075610-All dash numbers) Compressor Case and Stator - - - - -			.045	.060
3406	10th Stage Blade (PN 4079310-All dash numbers) - - - - -	20.872	20.903		
	Compressor Case and Stator - - - - -	20.962	20.993	.0295*	.0605*
3407	11th Stage Blade (PN 4075611-All dash numbers) Compressor Case and Stator - - - - -			.020	.031*
3407	11th Stage Blade (PN 4079411-All dash numbers) - - - - -	20.114	20.145		
	Compressor Case and Stator - - - - -	20.161	20.207	.0080*	.0465*
3408	12th Stage Blade (PN 4075612-All dash numbers) Compressor Case and Stator - - - - -			.018	.029*
3408	12th Stage Blade (PN 4079412-All dash numbers) - - - - -	19.420	19.451		
	Compressor Case and Stator - - - - -	19.474	19.498	.0115*	.0330*
3409	13th Stage Blade (PN 4075613-All dash numbers) Compressor Case and Stator - - - - -			.018	.029*
3409	13th Stage Blade (PN 4079413-All dash numbers) - - - - -	18.890	18.921		
	Compressor Case and Stator - - - - -	18.941	18.965	.0100*	.0375*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3411	7th Stage Blade - - - - -	23.422	23.459		
	Compressor Case and Stator - - - - -	23.535	23.553	.0380*	.0655*
3412	8th Stage Blade (PN 4075608-All dash numbers) Compressor Case and Stator - - - - -			.047	.062
3412	8th Stage Blade (PN 4079308-All dash numbers) - - - - -	22.587	22.618		
	Compressor Case and Stator - - - - -	22.701	22.738	.0415*	.0755*

Table 2. Mounting Distances and Backlash Checks for Bevel Gears
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3601	Gear backlash to be checked with high rotor positioned aft.		
	a) Core engine module shall be nose up with high rotor weight supported by No. 3 bearing.		
	b) Remove axial play in tower shaft bearing by loading pinion gear radially outward with 20 to 25 pounds.		
	c) Obtain backlash by measuring length of arc of rotation of upper tower shaft coupling at 2.067 inches radius.		
	d) Arc of rotation to be - - - - -	.058*	.081*
	Note: Arc includes rotation of tower shaft coupling relative to tower shaft gear		

Table 3. Torque Limits and Stretch
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3701	No. 2 Bearing Retaining Nut.		
	1. Tighten nut to 460 to 4800 lb-in. and loosen nut to 0 lb-in.		
	2. Tighten nut to 4600 to 4800 lb-in.		
	3. Establish common reference points between the nut and mating part		
	4. Loosen nut to 0 lb-in. and repeat step (2)		
	5. If the nut reference point is in line with the mating part ref point or beyond it within 1 degree 30 minutes maximum apply step (7), (8) and (9)		
	6. If the reference points are not within limits repeat steps (3), (4) and (5) in order until reference points are within limits then perform step (7), (8) and (9)		
	7. Loosen nut to 0 lb-in. and tighten to 1500 to 1700 lb-in.		
	8. Turn nut thru angle of 12 degrees minimum to 14 degrees maximum		
	9. If locking tabs will not line up with slots in nut, tighten to next slot and lock		
3702	No. 3 Bearing Seal Plate Nut. Tighten to 1475 to 1525 lb-in. If lock plate tabs will not line up with slots in nut tighten to next slot and lock		
3703	Gearbox Drive Upper Bearing Inner Retaining Nut. Seat bearing inner race and mating spacer. Then tighten to 245 to 255 lb-in. If lock tabs do not line up with slots in nut, tighten to next slot and lock.		
3704	Gearbox Drive Upper Bearing Outer Retaining Nut. Seat bearing outer race and tighten to 145 to 155 lb-in. If locking tabs do not line up with slots in nut, tighten to next slot and lock.		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3705	Gearbox Drive Lower Bearing Inner Retaining Nut. Seat bearing inner race, spacer and sleeve, then torque to 475 to 525 lb-in. If locking tabs do not line up with slots in nut, tighten to next slot and lock. To lock, bend all aligned tabs into slots.		
3706	Gearbox Drive Lower Bearing Outer Retaining Nut. Seat bearing outer race in support then tighten nut to 425 to 475 lb-in. If locking tabs do not line up with slots in nut, tighten to next slot and lock.		
3707	No. 3 Bearing and Gear Assembly Retaining Nut		
	1. Tighten nut to 5900 to 6100 lb-in. and loosen nut to 0 lb-in.		
	2. Tighten nut to 5900 to 6100 lb-in.		
	3. Establish common reference points between the nut and its mating part.		
	4. Loosen nut to 0 lb-in. and repeat step (2).		
	5. If the nut reference point is in line with the mating part reference point or beyond it within two degrees maximum apply step (7), (8) and (9).		
	6. in order until reference points are within limits, then perform step (7), (8) and (9).		
	7. If the reference points are not within limits repeat steps (3), (4) and (5) Loosen nut to 0 lb-in. and tighten to 1500 to 1700 lb-in.		
	8. Turn nut thru an angle of 15 degrees 30 minutes to 16 degrees 30 minutes.		
	9. If locking tabs will not line up with slots in nut, tighten to next slot and lock.		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3711	No. 4 Bearing Outer Race Retaining Nut		
	1. Tighten to 12,400 to 12,600 lb-in.		
	2. Loosen to 0 lb-in.		
	3. Retighten to 12,400 to 12,600 lb-in.		
	4. Advance 2 degrees 19 minutes maximum if necessary to lock.		
	NOTE: This nut is silver plated. Shearing of plating at assembly is permissible provided that all visible excess plating is removed.		
3712	No. 4 Bearing Inner Race Retaining Nut		
	1. Tighten nut to 9,900 to 10,100 lb-in. Turn nut thru angle of 52 degrees to 56 degrees and loosen nut to 0 lb-in.		
	2. Tighten nut to 9,900 to 10,100 lb-in.		
	3. Establish common reference points between nut and its mating part		
	4. Turn nut thru angle of 52 degrees to 56 degrees		
	5. Loosen nut to 0 lb-in. and repeat step (2)		
	6. If the nut reference point is in line with the mating part reference point or beyond it within one degree maximum apply steps (4) and (8)		
	7. If the reference points are not within limits, repeat steps (3) (4) and (5) in order, until reference points are within limits, then perform step (6)		
	8. If locking tab will not line up with slot in nut turn an additional 2 degrees 19 minutes maximum and lock		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3714	Rear Compressor Drive Turbine Rotor Coupling Nut (NOTE: Left Hand Thread)		
	1. If nut has been engine run:		
	A. Lap front face of nut to remove galling.		
	B. Re-treat nut per spec PWA 36545-3.		
	2. Burnish spec PWA 36545-3 on the threads only with a brass brush.		
	3. Apply anti-galling compound to front face of nut per PWA 36545-3 (wet).		
	4. Tighten nut to 3700 to 3900 lb-in.		
	5. Establish common reference points between the nut and its mating part.		
	6. Turn nut thru angle of 58 degrees to 60 degrees. Torque not to exceed 120,000 lb-in.		
	7. Loosen nut to 0 lb-in. and repeat step (4).		
	8. If the nut reference point is in line with the mating part reference point or beyond it within 4 degrees maximum, apply final angle of turn per step (6).		
	9. If the reference points are not within limits, repeat steps (5), (6) and (7) in order, until reference points are within limits. Then perform step (8).		
3718	Diffuser Case Rear ID Flange Nuts		
	1. Tighten nuts in sequence shown to 60 to 70 lb-in.		
	2. Tighten nuts in same sequence to 125 to 140 lb-in.		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3721	No. 4 Bearing Scavenge Tube Nut - - - - -	600	675
3722	Fuel Nozzle Bolts Tighten 3 Bolts in Increments of 20 lb-in to 65 to 85 lb-in.		
3723	Compressor Case Elbow Nut - - - - -	86	96
3731	Screw Thread Insert - - - - -	1250	1450
3733	No. 4 Bearing Manifold Retaining Nut - - - - -	300	335
3745	No. 4 Bearing Internal Air Vent Tube Nut - - - - -	35	45
3751	Self-locking bolts must have a 2 lb-in. run-on torque min. Tighten bolts to 35 to 40 lb-in. with vane arms positioned in the axial direction. Visually confirm at each location to verify that bolt head is seated on the vane arm and that no gap exists between top of vane stem and vane arm.		
3752	4th Thru 9th Stage Compressor Case and Stator Bolts		
	1. Tighten bolts in sequence shown to 375 to 425 lb-in. plus run-on torque.		
	2. Tighten bolts in same sequence to 825 to 875 lb-in. plus run-on torque.		
3753	4th Thru 9th Stage Compressor Case and Stator Bolts		
	1. Tighten bolts in sequence shown to 175 to 225 lb-in. plus run-on torque.		
	2. Tighten bolts in same sequence to 375 to 425 lb-in. plus run-on torque.		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

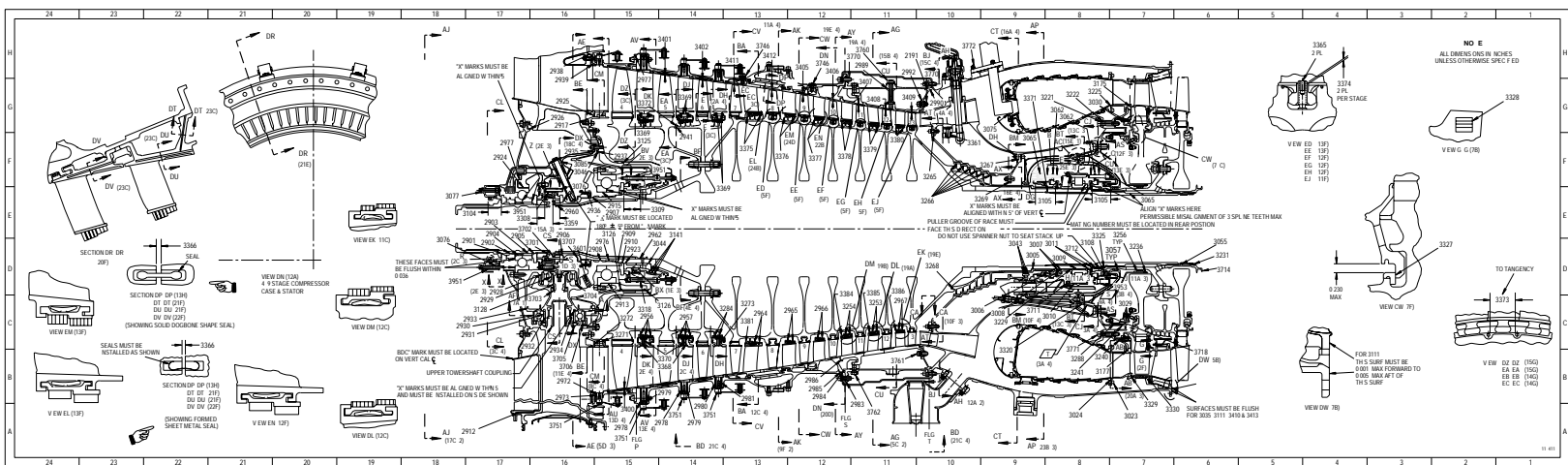
Ref No.	Name	Limits	
		Min	Max
3754	4th Thru 9th Stage Compressor Case and Stator Bolts 1. Tighten bolts in sequence shown to 375 to 425 lb-in. plus run-on torque. 2. Tighten bolts in same sequence to 975 to 1025 lb-in. plus run-on torque.		
3756	4th Thru 9th Compressor Case Bleed Strap Carriage Bolts - - - - -	86	92
3757	4th Thru 9th Compressor - - - - -	45	55
3758	4th Thru 9th Compressor Case TTH Customer Bleed Tube Bolts - - - - -	45	55
3759	Rear Compressor Variable Vane Castellated Nuts 1. Tighten nuts 3 to 5 lb-in. over the run-on torque. 2. Continue tightening until cotter pin can be installed. 3. Do not exceed 45 lb-in. total torque		
3760	10th Thru 12th Stage Compressor Case and Duct Set Bolts - - - - -	80	90
3761	10th Thru 12th Stage Compressor Case and Duct Set Bolts - - - - -	54	60
3762	10th Thru 12th Stage Compressor Case and Duct Set Bolts - - - - -	130	145
3763	Rear Compressor Variable Vane Castellated Nuts. 1. Tighten nuts 3 to 5 lb-in. over the run-on torque. 2. Continue tightening until cotter pin can be installed. 3. Do not exceed 85 lb-in. total torque.		
3764	Install self-locking bolts and record run-on torque each location. Bolts must have a minimum run-on torque of 2 lb-in. If this is not met discard and use new bolt. Tighten bolts to 27 to 30 lb-in.		

Table 3. Torque Limits and Stretch (continued)
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3765	8 Thru 13 Stage Blade Lock Set Screw (Spline Head) Tighten screws 16 to 48 oz-in over the run-on torque (24 oz-in min).		
3765	8 Thru 13 Stage Blade Lock Set Screw (Hex Head and Fluted) 1. Permissible for torque required to turn Fluted set screw through self-locking feature to vary from zero to a peak value. Peak torque of 1.5 to 11 pound-inches required. If peak torque of 1.5 to 11 pound-inches is not satisfied, replace blade lock assembly. 2. Tighten set screw 1 to 3 pound-inches above torque required to turn set screw through self-locking feature when measured prior to seating set screw against disk.		
3766	Tighten bolts 23 to 26 lb-in.		
3768	Tighten nuts 62 to 72 lb-in.		
3769	No. 4 Bearing Oil Supply Tube Nut PN ST2100-12 or PN ST2121-12 - - - - -	500	550
	PN 360583 - - - - -	400	450
3770	10th thru 12th Stage Stator Support Bolts and 4th thru 9th Case Aft Flange Bolts 1. Verify a run on torque of 3.5 to 30 lb-in. prior to seating. Fasteners not meeting this requirement must be replaced.		
3771	Combustion Chamber Bolts	120	130

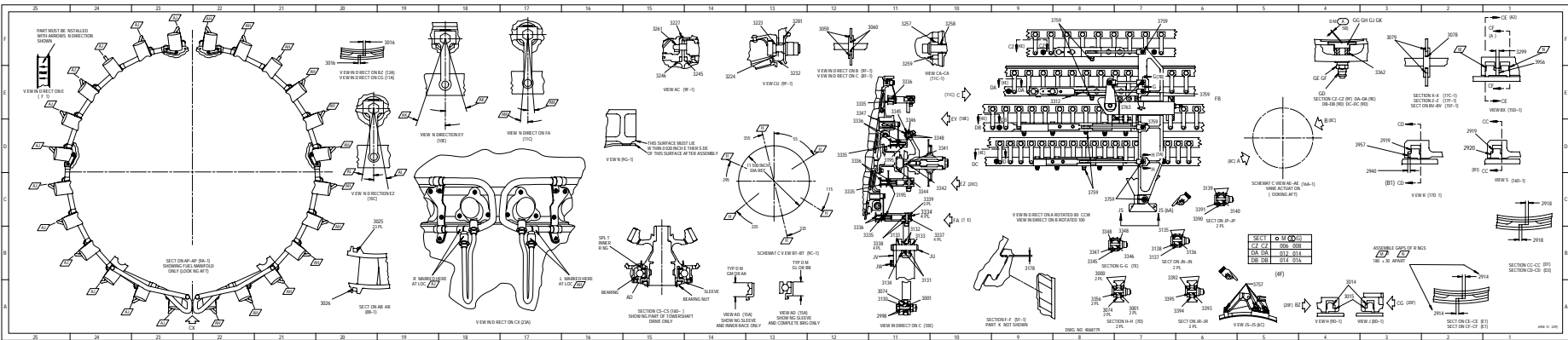
Table 4. Spring Pressures
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3951	No. 2 and No. 3 Bearing Seal Spring		
	At 1.664 in. - - - - -	.421	.504
	At 1.211 in. - - - - -	1.768	1.932
3952	Borescope Plug Spring		
	At .800 in. - - - - -	6.125	7.125
3953	No. 4 Bearing Front and Rear Seal Springs		
	At .880 in. - - - - -	1.875	2.000
	At .910 in. - - - - -	1.781	1.906
3956	Spring Rate: 1 lb. 11 oz-2 lb 6 Oz. at .040 length Maximum Spring Rate 24 lb/in.		
3957	Spring Rate 3 lbs 1.5 ox-3 lbs 11.5 oz at .040 length Maximum Spring Rate 31 lb/in.		



FO-1. Core Engine Module - Dimensional Limits and Torque Values (Sheet 1 of 4)





FO-1. Core Engine Module - Dimensional Limits and Torque Values (Sheet 3 of 4)



WORK PACKAGE**TECHNICAL PROCEDURES****CORE ENGINE MODULE -****TABLE OF LIMITS AND CLEARANCE CHARTS**

**EFFECTIVITY: ENGINE MODEL F100-PW-229
(INCORPORATING TCTO 2J-F100229(II)-548)**

LIST OF EFFECTIVE WP PAGES

Total Number of Pages in this WP is 38

PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.	PAGE NO.	CHANGE NO.
1	31	21 - 26	24	33	30
2 - 4	24	27	30	34 Blank	24
5	30	28 - 29	24	35	24
6 - 15	24	30 Blank	24	36 Blank	24
16	31	31	31	37	24
17 - 18	24	32 Blank	24	38 Blank	24
19 - 20	31				

REFERENCE MATERIAL REQUIRED

Title	Number
Standard Maintenance Procedures - - - - -	T.O. 2-1-111

APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS

T. O. No.	Date	Level	Title (ECP No.)
2J-F100229(II)-519	31 DEC 93	O/I	Retrofit of Improved 4th and 5th Stage Bushings to Eliminate Back-out, F100-PW-229 Engines, F15/F16 Aircraft (ECP 92QA105)
2J-F100229(II)-523	30 NOV 93	O/I	Remove and Replace No. 4 Bearing Air Seal Assembly PN 4074849 With New Assembly Featuring Increased Forward Snap Diameter, F100-PW-229 Engines, F15/F16 Aircraft (ECP 90QA181)
2J-F100229(II)-548	30 MAY 97	D	Reoperation of Diffuser Case Assembly OD Rear Flange to Incorporate a New Short Skirt Configuration, F100-PW-229, F15/F16 Aircraft (ECP 96QA053)

CONSUMABLE MATERIALS

None

EXPENDABLE ITEMS

None

APPLICABLE SUPPORT EQUIPMENT

None

ILLUSTRATED SUPPORT EQUIPMENT

None

1. INTRODUCTION.

- a. This work package contains dimensional limits for core engine module for F100-PW-229 engine incorporating TCTO 2J-F100229(II)-548. The following features are included:

- Short diffuser case
- Front turbine case

2. GENERAL INSTRUCTIONS.

(See FO-1 and Tables 1 through 3.)

- a. Core engine module dimensional limits are contained in three tables:
- Table 1 - Fits and Clearances
 - Table 2 - Mounting Distances and Backlash Checks For Bevel Gears
 - Table 3 - Spring Pressures
- b. Entries in tables have reference numbers which are also located in FO-1. These illustrations identify parts and indicate where fits and spring pressures apply. Further information on interpreting fits, clearances, terms and symbols is provided in T.O. 2-1-111.

3. LIMITS.

- a. Limits with no asterisks appearing in the limits column have a Replace If Over tolerance added to either the Minimum or Maximum limit, or both.
- b. Limits with a single asterisk (*) appearing in the limits column have no Replace If Over tolerance assigned.
- c. Limits with a double asterisk (**) appearing in either the Minimum or Maximum limits column, or both, have been assigned a Replace If Over clearance limit identical to the respective blueprint clearance limit.

4. TERMS AND SYMBOLS.

- a. Symbol T in Minimum and Maximum in Tables of Limits column indicates tight fit.
- b. Unless otherwise specified, all fits are diametrical, except spline fits which are calculated from chordal dimensions.
- c. Letter-number codes enclosed within a circle on limits charts, such as A12, are of contractor significance only and shall be ignored.
- d. Letter-number codes within parentheses, such as (C-8), relate to coordinates on the outer margins of each clearance chart to facilitate location.
- e. Symbol (+) in limits column indicates that clearance applies in As Assembled Condition.

5. UNITS.

- a. Figures in Minimum and Maximum columns in Tables of Limits shall be interpreted as follows:
Spring pressure in pounds, and
all other limits in inches.

Table 1. Fits and Clearances
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2901	Turbine Shaft Coupling - - - - -	4.0782	4.0798		
	No. 2 Bearing Seal Seat - - - -	4.0800	4.0810	.0002*	.0022*
2902	Turbine Shaft Coupling - - - - -	3.9990	4.0010		
	No. 2 Bearing Front Scoop - - -	4.0010	4.0025	.0000*	.0035*
2903	Turbine Shaft Coupling - - - - -	3.9998	4.0009		
	No. 2 Bearing Rear Scoop - - - -	3.9960	3.9965	.0033T*	.0049T*
2904	No. 2 Bearing Rear Scoop - - - -	4.3320	4.3325		
	No. 2 Bearing - - - - -	4.33045	4.3307	.0013T*	.00205T*
2905	Turbine Shaft Coupling - - - - -	3.9998	4.0009		
	No. 2 Bearing Seal Seat - - - -	3.9985	4.0000	.0002*	.0024T*
2906	6th Stage Compressor Disk and Hub - - - - -	4.3180	4.3197		
	No. 3 Bearing Seal Seat - - - -	4.3200	4.3210	.0003*	.0030*
2907	6th Stage Compressor Disk and Hub - - - - -	5.0995	5.1000		
	Gearbox Drive Bevel Gearshaft	5.0945	5.0950	.0040T	.0056T
2908	6th Stage Compressor Disk and Hub - - - - -	5.1445	5.1450		
	Gearbox Drive Bevel Gearshaft	5.1394	5.1402	.0043T*	.0056T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2909	6th Stage Compressor Disk and Hub - - - - -	5.5030	5.5035		
	Gearbox Drive Bevel Gearshaft	5.4995	5.5000	.003T*	.004T*
2910	6th Stage Compressor Disk and Hub - - - - -	5.6002	5.6014		
	No. 3 Bearing Seal Seat - - - - -	5.5990	5.6000	.0002T*	.0024T*
2912	3rd Stage Fan Compressor Stator - - - - -	31.864	31.868		
	Intermediate Case - - - - -	31.856	31.862	.000T	.012T
2913	No. 3 Bearing - - - - -	8.8577	8.8583		
	No. 3 Bearing Support - - - - -	8.8583	8.8589	.0000	.0020
2914	No. 3 Bearing Seal Ring Gap at 7.140 BSC - - - - -	.070	.090		
	No. 3 Bearing Seal - - - - -	7.139	7.141	.067*	.093*
2915	Gearbox Drive Bevel Gearshaft	6.1046	6.1056		
	No. 3 Bearing - - - - -	6.1021	6.1024	.0022T*	.0035T*
2917	Intermediate Case - - - - -	17.752	17.758		
	Rear Compressor Inlet Stator Shroud - - - - -	17.748	17.752	.000**	.010T
2918	No. 2 Bearing Oil Seal Ring Gap at 5.180 BSC - - - - -	.070	.090		
	No. 2 Bearing Seal - - - - -	5.179	5.181	.067*	.093*
2919	Side Clearance No. 2 Bearing Oil Seal Ring - - - - -	.119	.124		
	Seal Ring Holder - - - - -	.127	.130	.003*	.011*
2920	Side Clearance No. 2 Bearing Oil Seal Ring - - - - -	.1525	.1540		
	Seal Ring Holder - - - - -	.1570	.1600	.0030*	.0075*
2921	Bushing - - - - -	.7520	.7525		
	Compressor Intermediate Case -	.7500	.7515	.0005T**	.0025T**

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2922	Bushing - - - - -	.5010	.5015		
	Compressor Intermediate Case -	.4990	.5000	.0010T**	.0025T**
2923	6th Stage Compressor Disk and Hub - - - - -	5.6060	5.6065		
	No. 3 Bearing Air Seal - - - - -	5.6010	5.6015	.0035T	.0055T
2924	No. 2 Bearing - - - - -	6.6923	6.6929		
	No. 2 Bearing Housing - - - - -	6.6929	6.6935	.0000*	.0012*
2925	Rear Compressor Inlet Stator Shroud - - - - -	18.300	18.304		
	Compressor Stator Inlet Shroud - - - - -	18.296	18.300	.000*	.008T*
2926	No. 2 Bearing Support - - - - -	16.279	16.283		
	Compressor Intermediate Case -	16.275	16.279	.000**	.008T**
2927	No. 2 Bearing Housing - - - - -	8.019	8.022		
	No. 2 Bearing Support - - - - -	8.015	8.019	.000*	.007T*
2928	Gearbox Driveshaft Upper Bearing - - - - -	2.8342	2.8347		
	No. 2 Bearing Housing - - - - -	2.8343	2.8346	.0004*	.0004T*
2929	Gearbox Drive Bevel Gearshaft	1.2800	1.2809		
	Roller Bearing - - - - -	1.2793	1.2795	.0005T*	.0016T*
2930	Gearbox Driveshaft - - - - -	4.1336	4.1339		
	Intermediate Bearing Housing -	4.1335	4.1340	.0004*	.0004T*
2931	Gearbox Drive Gearshaft Sleeve - - - - -	2.5603	2.5611		
	Ball Bearing - - - - -	2.5589	2.5591	.0012T*	.0022T*
2932	Gearbox Drive Bevel Gearshaft	2.2996	2.3002		
	Gearshaft Sleeve - - - - -	2.2986	2.2990	.0006T*	.0016T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2933	Gearbox Drive Bearing Housing - - - - -	5.281	5.282		
	No. 2 Bearing Housing - - - - -	5.279	5.281	.000*	.003T*
2934	1) Gearbox Driveshaft Coupling External Spline (a) Effective Tooth Thickness - - - - -		.1259		
	(b) Actual Tooth Thickness -	.1228			
	2) Gearbox Drive Bevel Gearshaft Internal Spline (a) Effective Space Width - -	.1309			
	(b) Actual Space Width - - - -		.1340		
	3) Fit - - - - -			.0050*	
2935	No. 3 Bearing Support - - - - -	12.541	12.547		
	No. 3 Bearing Housing - - - - -	12.538	12.542	.001*	.009T*
2936	No. 3 Bearing Lock - - - - -	6.024	6.026		
	Gearbox Drive Bevel Gearshaft - - - - -	6.028	6.030	.002*	.006*
2937	No. 3 Bearing Seal Support -	12.780	12.784		
	Compressor Intermediate Case - - - - -	12.776	12.780	.000**	.006T**
2938	Fan Exit Case and Stator - - -	28.430	28.438		
	Intermediate Case - - - - -	28.438	28.442	.000**	.012T**
2939	Fan Exit Case and Stator - - -	26.909	26.917		
	4th Stage Compressor Case - -	26.903	26.907	.002T**	.014T**
2940	Side Clearance No. 2 Bearing Seal Ring - - - - -	.1920	.1950		
	Seal Ring Holder - - - - -	.1525	.1540	.0380*	.0425*
2941	Rear Compressor Drum Rotor Disk - - - - -	16.625	16.628		
	Compressor 6th Stage Disk and Hub - - - - -	16.636	16.646	.008T*	.021T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2956	Air Seal Radial Clearance				
	4th Stage Air Seal - - - - -	17.174	17.188		
	Sealing Ring (Front) - - - - -	17.186	17.214	.001T*	.020*
	4th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Center) - - - - -	17.286	17.314	.001T*	.020*
2957	Air Seal Radial Clearance				
	5th Stage Air Seal - - - - -	17.174	17.188		
	Sealing Ring (Front) - - - - -	17.186	17.214	.001T*	.020*
	5th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Center) - - - - -	17.286	17.314	.001T*	.020*
	5th Stage Air Seal - - - - -	17.374	17.388		
	Sealing Ring (Rear) - - - - -	17.386	17.414	.001T*	.020*
2960	No. 3 Bearing Heat Shield - - - -	3.901	3.902		
	Rear Compressor Front Hub - - - -	3.896	3.900	.001T	.006T
2962	No. 3 Bearing Heat Shield - - - -	4.895	4.896		
	Rear Compressor Front Hub - - - -	4.890	4.894	.001T	.006T
2964	Air Seal Radial Clearance				
	7th Stage Air Seal - - - - -	18.280	18.294		
	Sealing Ring (Front) - - - - -	18.283	18.331	.0055T*	.0255*
	7th Stage Air Seal - - - - -	18.147	18.161		
	Sealing Ring (Center) - - - - -	18.150	18.198	.0055T*	.0255*
2965	Air Seal Radial Clearance				
	8th Stage Air Seal - - - - -	18.019	18.033		
	Sealing Ring (Front) - - - - -	18.022	18.070	.0055T*	.0255*
	8th Stage Air Seal - - - - -	17.926	17.940		
	Sealing Ring (Rear) - - - - -	17.929	17.977	.0055T*	.0255*
2966	Air Seal Radial Clearance				
	9th Stage Air Seal - - - - -	17.568	17.582		
	Sealing Ring (Front) - - - - -	17.571	17.619	.0055T*	.0255*
	9th Stage Air Seal - - - - -	17.449	17.463		
	Sealing Ring (Rear) - - - - -	17.452	17.500	.0055T*	.0255*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2967	Air Seal Radial Clearance				
	12th Stage Air Seal				
	(PN 4079372-01) - - - - -	16.238	16.252		
	Sealing Ring (Front) - - - - -	16.263	16.305	.0055*	.0335*
	12th Stage Air Seal - - - - -	16.150	16.164		
	Sealing Ring (Rear) - - - - -	16.172	16.215	.0040*	.0325*
2967	Air Seal Radial Clearance				
	12th Stage Air Seal				
	(PN 4080382-01) - - - - -	16.222	16.226		
	Sealing Ring (Front) - - - - -	16.253	16.257	.0285	.0325+
	12th Stage Air Seal - - - - -	16.134	16.138		
	Sealing Ring (Rear) - - - - -	16.165	16.169	.0285	.0325+
2972	Inlet Guide Vane Bearing - - - -	.5445	.5455		
	Compressor 4th Stage Case - - -	.5450	.5470	.0025**	.0005T**
2973	Compressor Inlet Guide Vane - -	.3950	.3970		
	Bearing - - - - -	.3980	.3995	.0010*	.0045*
2976	Rear Compressor Front Hub				
	Spline - - - - -	.0686	.0730		
		ACT	EEF		
	Towershaft Drive Gear Spline -	.0780	.0829	.0050*	.0143*
	Max Limit fit based on .0712				
	min EEF (REF)				
2977	4th Stage Compressor Case - - -	28.208	28.212		
	4th through 9th Stage				
	Compressor Case Set - - - - -	28.202	28.206	.001T	.010T
2978	Compressor Vane Bearing				
	(4th Stage PN 4071383 and				
	5th Stage PN 4074428) - - - -	.5458	.5465		
	Compressor Case Set - - - - -	.5450	.5470	.0012*	.0015T*
2978	Compressor Vane Bearing				
	(4th Stage PN 4081053-01 and				
	5th Stage PN 4081054-01) - -	.543	.544		
	Compressor Case Set - - - - -	.545	.547	.001*	.004*
2979	Compressor Vane - - - - -	.3950	.3970		
	Bearing - - - - -	.3980	.3995	.0010*	.0045*
2980	Compressor Vane Bearing - - - -	.544	.545		
	4th through 9th Stage				
	Compressor Case Set - - - - -	.545	.547	.000*	.003*
2981	Compressor Vane Bearing - - - -	.399	.400		
	Compressor Vane - - - - -	.395	.397	.002*	.005*
2982	Compressor Vane Bearing - - - -	.543	.544		
	Compressor Case Set - - - - -	.545	.547	.001*	.004*
2983	4th through 9th Stage				
	Compressor Case Set - - - - -	24.916	24.920		
	10th through 12th Stage				
	Compressor Case - - - - -	24.920	24.924	.000*	.008T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
2984	9th Stage Compressor Stator				
	Set - - - - -	23.088	23.098		
	10th through 12th Stage				
	Compressor Case - - - - -	23.078	23.082	.006*	.020*
2985	9th Stage Compressor Stator				
	Set - - - - -	23.328	23.332		
	4th through 9th Stage				
	Compressor Case Set - - - - -	23.328	23.332	.004*	.004T*
2986	9th Stage Compressor Stator				
	Set - - - - -	21.328	21.332		
	10th through 12th Stage Case				
	and Stator Set - - - - -	21.328	21.332	.004*	.004T*
2989	10th through 12th Stage				
	Compressor Case - - - - -	22.798	22.802		
	10th through 12th Stage				
	Compressor Stator Set - - - - -	22.798	22.802	.004*	.004T*
2990	Compressor Stator and Support -	22.678	22.682		
	Diffuser Case - - - - -	22.673	22.679	.002	.009T**
2991	Compressor Stator Support - - -	22.851	22.855		
	10th through 12th Stage				
	Compressor Case - - - - -	22.836	22.842	.009T*	.019T*
2992	Compressor Stator Support - - -	20.904	20.908		
	10th through 12th Stage				
	Compressor Stator Set - - - - -	20.904	20.908	.004*	.004T*
2998	Compressor Stator Synchronizing				
	Arm Bolt - - - - -	.1883	.1893		
	Bracket - - - - -	.1895	.1900	.0002*	.0017*
3000	Compressor Stator Connecting				
	Link Bolt - - - - -	.1883	.1893		
	Compressor Stator Rigid				
	Connecting Link - - - - -	.1895	.1900	.0002*	.0017*
3001	Compressor Stator Connecting				
	Link Bolt - - - - -	.1883	.1893		
	Connecting Link Bolt Bearing -	.1895	.1900	.0002*	.0017*
3005	Rear Compressor Driveshaft - - -	6.555	6.557		
	No. 4 Bearing Air Seal - - - - -	6.564	6.566	.008**	.011**

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3006	Rear Compressor Driveshaft - -	6.550	6.551		
	No. 4 Bearing Air Seal - - - -	6.546	6.548	.0015T	.005T
3007	Rear Compressor Driveshaft - -	6.545	6.546		
	No. 4 Bearing Front Seal Seat - - - - -	6.543	6.544	.001T	.004T
3008	Rear Compressor Driveshaft - -	6.545	6.546		
	No. 4 Bearing Scoop (Front) -	6.546	6.547	.000	.003
3009	Rear Compressor Driveshaft - -	6.4991	6.4997		
	No. 4 Bearing - - - - -	6.4957	6.4961	.003T**	.004T**
3010	No. 4 Bearing - - - - -	8.8578	8.8588		
	No. 4 Bearing Housing - - - - -	8.854	8.855	.0028T*	.0048T*
3011	Rear Compressor Driveshaft - -	6.459	6.460		
	No. 4 Bearing Rear Seal Seat - - - - -	6.457	6.458	.001T	.004T
3014	Side Clearance				
	No. 4 Bearing Seal Ring - - - -	.119	.124		
	Seal Ring Holder - - - - -	.127	.130	.003*	.011*
3015	Side Clearance				
	No. 4 Bearing Seal Ring - - - -	.1525	.1540		
	Seal Ring Holder - - - - -	.1570	.1600	.0030*	.0075*
3016	Gap No. 4 Bearing Seal Ring Seal				
	Ring Gap at 7.606 BSC Dia - -	.090	.110		
	No. 4 Bearing Seal - - - - -	7.605	7.607	.087*	.113*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3024	Axial Clearance 1st Stage Turbine Vane and Combustion Chamber Outer Brush Seal - - - - -			.036*	.091*
3025	Side Clearance 1st Stage Turbine Vane - - - - -	.373	.379		
	Combustion Chamber - - - - -	.360	.370	.003*	.019*
3029	1st Stage Turbine Air Seal Radial Clearance Air Seal - - - - -	(Assembled on 1st Stage Turbine Disk)			
	Sealing Ring (Front) - - - - -	14.874	14.892		
	Air Seal - - - - -	14.903	14.907	.0055*	.0165*
	Sealing Ring (Rear) - - - - -	14.874	14.892		
	Sealing Ring (Rear) - - - - -	14.903	14.907	.0055*	.0165*
3030	1st Stage Turbine Air Seal Radial Clearance 1st Stage Turbine Blade Retaining Plate - - - - -	(Assembled on 1st Stage Turbine Disk)			
	Turbine Outer Air Sealing Ring (Front) - - - - -	17.387	17.405		
	1st Stage Turbine Blade Retaining Plate - - - - -	17.419	17.423	.007*	.018*
	Turbine Outer Air Sealing Ring (Rear) - - - - -	17.491	17.509		
	Turbine Outer Air Sealing Ring (Rear) - - - - -	17.5190	17.5230	.005*	.016*
3035	Turbine Duct Support - - - - -	26.140	26.148		
	Front Turbine Case - - - - -	26.092	26.100	.056T*	.040T*
	Max limit dimension located 0.088 inch from rear most surface of parts.				
3040	Side Clearance (11 Places) Front Turbine Case - - - - -	.795	.805		
	Turbine Duct Support - - - - -	.745	.755	.040*	.060*
	Side Clearance (3 Places) Front Turbine Case - - - - -	.715	.725		
	Turbine Duct Support - - - - -	.670	.680	.035*	.055*
3043	No. 4 Bearing Front Air Seal Radial Clearance No. 4 Bearing Seal - - - - -				
	Sealing Ring - - - - -	7.281	7.285		
	Sealing Ring - - - - -	7.329	7.333	.022*	.026*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3044	6th Stage Compressor Disk and Hub - - - - -	5.6515	5.6555		
	No. 3 Bearing Air Seal - - - - -	5.6495	5.6505	.0010T*	.0060T*
3046	No. 3 Bearing Support - - - - -	12.618	12.620		
	No. 3 Bearing Seal Support - -	12.616	12.618	.000*	.004T*
3047	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap Rigid Connecting Link - - - - -	.2525	.2540	.0020*	.0040*
3048	Bleed Valve Strap Retaining Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap - - - - -	.2510	.2525	.0005*	.0025*
3049	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Carriage Roller - - - - -	.2525	.2540	.0020*	.0040*
3050	Bleed Valve Connecting Link Bolt - - - - -	.2500	.2505		
	Bleed Valve Strap Rigid Connecting Link - - - - -	.2525	.2540	.0020*	.0040*
3051	Bleed Valve Carriage Bolt - - -	.2500	.2505		
	Bleed Valve Connecting Link -	.2510	.2525	.0005*	.0025*
3055	Rear Compressor Driveshaft - -	5.7645	5.7675		
	Nut - - - - -	5.7750	5.7780	.0075*	.0135*
3057	Radial Clearance Turbine Hub - - - - -	6.684	6.680		
	Air Sealing Ring - - - - -	6.720	6.724	.018*	.022*
3059	Side Clearance No. 4 Bearing Seal Housing - -	.070	.080		
	Bushing - - - - -	.085	.105	.005*	.035*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3060	End Clearance				
	No. 4 Bearing Seal Bushing - -	.336	.340		
	Housing - - - - -	.349	.353	.009*	.017*
3062	No. 4 Bearing Seal Pin - - - - -	.248	.251		
	Bushing - - - - -	.256	.258	.005*	.010*
3065	No. 4 Bearing Seal Pin - - - - -	.3614	.3618		
	Support - - - - -	.3600	.3610	.0004T*	.0018T*
3071	Bleed Valve Carriage Roller -	.4996	.5000		
	Guide - - - - -	.5000	.5080	.0000*	.0084*
3074	Compressor Synchronizing Arm				
	Bearing - - - - -	.5620	.5625		
	Arm - - - - -	.5622	.5628	.0003T*	.0008*
3075	Fuel Nozzle - - - - -	.998	1.001		
	Combustion Chamber - - - - -	1.005	1.009	.004*	.011*
3076	No. 2 and No. 3 Bearing Seal				
	Pin - - - - -	.220	.221		
	Seal Guide - - - - -	.223	.225	.002*	.005*
3077	No. 2 and No. 3 Bearing Seal				
	Pin - - - - -	.220	.221		
	Seal Ring Holder - - - - -	.219	.220	.000*	.002T*
3078	End Clearance				
	No. 2 and No. 3 Bearing Seal				
	Guide - - - - -	.320	.324		
	Seal Housing - - - - -	.342	.346	.018*	.026*
3079	Side Clearance				
	No. 2 and No. 3 Bearing Seal				
	Housing - - - - -	.065	.075		
	Seal Guide - - - - -	.078	.088	.003*	.023*
3085	No. 2 and No. 3 Bearing				
	Nozzle - - - - -	.7285	.7295		
	No. 2 Bearing Support - - - - -	.7300	.7310	.0005*	.0025*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3104	No. 2 Bearing Face Seal Height - - - - - (Seal Face to Extreme End of Housing)			1.070*	1.080*
3105	No. 4 Bearing Face Seal Height - - - - - (Seal Face to Extreme End of Housing)			1.520*	1.530*
3108	No. 4 Bearing Air Sealing Ring - - - - -	7.041	7.043		
	Seal Rear Support - - - - -	7.044	7.046	.001*	.005*
3125	No. 3 Bearing Seal Support -	10.918	10.910		
	Heat Shield - - - - -	10.912	10.900	.002T*	.018T*
3126	No. 3 Bearing Seal Support -	9.960	9.962		
	Support - - - - -	9.946	9.948	.012*	.016*
3128	Bolt - - - - -	.974	.976		
	Gearbox Drive Bevel Gearshaft - - - - -	.976	.978	.000*	.004*
3130	End Clearance Rear Compressor Stator Synchronizing Arm Bracket -	.281	.286		
	Arm Bearing - - - - -	.279	.281	.000*	.007*
3131	Pin - - - - -	.3955	.3975		
	Bearing - - - - -	.3980	.3995	.0005	.004
3132	Bell Crank - - - - -	.545	.547		
	Bearing - - - - -	.5458	.5465	.0015T	.0012
3133	Pin - - - - -	.3955	.3975		
	Bracket - - - - -	.396	.397	.0015T	.0015
3134	End Clearance Bracket - - - - -	.555	.557		
	Bearing and Bell Crank - - - -	.546	.553	.002	.011
3135	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001	.0018
3136	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002	.0017

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3137	Arm - - - - -	.6552	.6557		
	Bearing - - - - -	.6557	.6562	.001T	.0000
3138	End Clearance				
	Bearing - - - - -	.341	.343		
	Link - - - - -	.344	.346	.001	.005
3139	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001	.0018
3140	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002	.0017
3141	No. 3 Bearing Air Seal Radial Clearance				
	No. 3 Bearing Air Seal - - - - -	6.979	6.981		
	Sealing Ring (Front) - - - - -	6.994	6.996	.0065*	.0085*
	No. 3 Bearing Air Seal - - - - -	7.079	7.081		
	Sealing Ring (Center) - - - - -	7.094	7.096	.0065*	.0085*
	No. 3 Bearing Air Seal - - - - -	7.179	7.181		
	Sealing Ring (Rear) - - - - -	7.194	7.196	.0065*	.0085*
3146	Pin - - - - -	.1870	.1880		
	Compressor Discharge Manifold -	.1905	.1915	.0025*	.0045*
3168	Pin - - - - -	.187	.188		
	Diffuser Case - - - - -	.186	.187	.000**	.002T**
3175	Air Seal Radial Clearance				
	1st Stage Turbine Ring and Support - - - - -	19.764	19.768		
	1st Stage Turbine Rotor Blade, Assy Of - - - - -	19.798	19.822	.015*	.029*
3177	1st Stage Turbine Outer Air Sealing Ring (PN 4085123-01) -	1.042	1.048		
	1st Stage Turbine Stator Support - - - - -	1.064	1.076	.016T*	.034T*
3177	1st Stage Turbine Outer Air Sealing Ring (PN 4082788-01) -	1.028	1.044		
	1st Stage Turbine Stator Support - - - - -	1.064	1.076	.020T*	.048T*
3177	1st Stage Turbine Outer Air Sealing Ring (PN 4080012-01) -	1.034	1.064		
	1st Stage Turbine Stator Support - - - - -	1.064	1.076	.000*	.042T*
3192	No. 4 Bearing Air Tube Elbow - -	1.093	1.097		
	Diffuser Case - - - - -	1.098	1.102	.001*	.012

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3193	Tube Retaining Plate - - - - -	1.078	1.080		
	Diffuser Case Adapter - - - - -	1.084	1.086	.004*	.008*
3194	Side Clearance				
	No. 4 Bearing Pressure Tube				
	Ferrule - - - - -	.462	.464		
	Retaining Plate - - - - -	.463	.465	.001T*	.003*
3195	Bracket - - - - -	.300	.301		
	Bearing - - - - -	.3012	.3017	.0002T*	.0017T*
3196	Side Clearance				
	No. 4 Bearing Oil Pressure Tube				
	Sealing Ring - - - - -	.084	.085		
	Connector - - - - -	.086	.088	.001*	.004*
3197	Gap				
	No. 4 Bearing Oil Pressure Tube				
	Seal Ring Gap at 1.120 BSC -	.005	.015		
	Front Air Sealing Ring - - - - -	1.119	1.121	.002*	.018*
3199	PS5 Instrumentation Tube				
	Coupling - - - - -	.3725	.3735		
	Diffuser Case - - - - -	.3745	.3765	.001**	.006
3204	Side Clearance				
	No. 4 Bearing Scavenge Oil Tube				
	Seal Ring - - - - -	.077	.078		
	External Threaded Ring - - - - -	.079	.081	.001*	.004*
3205	Gap				
	No. 4 Bearing Scavenge Oil Tube				
	Seal Ring Gap at 1.270 BSC -	.005	.015		
	Front Air Sealing Ring - - - - -	1.269	1.271	.002*	.018*
3206	No. 4 Bearing Sump - - - - -	1.0010	1.0015		
	Front Seal Support - - - - -	1.0000	1.0005	.0005T*	.0015T*
3216	Side Clearance				
	No. 4 Bearing Seal Air Supply				
	Tube Seal Ring - - - - -	.077	.078		
	Ferrule - - - - -	.079	.081	.001*	.004*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3217	Gap No. 4 Bearing Seal Air Supply Tube Seal Ring Gap at 1.270 BSC - - - - -	.005	.015		
	Front Air Sealing Ring - - - -	1.269	1.271	.002*	.018*
3220	Headless Shoulder Pin - - - - -	.2502	.2507		
	Diffuser Case - - - - -	.2490	.2500	.000	.0017T**
3221	Combustion Chamber - - - - -	.288	.292		
	Bolt - - - - -	.281	.282	.006*	.011*
	Maximum of three combustion chamber holes may be .288 to .297 diameter. Fit for these holes is .006 to .016.				
3222	1st Stage Turbine Stator Support - - - - -	.287	.289		
	Support Bolt - - - - -	.281	.282	.005*	.008*
3223	Shoulder Bolt - - - - -	.3290	.3310		
	Diffuser Case - - - - -	.3290	.3390	.002T**	.010**
3224	No. 4 Bearing Front Seal Support - - - - -	12.880	12.883		
	Diffuser Case - - - - -	12.877	12.880	.001	.006T**
3225	Axial Clearance 1st Stage Turbine Vane - - - -	1.269	1.277		
	Combustion Chamber - - - - -	1.278	1.288	.001*	.019*
3227	No. 4 Bearing Seal Front Support - - - - -	12.321	12.323		
	Front Air Sealing Ring - - - -	12.315	12.319	.002T*	.008T*
3229	Rear Compressor Driveshaft - -	6.505	6.506		
	No. 4 Bearing Scoop (Rear) - -	6.506	6.507	.000	.003
3231	Rear Compressor Driveshaft Nut Lock Spline - - - - -	.0619	.0639		
	Rear Compressor Driveshaft Nut Spline - - - - -	.0654	.0722	.0015*	.0103*
3232	No. 4 Bearing Front Seal Support - - - - -	12.720	12.724		
	1st Stage Turbine Stator Support - - - - -	12.724	12.728	.000*	.008T*
3236	Damper - - - - -	7.104	7.108		
	Ring - - - - -	7.098	7.102	.002T*	.010T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3240	1st Stage Turbine Outer Air				
	Sealing Ring (PN 4085123-01) -	18.095	18.099		
	Stator Support - - - - -	18.086	18.092	.003T*	.013T*
3240	1st Stage Turbine Outer Air				
	Sealing Ring (PN 4082788-01) -	18.097	18.101		
	Stator Support - - - - -	18.086	18.092	.005T*	.015T*
3240	1st Stage Turbine Outer Air				
	Sealing Ring (PN 4080012-01) -	18.098	18.102		
	Stator Support - - - - -	18.086	18.092	.006T*	.016T*
3241	1st Stage Turbine Inner Air				
	Sealing Ring - - - - -	15.549	15.573		
	Stator Support - - - - -	15.491	15.495	.054T*	.082T*
3245	No. 4 Bearing Housing - - - - -	10.500	10.503		
	Seal Rear Support - - - - -	10.497	10.500	.000*	.006T*
3246	No. 4 Bearing Housing - - - - -	10.500	10.503		
	Seal Front Support - - - - -	10.497	10.500	.000*	.006T*
3253	Air Seal Radial Clearance				
	11th Stage Air Seal				
	(PN 4079371-01 or 4079381-01) -	16.648	16.662		
	Sealing Ring (Front) - - - - -	16.663	16.705	.0005*	.0285*
	11th Stage Air Seal - - - - -	16.568	16.582		
	Sealing Ring (Rear) - - - - -	16.587	16.630	.0025*	.0310*
3253	Air Seal Radial Clearance				
	11th Stage Air Seal				
	(PN 4080291-01 or 4080381-01) -	16.632	16.636		
	Sealing Ring (Front) - - - - -	16.663	16.667	.0285	.0325+
	11th Stage Air Seal - - - - -	16.552	16.556		
	Sealing Ring (Rear) - - - - -	16.583	16.587	.0285	.0325+
3254	Air Seal Radial Clearance				
	10th Stage Air Seal				
	(PN 4079370-01 or 4079380-01) -	17.104	17.118		
	Sealing Ring (Front) - - - - -	17.134	17.198	.0080*	.0470*
	10th Stage Air Seal - - - - -	17.004	17.018		
	Sealing Ring (Rear) - - - - -	17.034	17.099	.0080*	.0475*
3254	Air Seal Radial Clearance				
	10th Stage Air Seal				
	(PN 4080380-01 or 4080390-01) -	17.088	17.092		
	Sealing Ring (Front) - - - - -	17.159	17.163	.0335	.0375+
	10th Stage Air Seal - - - - -	16.988	16.992		
	Sealing Ring (Rear) - - - - -	17.059	17.063	.0335	.0375+
3256	Air Seal Radial Clearance - - - - -	6.893	6.905		
	Sealing Ring - - - - -	6.911	6.915	.003*	.011*
3257	End Clearance				
	13th Stage Compressor Air Sealing				
	Ring Bushing - - - - -	.398	.402		
	Exit Compressor Stator - - - - -	.404	.412	.002	.016

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3258	13th Stage Compressor Air				
	Sealing Ring Bushing - - - - -	.299	.300		
	No. 4 Bearing Air Sealing				
	Ring - - - - -	.300	.302	.000	.005
3259	End Clearance				
	13th Stage Compressor Air				
	Sealing Ring Bushing - - - - -	.182	.184		
	Exit Compressor Stator - - - - -	.176	.182	.000*	.008*
3261	Pin - - - - -	.1245	.1246		
	No. 4 Bearing Front Air Sealing				
	Ring - - - - -	.1235	.1245	.0000*	.0011T*
3264	No. 4 Bearing Connector - - - - -	.450	.451		
	Nozzle - - - - -	.452	.455	.001*	.005*
3265	Diffuser Case - - - - -	15.404	15.410		
	No. 4 Bearing Ring - - - - -	15.410	15.420	.000**	.016T**
3266	No. 4 Bearing Air Seal Radial				
	Clearance (PN 4077319 Prior				
	to Change J) (Listed Front to				
	Rear)				
	No. 4 Bearing Air Seal - - - - -	10.613	10.625		
	Sealing Ring - - - - -	10.628	10.632	.0015**	.0095**
	No. 4 Bearing Air Seal - - - - -	10.213	10.225		
	Sealing Ring - - - - -	10.238	10.242	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.813	9.825		
	Sealing Ring - - - - -	9.838	9.842	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.413	9.425		
	Sealing Ring - - - - -	9.438	9.442	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	9.013	9.025		
	Sealing Ring - - - - -	9.038	9.042	.0065**	.0145**
	No. 4 Bearing Air Seal - - - - -	8.613	8.625		
	Sealing Ring - - - - -	8.638	8.642	.0065**	.0145**
3266	No. 4 Bearing Air Seal Radial				
	Clearance (PN 4077319				
	Change J and up) (Listed				
	Front to Rear)				
	No. 4 Bearing Air Seal - - - - -	10.613	10.625		
	Sealing Ring - - - - -	10.627	10.633	.001**	.010**
	No. 4 Bearing Air Seal - - - - -	10.213	10.225		
	Sealing Ring - - - - -	10.237	10.243	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.813	9.825		
	Sealing Ring - - - - -	9.837	9.843	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.413	9.425		
	Sealing Ring - - - - -	9.437	9.443	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	9.013	9.025		
	Sealing Ring - - - - -	9.037	9.043	.006**	.015**
	No. 4 Bearing Air Seal - - - - -	8.613	8.625		
	Sealing Ring - - - - -	8.637	8.643	.006**	.015**

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3267	Front No. 4 Bearing Air Sealing Ring - - - - -	11.280	11.284		
	Diffuser Case - - - - -	11.278	11.280	.000**	.006T**
3268	Rear Compressor Driveshaft - -	9.819	9.821		
	No. 4 Bearing Air Seal (PN 4074849) - - - - -	9.831	9.832	.010T**	.013T**
3268	Rear Compressor Driveshaft - -	9.8165	9.8215		
	No. 4 Bearing Air Seal (PN 4080807) - - - - -	9.8355	9.8365	.014T*	.020T*
3269	No. 4 Bearing Air Sealing Ring - - - - -	7.663	7.667		
	No. 4 Bearing Air Sealing Ring Flange - - - - -	7.656	7.660	.003T*	.011T*
3271	Compressor Stator Vane - - - - -	.3500	.3520		
	Compressor Stator Bearing - - -	.3525	.3535	.0005*	.0035*
3272	Compressor Stator Bearing - - -	.681	.683		
	Compressor Stator Shroud - - -	.688	.692	.005*	.011*
3273	Inner Shroud - - - - -	.2480	.2510		
	Variable Vane - - - - -	.2445	.2465	.0015	.0075
3281	1st Stage Inner Air Sealing Ring - - - - -	14.311	14.315		
	1st Stage Turbine Stator Support - - - - -	14.307	14.311	.000*	.008T*
3282	Side Clearance				
	No. 4 Bearing Seal Air Supply Tube Seal Ring - - - - -	.056	.057		
	Ferrule - - - - -	.059	.061	.002*	.005*
3284	Air Sealing Radial Clearance				
	6th Stage Air Seal - - - - -	17.374	17.388		
	Sealing Ring (Front) - - - - -	17.386	17.414	.001T*	.020*
	6th Stage Air Seal - - - - -	17.274	17.288		
	Sealing Ring (Rear) - - - - -	17.286	17.314	.001T*	.020*
3288	1st Stage Air Sealing Ring Support - - - - -	15.365	15.375		
	1st Stage Air Sealing Turbine Sealing Ring - - - - -	15.357	15.367	.018*	.002T*
3289	Front Turbine Case - - - - -	.342	.345		
	1st Stage Turbine Vane Sleeve	.337	.338	.004*	.008*
3290	1st Stage Turbine Vane - - - - -	.355	.359		
	1st Stage Turbine Vane Sleeve	.337	.338	.017*	.022*
3291	1st Stage Turbine Sleeve - - -	.2485	.2495		
	1st Stage Turbine Vane Bolt -	.2485	.2495	.001T*	.001*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3292	Combustion Chamber, Assy of - Bushing, Sleeve, Combustion Chamber - - - - -	.5725	.5745		
		.5745	.5748	.0023T*	.000*
3293	Bushing, Sleeve, Combustion Chamber - - - - -	.385	.391		
	Front Turbine Case Sleeve - - -	.379	.380	.005*	.012*
3294	Axial Fit Combustion Chamber, Assy of Front Turbine Case Sleeve - - -			.058T*	.035*
3296	Gap No. 4 Bearing Seal Air Supply Tube Seal Ring at 1.551 BSC	.005	.015		
	Air Sealing Ring - - - - -	1.551	1.554	.005*	.024*
3299	Side Clearance No. 3 Bearing Seal Ring (2 Rings) - - - - -	.305	.308		
	Seal Ring Holder - - - - -	.3435	.3465	.0355*	.0415*
3301	Shoulder Pin, Headless - - - - - 1st Stage Turbine Stator Support - - - - -	.1965	.1975		
		.2015	.2025	.0040*	.0060*
3302	Shoulder Pin, Headless - - - - - No. 4 Bearing Seal Front Support - - - - -	.1965	.1975		
		.2020	.2030	.0045*	.0065*
3303	Shoulder Pin, Headless - - - - - Diffuser Case - - - - -	.2000	.2010		
		.1985	.1995	.0005T*	.0025T*
3304	Shoulder Pin, Headless - - - - - No. 4 Bearing Air Sealing Flange - - - - -	.3115	.3116		
		.3135	.3145	.019*	.030*
3305	Shoulder Pin, Headless - - - - - Diffuser Case - - - - -	.2492	.2493		
		.2482	.2492	.000*	.011T*
3308	No. 3 Front Bearing Face Seal (Seal Face to Extreme End of Housing) - - - - -			1.265*	1.275*
3309	No. 3 Rear Bearing Face Seal (Seal Face to Extreme End of Housing) - - - - -			1.345*	1.355*
3312	Side Clearance Bracket - - - - -	.282	.284		
	Bearing - - - - -	.279	.281	.001*	.005*
3318	Helical Compression Spring Seat - - - - -	.223	.226		
	No. 3 Bearing Seal Pin - - - - -	.220	.221	.002*	.006*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3320	1st Stage Turbine Air Sealing Ring - - - - -	12.182	12.185		
	No. 4 Bearing Front Seal Support - - - - -	12.170	12.175	.007T*	.015T*
3321	Rear Compressor Driveshaft - -	5.9170	5.9190		
	By Selection - - - - -	5.9370	5.9384	.0180T*	.0214T*
3325	Turbine Hub - - - - -	6.336	5.339		
	Rear Compressor Driveshaft - -	6.344	6.345	.005T*	.009T*
3332	Igniter Mounting Distance By Selection - - - - -			2.120*	2.150*
3334	Connecting Link - - - - -	.5625	.5630		
	Bearing - - - - -	.5620	.5625	.0000*	.0010*
3335	Synchronizing Ring - - - - -	.300	.301		
	Bearing - - - - -	.3012	.3017	.0002T*	.0017T*
3336	Compressor Stator Arm - - - - -	.188	.189		
	Bearing - - - - -	.191	.193	.002*	.005*
3337	Bolt - - - - -	.1885	.1890		
	Bearing - - - - -	.1895	.1900	.0005*	.0015*
3338	Bracket - - - - -	.1900	.1910		
	Bolt - - - - -	.1885	.1890	.0010*	.0025*
3339	End Clearance Bracket				
	Bearing - - - - -			.008*	.007T*
3341	Half Pin - - - - -	.102	.105		
	Arm and Bearing - - - - -	.109	.115	.004*	.013*
3342	Bearing - - - - -	.340	.341		
	Arm - - - - -	.341	.342	.000*	.002*
3344	Bearing - - - - -	.9993	.9998		
	Rear Compressor Stator Linkage Arm Bracket - - - - -	.9999	1.0004	.0001*	.0011*
3345	Compressor Synchronizing Arm and Compressor Stator Linkage Arm - - - - -	.6560	.6565		
	Bearing - - - - -	.6557	.6562	.0002*	.0008*
3346	Bearing - - - - -	.2495	.2500		
	Bolt - - - - -	.2483	.2493	.0002*	.0017*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3347	End Clearance				
	Bearing - - - - -	.341	.343		
	Link - - - - -	.344	.346	.001*	.005*
3348	Link - - - - -	.2494	.2501		
	Bolt - - - - -	.2483	.2493	.0001*	.0018*
3356	End Clearance				
	Bearing - - - - -	.279	.281		
	Link - - - - -	.282	.284	.001*	.005*
3359	No. 2 Bearing Face Seal Rear Height (Seal Face to Extreme End of Housing) - - - - -			1.290*	1.300*
3361	Bracket, Angle, Assy of Tube-Pressure - - - - -	.2815	.2825		
	Flanged Sleeve Bushing - - - - -	.2830	.2840	.0005*	.0025*
3363	4th Stage Compressor Stator Segment Gap - - - - -			.026*	.040*
3364	5th Stage Compressor Stator Segment Gap - - - - -			.029*	.043*
3365	6th Stage Compressor Stator Segment Gap - - - - -			.033*	.047*
3366	7th, 8th, 9th Stage Stator Gap - - - - -		.072		
	Apply When Stators are Loaded Forward, Prior to and During Torquing of Rail Bolts				
3368	Inner Shroud - - - - -	.3550	.3580		
	Inner Shroud Bearing - - - - -	.3530	.3545	.0005*	.0050*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3369	Inner Shroud - - - - -	.1905	.1925		
	Bolt - - - - -	.1885	.1895	.001*	.004*
3370	Inner Shroud Bearing - - - - -	.247	.249		
	Variable Vane - - - - -	.2445	.2465	.0005*	.0045*
3371	Drum Rotor Disk - - - - -	5.958	5.963		
	Heat Shield - - - - -	5.965	5.970	.002T*	.012T*
3372	Rear Compressor Drum Rotor				
	Disk Compressor 6th Stage				
	Disk and Hub - - - - -			.000**	.018**
3373	4th, 5th, 6th, 7th Stage Lock				
	Ring - - - - -			.030*	.100*
3375	7th Stage Compressor Stator				
	Hook (Front) - - - - -	.097	.103		
	7th Stage Compressor Shroud ID				
	Foot - - - - -	.094	.096	.001*	.009*
	7th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
	7th Stage Compressor Stator ID				
	Foot - - - - -	.074	.076	.001*	.009*
3376	8th Stage Compressor Stator				
	Hook (Front) - - - - -	.117	.123		
	8th Stage Compressor Shroud ID				
	Foot - - - - -	.114	.116	.001*	.009*
	8th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
	8th Stage Compressor Shroud ID				
	Foot - - - - -	.074	.076	.001*	.009*
3377	9th Stage Compressor Stator				
	Hook (Front) - - - - -	.137	.143		
	9th Stage Compressor Shroud ID				
	Foot - - - - -	.134	.136	.001*	.009*
	9th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
	9th Stage Compressor Shroud ID				
	Foot - - - - -	.074	.076	.001*	.009*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3378	10th Stage Compressor Stator				
	Hook (Front) - - - - -	.097	.103		
	10th Stage Compressor Shroud				
	ID Foot - - - - -	.093	.096	.001*	.010*
	10th Stage Compressor Stator				
	Hook (Rear) - - - - -	.077	.083		
3379	10th Stage Compressor Shroud				
	ID Foot - - - - -	.073	.076	.001*	.010*
	11th Stage Compressor Stator				
	Hook (Front) - - - - -	.117	.123		
	11th Stage Compressor Shroud				
	ID Foot - - - - -	.113	.116	.001*	.010*
3380	11th Stage Compressor Stator				
	Hook (Rear) - - - - -	.067	.073		
	11th Stage Compressor Stator				
	ID Foot - - - - -	.063	.066	.001*	.010*
	12th Stage Compressor Stator				
	Hook (Front) - - - - -	.077	.083		
3381	12th Stage Compressor Shroud				
	ID Foot - - - - -	.073	.076	.001*	.010*
	12th Stage Compressor Stator				
	Hook (Rear) - - - - -	.087	.093		
	12th Stage Compressor Shroud				
	ID Foot - - - - -	.083	.086	.001*	.010*
3382	7th Stage Compressor Damper				
	Pocket - - - - -	.093	.107		
3383	7th Stage Damper Spring - - - -	.128	.139	.021T*	.046T*
	8th Stage Compressor Damper				
3384	Pocket - - - - -	.093	.107		
	8th Stage Damper Spring - - - -	.128	.139	.021T*	.046T*
3385	9th Stage Compressor Damper				
	Pocket - - - - -	.093	.100		
3386	9th Stage Damper Spring - - - -	.128	.136	.021T*	.048T*

Table 1. Fits and Clearances (continued)

(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3384	10th Stage Compressor Damper				
	Pocket - - - - -	.087	.107		
	10th Stage Damper Spring - - -	.128	.139	.021T*	.046T*
3385	11th Stage Compressor Damper				
	Pocket - - - - -	.087	.107		
	11th Stage Damper Spring - - -	.128	.139	.021T*	.046T*
3386	12th Stage Compressor Damper				
	Pocket - - - - -	.087	.105		
	12th Stage Damper Spring - - -	.123	.134	.016T*	.041T*
3387	Gap between Rigid Connecting Link, Bleed Valve Strap and Rigid Connecting Link, Bleed Valve Strap to be .010 min through full Start Bleed Actuator Movement				
3388	Radial Fit				
	9th Stage Stator - - - - -	21.328	21.332		
	10th Stage Stator - - - - -	21.328	21.332	.004*	.004T*
3389	Axial gap between 9th Stage Stator and 10th Stage Stator - - - - -			.002*	.018*
3390	Bell Crank - - - - -	.6552	.6557		
	Bearing - - - - -	.6557	.6562	.001T*	.0000*
3391	End Clearance				
	Bearing - - - - -	.341	.343		
	Link - - - - -	.344	.346	.001*	.005*
3392	Link - - - - -	.1895	.1900		
	Bolt - - - - -	.1885	.1890	.0005*	.0015*
3393	Bearing - - - - -	.1895	.1900		
	Bolt - - - - -	.1885	.1890	.0005*	.0015*
3394	Bearing - - - - -	.5620	.5625		
	Bell Crank - - - - -	.5615	.5620	.0001T*	.0000*
3395	End Clearance				
	Bearing - - - - -	.279	.281		
	Link - - - - -	.282	.284	.001*	.005*
3396	Diffuser Case - - - - -	26.890	26.894		
	Front Turbine Case - - - - -	26.878	26.882	.016T*	.008T*
3397	Inner Brush Seal - - - - -	19.626	19.630		
	Combustion Chamber - - - - -	19.602	19.610	.028T*	.016T*
3398	Outer Brush Seal - - - - -	25.004	25.008		
	Combustion Chamber - - - - -	24.984	24.992	.024T*	.012T*

Table 1. Fits and Clearances (continued)
(See FO-1.)

Ref No.	Name	Dimensions for Ref		Limits	
		Min	Max	Min	Max
3400	4th Stage Blade - - - - -	25.982	26.019		
	Compressor Case and Duct - - -	26.098	26.146	.0395*	.0820*
3401	5th Stage Blade - - - - -	24.974	25.011		
	Compressor Case and Duct - - -	25.076	25.124	.0325*	.0750*
3402	6th Stage Blade - - - - -	24.156	24.192		
	Compressor Case and Duct - - -	24.226	24.275	.0170*	.0595*
3405	9th Stage Blade - - - - -	21.784	21.815		
	Compressor Case and Stator - -	21.882	21.921	.0330*	.0685*
3406	10th Stage Blade - - - - -	20.872	20.903		
	Compressor Case and Stator - -	20.962	20.993	.0295*	.0605*
3407	11th Stage Blade - - - - -	20.114	20.145		
	Compressor Case and Stator - -	20.161	20.207	.0080*	.0465*
3408	12th Stage Blade - - - - -	19.420	19.451		
	Compressor Case and Stator - -	19.474	19.498	.0115*	.0390*
3409	13th Stage Blade - - - - -	18.890	18.921		
	Compressor Case and Stator - -	18.941	18.965	.0100*	.0375*
3411	7th Stage Blade - - - - -	23.422	23.459		
	Compressor Case and Duct - - -	23.535	23.553	.0380*	.0655*
3412	8th Stage Blade - - - - -	22.587	22.618		
	Compressor Case and Stator - -	22.701	22.738	.0415*	.0755*

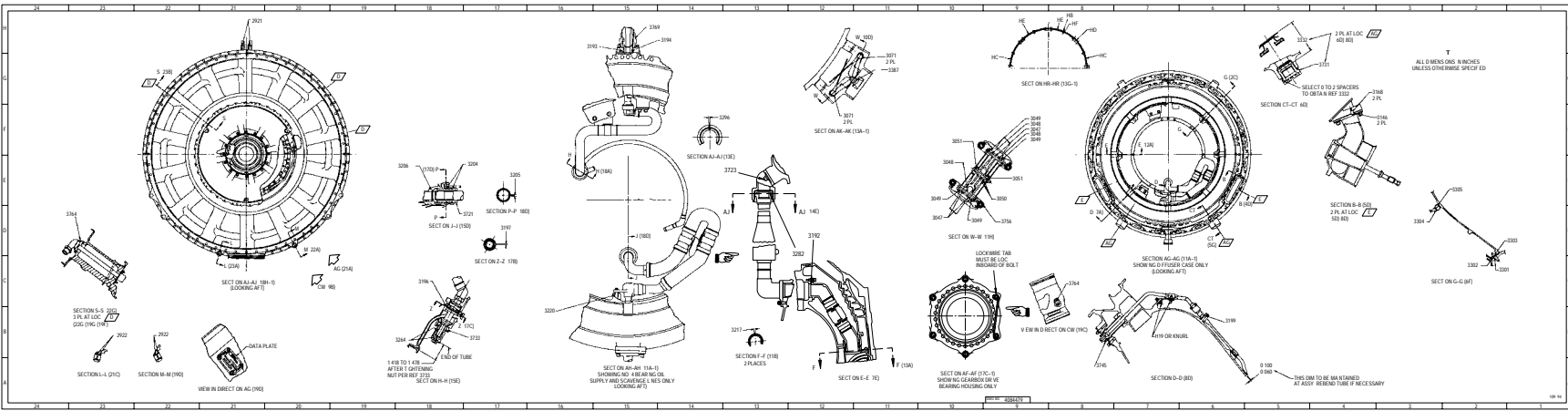
Table 2. Mounting Distances and Backlash Checks for Bevel Gears
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3601	Gear backlash to be checked with high rotor positioned aft.		
	a) Core engine module shall be nose up with high rotor weight supported by No. 3 bearing.		
	b) Remove axial play in towershaft bearing by loading pinion gear radially outward with 20 to 25 pounds.		
	c) Obtain backlash by measuring length of arc of rotation of upper towershaft coupling at 2.067 inches radius.		
	d) Arc of rotation to be -----	.058*	.081*
	Arc includes rotation of towershaft coupling relative to towershaft gear.		

Table 3. Spring Pressures
(See FO-1.)

Ref No.	Name	Limits	
		Min	Max
3951	No. 2 and No. 3 Bearing Seal Spring		
	At 1.664 in. -----	.421	.504
	At 1.211 in. -----	1.768	1.932
3952	Borescope Plug Spring		
	At .800 in. -----	6.125	7.125
3953	No. 4 Bearing Front and Rear Seal Springs		
	At .880 in. -----	1.875	2.000
	At .910 in. -----	1.781	1.906
3956	Spring Rate: 1 lb 11 oz to 2 lbs 6 oz at .040 length. Maximum Spring Rate 24 lb/in.		
3957	Spring Rate: 3 lbs 1.5 oz to 3 lbs 11.5 oz at .040 length. Maximum Spring Rate 31 lb/in.		





FO-1. Core Engine Module - Dimensional Limits (Sheet 2 of 4)



